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Record of the Giant Otter, *Pteronura brasiliensis* (Zimmermann, 1780), (Carnivora: Mustelidae) in a fragmented landscape of Maranhão state, Brazil

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Abstract: Three individuals of the endangered Giant Otter (*Pteronura brasiliensis*) were sighted in a small river in the municipality of Buriticupu, Maranhão state, Brazil. Information on the distribution of this species is contradictory, with some authors ignoring while others confirming the presence of this species in this state, but only in the Rebio do Gurupi region. We document the presence of this species in Maranhão state, outside the Rebio do Gurupi area. Our record of *P. brasiliensis* expands the known regional distribution 290 km eastwards from the closest previously known occurrence.

Key words: Amazon; distribution range; endangered species; Buriticupu; Pindaré River; new record

The conservation status of species requires data on population size, distribution, and ecological requirements (IUCN 2015). The Giant Otter, *Pteronura brasiliensis* (Zimmermann, 1780), known in Brazil as "ariranha", is an endemic species of the main South American watersheds (Carter & Rosas 1997; Groenendijk 1998) and one of the largest predators in tropical rainforests and lowland wetlands (Mason & Macdonald 1986). It is the largest of the four Neotropical otters, with the greatest body length of any mustelid, ranging from 1.5 to 1.8 m in males and 1.5 to 1.7 m in females (Mondolfi 1970; Duplaix 1980). The body weight ranges from 26–32 kg for males and 22–26 kg for females (Duplaix 1980). It has diurnal, semi-aquatic and social habits, with groups formed by the reproductive couple and their offspring (Emmons & Feer 1997; Eisenberg & Redford 1999). This species feeds mainly on fish that they catch in the water and eat in the land, but the diet is supplemented with other small vertebrates (Carter & Rosas 1997; Rosas et al. 1999).

Pteronura brasiliensis is considered one of the most endangered species of mammal of South America (Duplaix 1980, 2008; ICMBio 2010), listed as endangered by the IUCN (Duplaix et al. 2008; Groenendijk et al. 2015). It is almost extinct in two countries of its former distribution, and seriously endangered in seven countries. In Brazil, the Giant Otter is listed as vulnerable by the Ministry of Environment (MMA 2014), and it is believed to be extirpated in the states of Minas Gerais, Rio de Janeiro, Santa Catarina, São Paulo and Rio Grande do Sul (Machado et al. 2008). Stable populations occur only in Amazonia and Pantanal (ICMBio 2010). Moreover, relatively little is known about its biology and ecology.

Following the listing of the Giant Otter under CITES in 1973, and the collapse of the international market for carnivore skins, the species has begun to recover in some areas, notably in the Pantanal (Carter & Rosas 1997; Tomas et al. 2000) and in some locations in Peru (Groenendijk & Hajek 2006; Recharte et al. 2010) and Bolivia (Zambrana Rojas 2007). However, populations remain fragmented, and although the threat of commercial hunting has declined, habitat degradation has increased. Distribution information of *P. brasiliensis* is contradictory. Despite recent report asserting that the species is absent in the state of Maranhão (Rodrigues et al. 2013; IUCN 2015), some sources say that the Giant Otter still occurs there, albeit exclusively in the Rebio do Gurupi (in English, Biological Reserve of Gurupi; Oliveira et al. 2007), a protected area located in the northwestern part of the state. Nevertheless, Silva-Júnior (2001) reported its presence in another part of the state, in the Mearim-Grajaú interfluvium. Here, we present additional data on the geographical distribution of *P. brasiliensis* in the Amazon basin and confirm this species' presence in Maranhão but outside of the Rebio do Gurupi.

Figure 1. Giant otter (*Pteronura brasiliensis*) recorded at dos Sonhos River, Maranhão, Brazil.

