

REPORT

ON THE OCCURRENCE OF THE NEOTROPICAL OTTER (*Lontra longicaudis* OLFERS, 1818) IN THE ENVIRONMENTAL PROTECTION AREA OF LAGOA SANTA KARST AND SURROUNDINGS, SOUTHEASTERN BRAZIL

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Abstract: The Dry Diagonal is a South American domain is characterized by the predominance of open area habitats and rainfall restriction. The distribution of the Neotropical otter (*Lontra longicaudis*) in the region is very misunderstood. Herein we present confirmed recent records of *L. longicaudis* in Environmental Protection Area (EPA) of Lagoa Santa Karst and surroundings, Minas Gerais state, easternmost Cerrado of Dry Diagonal in southeastern Brazil. Between January 2018 and November 2020, vestiges of *L. longicaudis* (feces, mucus, and footprints) were found in five sites in Lagoa Santa and Funilândia municipalities. Those sites are distributed in restriction protection conservation unit (Sumidouro State Park), sustainable use conservation unit (EPA Lagoa Santa Karst), and outside the protected areas. We comment about conservation aspects of the species in the studied area.

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INTRODUCTION

The Neotropical otter *Lontra longicaudis* (Olfers, 1818) is widely distributed throughout Neotropical region, from Mexico to Buenos Aires Province in Argentina (Larivière, 1999; Rodrigues et al., 2013). However, within this range, the occurrence of the species is not fully understood in the northern part of a domain characterized by marked seasonal climate variation and rainfall restriction known as the South American ‘Dry Diagonal’ or ‘Diagonal of Open Areas’ (Rheingantz et al., 2014; Rosas-Ribeiro et al., 2017). The northern Dry Diagonal extends throughout central and northeastern Brazil and is occupied by the biomes Cerrado and Caatinga (Zanella, 2011). In relation to the indications of *L. longicaudis* distribution in such area, the available literature content is high variable. As example, some distribution maps from late 1990’s did not indicate the species occurrence in easternmost Cerrado and northeastern Brazil (including Caatinga and northern Atlantic Forest) (Emmons and Feer, 1997; Larivière,

1999). More recent works represented the species distribution with gaps of variable sizes in northeastern Brazil, with the addition of scattered records in the coastal northeast (Astúa et al., 2010; Rodrigues et al., 2013; Rheingantz et al., 2014; Rosas-Ribeiro et al., 2017). Rodrigues et al. (2013) also extend the gap area to central Minas Gerais state, within the Cerrado domain. On the other hand, Rheingantz and Trinca (2015) represented the distribution of *L. longicaudis* as continuous throughout Brazilian Dry Diagonal. In summary, the distribution of *L. longicaudis* in Brazilian Dry Diagonal is still undefined due to scarce information based on confirmed records for that region.

Lontra longicaudis is globally classified as Near Threatened, with decreasing population trend (Rheingantz and Trinca, 2015). In Brazil, the species is also considered as Near Threatened, and it is subjected to several impacts such as the loss of habitat (deforestation of riparian zones), conflicts with fishing and fish farms, pollution, and the expansion of hydropower plants. However, when considered only the Brazilian Atlantic Forest, the species is considered as vulnerable mainly due to the degradation of riparian forests and the decreased protection of these habitats due to changes to the Brazilian Forest Code (Rodrigues et al., 2013). In Minas Gerais state, southeastern Brazil, *L. longicaudis* is classified as Vulnerable (COPAM, 2010) and few reliable recent records are available for the species. The Lagoa Santa Karste region, located in the central region of Minas Gerais, has a great historical importance as the “birth place” of mammalogy (including mammal paleontology) in Brazil through the studies of the Danish researcher Peter W. Lund, conducted between 1835 and 1844 (Leite and Costa, 2002). Lund referred to *L. longicaudis* (as *Lutra brasiliensis*) as part of the extant mammalian fauna at that time (Lund, 1842; compiled with revised taxonomy in Leite and Costa, 2002). Afterwards, few large- to medium-sized mammal surveys were conducted in Lagoa Santa region. Herrmann et al. (1998) inventoried the mammals from Environmental Protection Area (EPA) of Lagoa Santa Karst and did not record *L. longicaudis*. Later, Trolle et al. (2002) performed a survey of large- to medium-sized mammal in Caiuaia Farm and cited the occurrence of the species only through information obtained by interviews.

The EPA Lagoa Santa Karst occupies an area of 35,600 hectares distributed in seven municipalities located in a transitional area of Cerrado and Atlantic Forest biomes in central Minas Gerais state, southeastern Brazil. The EPA is inserted in the Metropolitan Region of Belo Horizonte, composed by the Minas Gerais capital Belo Horizonte and other 34 neighbouring municipalities which account for a population of more than 6 million people (IBGE, 2020). Despite constituting itself a conservation unit, the EPA Lagoa Santa Karst comprises other units, including the Sumidouro State Park, the Cerca Grande State Park, the Experiência da Jaguará Natural Monument, and others. Herein we provided current records of *L. longicaudis* in EPA Lagoa Santa Karste and surroundings, obtained through encounters of the characteristic vestiges of the species.

METHODS

A survey of mammals in EPA Lagoa Santa Karst and surroundings was conducted from January 2018 to November 2020 as part of the Karst Project. The hydrographic elements in the studied area comprise karstic lagoons, streams, and two main rivers. The vegetation around water bodies comprises Seasonal Semi-Deciduous Forest fragments (streams and rivers) and marginal palustrine belts (lagoons) (Herrmann et al., 1998). For the verification on *L. longicaudis* occurrence in the study area, we performed random field trips to 20 sites (nine lagoons and 11 stretches of streams and rivers), which were selected based on the presence of arboreal and/or dense herbaceous

marginal vegetation, habitats suitable for the occurrence of *L. longicaudis* shelters and resting sites (Waldemarin and Colares, 2000; Quadros and Monteiro-Filho, 2002; Quintela et al., 2011). The areas of the sample lagoons range from 1.21 to 254 hectares and its margins were checked by foot and kayak. Smaller lagoons (20 hectares or less) were fully encircled while in the larger ones some points of marginal areas were selected due to the accessibility. In relation to rivers and streams, stretches ranging from 0.8 to 2 km long were checked by foot, comprising 11.3 km of sampled riverbank. Each sampled site was visited at least twice during the sampling period, covering the rainy and dry periods of the year. The records of *L. longicaudis* were obtained through the identification of characteristic vestiges (feces, mucus, and footprints). Samples of feces and mucus were collected, labelled, and kept frozen for ecotoxicological and genetic analyses to be performed as part of the project Neotropical Otter Conservation Program in Minas Gerais. All record sites were geo-referenced (Datum WGS84).

RESULTS AND DISCUSSION

We found vestiges of *L. longicaudis* in five from the 20 sites visited in the present study. Three sites are located within the perimeter of EPA Lagoa Santa Karst, and the other two are located at northern and southeastern surroundings of the EPA. Within the EPA, record sites comprised: (1) limestone outcrops at the bank of Sumidouro Lagoon (19°32'24"S, 43°56'28"; 649 m a.s.l.) within Sumidouro State Park, Lagoa Santa municipality; (2) under road drainage pipe linked to palustrine wetlands contiguous to Sangradouro Lagoon (19°34'39"S, 43°56'24"; 682 m a.s.l.), urban area of 'Lapinha' district, Lagoa Santa municipality; (3) under bridge in stretch with preserved riparian forest in Jacques stream (19°33'35"S, 43°55'10"; 644 m a.s.l.), 'Campinho de Baixo' district, Lagoa Santa municipality. At the surroundings of EPA Lagoa Santa Karst, record sites comprised: (1) unnamed lagoon with abundant emergent and floating vegetation and wooded banks in the immediate surroundings of EPA northern limits (19°24'41"S, 43°01'23"; 660 m a.s.l.; ca. 160 m from EPA limits), Funilândia municipality; (2) under bridge in a highly structured riparian forest of unnamed stream (19°42'02"S, 43°52'20"; 682 m a.s.l.), tributary of Ribeirão da Mata creek, Ribeirão da Mata locality, Lagoa Santa municipality (about 4 km from EPA southeastern limits) (Fig. 1,2).