In February 2012, we performed 120 km of line transect censuses and 3,024 h of camera trap surveys (504 h/camera, with six cameras), to monitor medium and large bodied mammals, totaling 24 d of fieldwork. Six forest fragments (total area 2,544,975 km^2) were sampled in the municipality of Buriticupu, Maranhão (04°28′42.31″ S, 046°19′05.05″ W). As we worked with non-invasive methods, no permits were necessary. This region is predominantly covered by evergreen seasonal forest (Hueck 1972) that has been severely degraded by logging and agricultural projects (Rebelo & Silva 1999). The Pindaré River, a tributary of the Mearim River and with a length of 468 km, is the main watercourse in the region. The region is characterized by a hot and humid climate with annual rainfall of 1,800 mm, and four dry months (Nimer 1979).

Three individuals were detected on 23 February 2012, in dos Sonhos River, a tributary that of the Pindaré River (04°20′50.25″ S, 046°42′45.71″ W; Figure 1). All geographic coordinates were collected using the WGS84 datum. One animal was photographed using a Nikon D7100 with a 400 mm telephoto lens. The identification was confirmed following the morphological descriptions provided by Emmons & Feer (1997) and Reis et al. (2006), and was compared with photographs of other Giant Otters and of the Neotropical Otter, *Lontra longicaudis* (Olfers, 1818), the only other species of otter that occur in the region.

Our new record confirms the presence of *P. brasiliensis* in Maranhão state, as well as outside the Rebio do Gurupi. It is approximately 290 km east of the closest previously known occurrence according to the IUCN (Groenendijk et al. 2015), approximately 30 km from the Rebio do Gurupi and 130 km from the Mearim-Grajaú interfluvium (Silva-Júnior 2001; Oliveira et al. 2007; Figure 2). Despite camera trap efforts, animals were only directly