Our study adds reliable records on the current occurrence of *L. longicaudis* in the easternmost Cerrado Brazilian Dry Diagonal, a region where the distribution of the species is little understood. In EPA Lagoa Santa Karst and surroundings, vestiges of *L. longicaudis* were found in urban and well-conserved areas inside strictly protected areas (Sumidouro State Park) and rural areas, but always associated to sites with high structured palustrine/riparian vegetation. The Environmental Protection Area is adopted by Brazilian government as a category of conservation unit of sustainable use, which implies that human settlements and the development of economic activities compatible with the environmental conservation are allowed. Meanwhile, considering such flexibility in relation to the property and use of the land, conflicts concerning the conservation of natural resources are likely to occur in EPAs (Cabral & Souza, 2005). The region of EPA Lagoa Santa Karst and surroundings is passing through and accelerated process of urbanization, which represents a serious threat to *L. longicaudis* remaining populations due to the loss and degradation of habitats. Many water bodies in the studied area had their riparian and palustrine vegetation suppressed or high altered. According to the MapBiomes (<https://mapbiomas.org/>), the counties included in our study area experienced a loss of the 1,975 hectares of original forest coverage (distributed mainly along water bodies) in the last three decades.

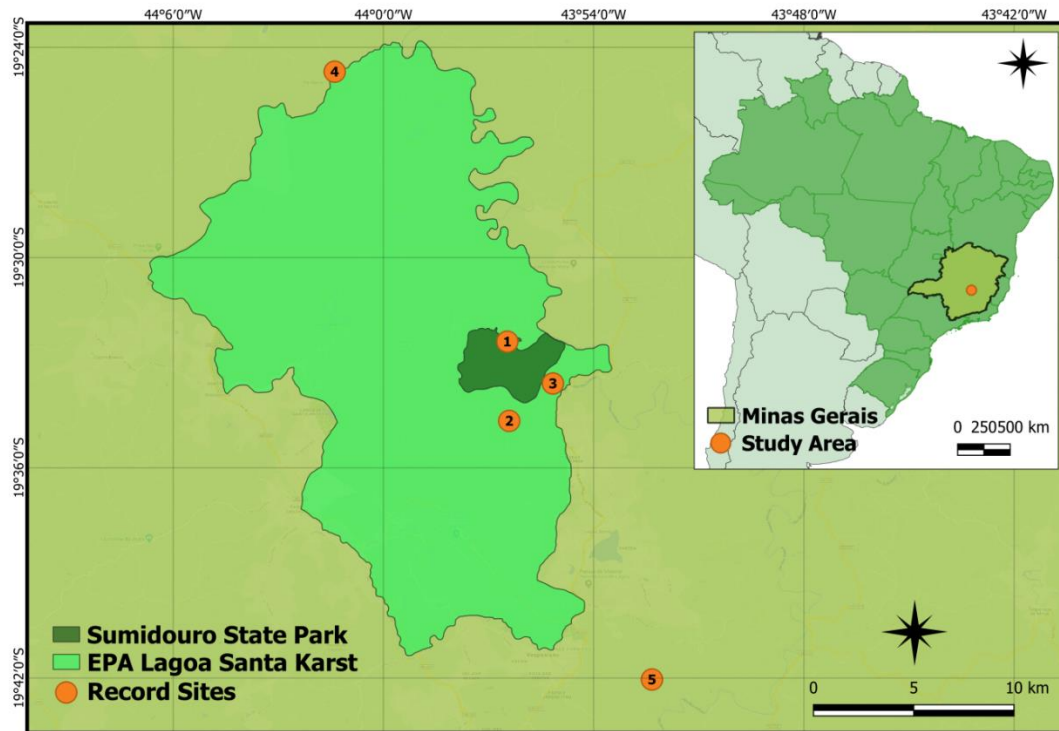


Figure 1. Location of Environmental Protection Area (EPA) of Lagoa Santa Karst and Sumidouro State Park at Minas Gerais State, southeastern Brazil, and the record sites of *Lontra longicaudis*.