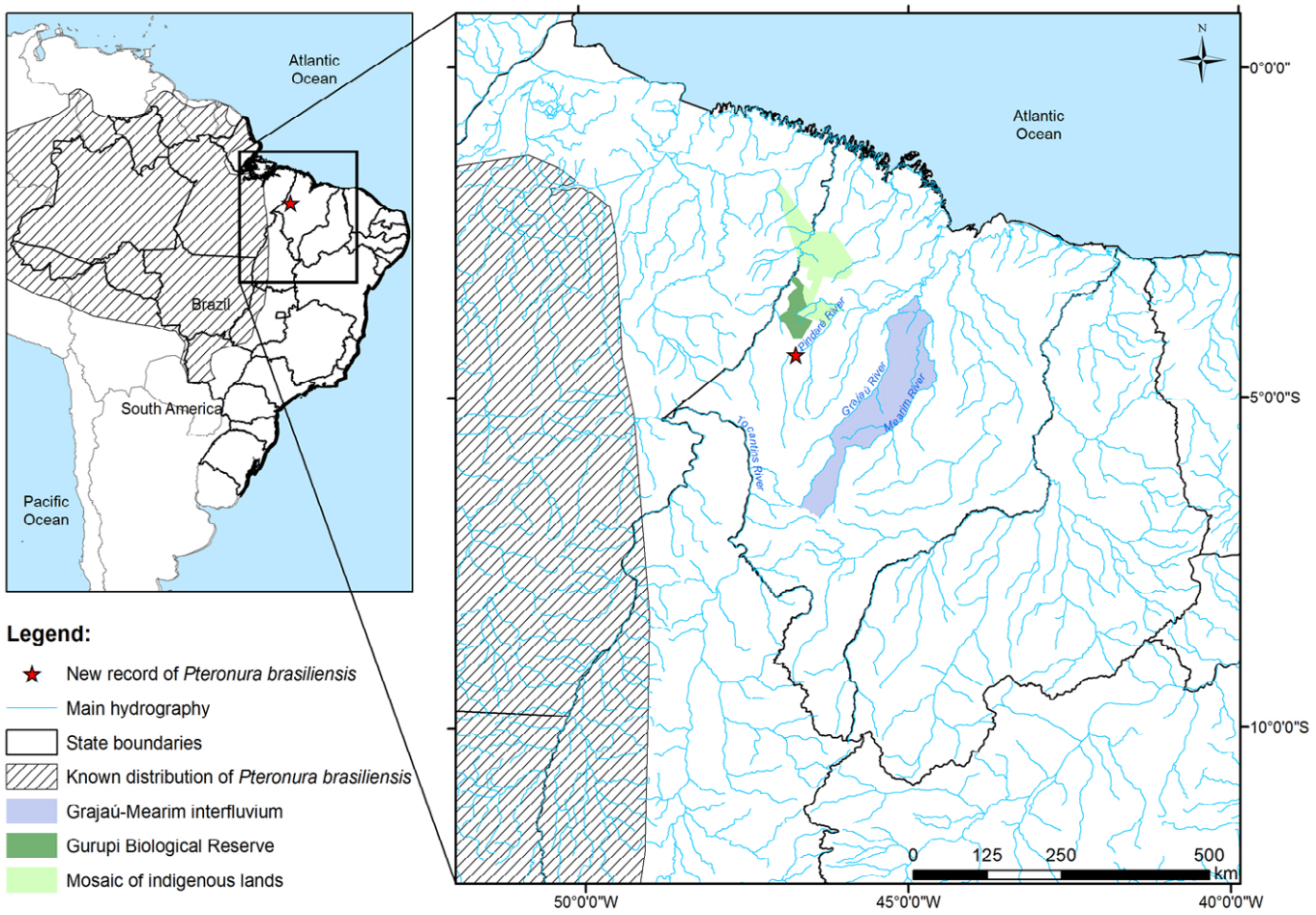

Figure 2. Map showing the geographic distribution of *Pteronura brasiliensis* according to IUCN (2015). The Rebio do Gurupi is represented in light and dark green (Oliveira et al. 2007), the Grajaú-Mearim Interfluvium is represented in light blue (Silva-Junior 2001), and the main river where the species is supposed to be present are represented in blue.

observed during line transect census inventory, along dos Sonhos River in a highly-fragmented area surrounded by a matrix formed by pasture.

It is beyond the scope of this study to determine whether the three individuals detected only once during our survey were dispersing from the Rebio do Gurupi in search for food or new territory, or if the animals were always there but previously undetected. However, the distances between our new record the closest occurrences according to the IUCN (290 km), or in the Rebio do Gurupi (30 km) and the Mearim-Grajaú interfluvium (130 km), are greater than the suspected home range of this species. Giant Otter home ranges in the Amazon were estimated to range from approximately 8 to 19 km, as measured by linear distance along rivers; Duplaix 1980; Utreras 2005; Evangelista & Rosas 2011). Furthermore, our record adds documented evidence of the presence of this species in Maranhão state, one of the least known states in terms of its fauna. We emphasize the need for further studies on the Giant Otter in Maranhão to determine whether other individuals and/or groups, are present and the development of new conservation strategies for areas beyond its known distribution. As these areas consist primarily of farmland, educating and informing farmers and other local people about Giant Otter conservation should become a key priority.

The presence of *P. brasiliensis* in new areas is of considerable importance, especially because remaining populations in the Amazon and Pantanal are threatened by large-scale deforestation and degradation (FAO 2005), which is rapidly transforming many areas and rendering them unable to support Giant Otter population (Groenendijk et al. 2004). Another threat to this species is the construction of hydroelectric plants (Rodrigues et al. 2013). Fortunately, the main basin where our study was undertaken has low hydroelectric potential (MME/EPE 2007), which guarantees the non-interest of hydroelectric development and may contribute to the survival and expansion of the species locally. Northern Brazil represents a new frontier for the advancement of knowledge about the aquatic and semi-aquatic mammals (Siciliano 2008).

Because the Giant Otter is endangered both nationally and globally, any information that may contribute to its future conservation and management plans in different localities is extremely valuable (Carter & Rosas 1997; Utreras et al. 2005). The Giant Otter seems to prefer slow-flowing clear or black creeks and rivers with intact forest cover (Duplaix 1980, 2002; van Damme 2002), and the detection of these specimens in a medium-sized river with degraded forest cover, reinforces the need for new studies and new surveys aimed at acquiring an improved understanding of its distribution and the threats that put it in danger, which can aid in new policies and areas for conservation.

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