Another serious threat is the potential risk of water contamination through limestone mining, industrial and domestic waste. It is known that the occurrence of *L. longicaudis* is conditioned to dense vegetated habits, which provide spatial resources for den and resting sites (Alarcon and Simões-Lopes, 2003; Carrilo-Rubio and Láfon, 2004). A recent study also demonstrated that *L. longicaudis* is tolerant to moderate levels of eutrophication, but a condition with very low water quality is incompatible with the species occurrence (Almeida and Pereira, 2017). Therefore, the conservation of riparian/palustrine vegetation and water quality in the aquatic habitats of EPA Lagoa Santa Karst and vicinities is essential for the maintenance of *L. longicaudis* in the region.

While a considerable part of lacustrine, swampy and lesser fluvial systems (streams, creeks) still keep highly or moderately structured habitats, the major hydrographic element in EPA Lagoa Santa Karst, the Rio das Velhas, has been long-term affected by human activities. The stretch of Rio das Velhas that crosses the Metropolitan Region of Belo Horizonte is acutely damaged in its structure (including the deforestation of riparian zones) and water quality, showing clear signs of eutrophication (high levels of total nitrogen and phosphorous, high conductivity and turbidity, high percentage of organic matter in sediment, low levels of dissolved oxygen) and low fish species richness (Pompeu et al., 2005). Such condition of habitat degradation is not favourable for the occurrence of *L. longicaudis*, considering the species requirement for riparian vegetation for shelters and resting sites (Waldemarin and Colares, 2000; Quadros and Monteiro-Filho, 2002; Quintela et al., 2011), the decrease on prey detection caused by the increase of water turbidity, and the decrease of feeding resources due to the loss of aquatic biodiversity (Almeida and Pereira, 2017). The efforts made so far did not detected the presence of *L. longicaudis* in Rio das Velhas around EPA Lagoa Santa Karst, but considering the historical records in the river valley

(Lund, 1842), intensive searches will be conducted to better determine if the species still persists in such system.



Figure 2. Footprints and mucus (insert) of *Lontra longicaudis* recorded in Ribeirão da Mata creek affluent, Lagoa Santa municipality, Minas Gerais state, southeastern Brazil.

The conservation of the Neotropical otter in EPA Lagoa Santa Karst and surroundings is quite challenging. While some localities such as Sumidouro State Park and few other strict protection conservation units provide an effective basis for *L. longicaudis* conservation (habitat quality and inspection), the same is completely vulnerable to impacts outside those areas. Although EPAs represents an advance of Brazilian government in relation to the applicable restrictions on the land use in areas with relevant natural resources (including biodiversity) (Cabral and Souza, 2005), many conservation units are still deficient concerning the inspection on human interference with habitats and wildlife. Nevertheless, due to human occupancy and the flexibility on the use of natural resources, the EPA is a conservation unit category which needs further inspection efforts aiming to prevent environmental impacts, especially those related to deforestation (loss of habitats) and hunting. A study conducted in eastern Minas Gerais state identified causes of death of *L. longicaudis* related to hunting, entanglement in fishnet, domestic dog attacks, and roadkill (Quintela et al., 2012). Thus, *L. longicaudis* could also be subjected to such impacts in EPA Lagoa Santa Karst and surroundings. Finally, aiming for an effective conservation of the Neotropical otter in EPA Lagoa Santa Karst, we recommend:

- (1) a vigorous inspection on hunting and deforestation by environmental agencies;
- (2) adoption of a program for control of domestic dogs in natural environments;

- (3) identification of critical points for wildlife roadkill and adoption of mitigating procedures (traffic signs, containment fences and wildlife passages); and
 (4) development of Environment Education activities.

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RÉSUMÉ

DE L'OCCURRENCE DE LA LOUTRE NÉORTROPICALE (*Lontra longicaudis*, OLFERS, 1818) DANS L'AIRE DE PROTECTION ENVIRONNEMENTALE CARSTE DE LAGOA SANTA ET ALENTOURS, BRÉSIL

La Diagonale Sèche est un domaine de l'Amérique du Sud caractérisé par la prédominance d'habitats d'espaces ouverts et de la restriction de pluies. La distribution de la loutre Néotropical (*Lontra longicaudis*) dans cette région est très peu comprise. Nous présentons ici des registres récents confirmés de *L. longicaudis* dans l'Aire de Protection Environnementale (APA) du Carste de Lagoa Santa et ses alentours, dans état de Minas Gerais, extrémité de l'est de la Diagonale Sèche du sud-est du Brésil. Entre janvier 2018 et novembre 2020, des traces de l'occurrence de *L. longicaudis* (des fèces, du mucus, des foulées) ont été retrouvées dans cinq endroits dans les municipes de Lagoa Santa et Funilândia. Ces endroits sont distribués en: Unité de conservation de protection intégrale (Parque Estadual do Sumidouro), Unité de conservation d'usage soutenable (APA) Carste de Lagoa Santa et hors des aires protégées. Nous commentons sur des aspects de la conservation de l'espèce dans l'aire de l'étude.

RESUMEN

SOBRE LA PRESENCIA DE NUTRIA NEOTROPICAL (*Lontra longicaudis*, OLFERS, 1818) EN EL ÁREA DE PROTECCIÓN AMBIENTAL CARSTE DE LAGOA SANTA KARST Y ALREDEDORES, BRASIL

Diagonal Seca es un dominio de América del Sur caracterizado por el predominio de hábitats de área abierta y restricción de lluvias. La distribución de la nutria neotropical (*Lontra longicaudis*) en esta región es muy poco conocida. Presentamos aquí registros recientes de *L. longicaudis* en el Área de Protección Ambiental (APA) de la Carste de Lagoa Santa y alrededores, estado de Minas Gerais, extremo este de la Diagonal Seca del sudeste de Brasil. Entre enero de 2018 y noviembre de 2020, se encontraron rastros de la ocurrencia de *L. longicaudis* (heces, moco y huellas) en cinco ubicaciones de los municipios de Lagoa Santa y Funilândia. Estos sitios se distribuyen en una unidad de conservación de protección integral (Parque Estatal Sumidouro), unidad de conservación para uso sostenible (APA Carste de Lagoa Santa), y áreas protegidas exteriores. Comentamos aspectos de la conservación de la especie en el área de estudio.

RESUMO

SOBRE A OCORRÊNCIA DA LONTRA NEOTROPICAL (*Lontra longicaudis* OLFERS, 1818) NA ÁREA DE PROTEÇÃO AMBIENTAL CARSTE DE LAGOA SANTA KARST E ARREDORES, BRASIL

A Diagonal Seca é um domínio da América do Sul caracterizado pela predominância de habitats de áreas abertas e restrição de chuvas. A distribuição da lontra neotropical (*Lontra longicaudis*) nesta região é muito pouco compreendida. Apresentamos aqui registros recentes de *L. longicaudis* na Área de Proteção Ambiental (APA) do Carste de Lagoa Santa e arredores, estado de Minas Gerais, extremidade leste da Diagonal Seca do sudeste do Brasil. Entre janeiro de 2018 e novembro de 2020, vestígios da ocorrência de *L. longicaudis* (fezes, muco e pegadas) foram encontrados em cinco locais nos municípios de Lagoa Santa e Funilândia. Estes locais estão distribuídos em unidade de conservação de proteção integral (Parque Estadual do Sumidouro), unidade de conservação de uso sustentável (APA Carste de Lagoa Santa), e fora das áreas protegidas. Nós comentamos aspectos da conservação da espécie na área de estudo.