



Protection and monitoring of the giant otter (*Pteronura brasiliensis*) in Cantão State Park, Tocantins, Brazil

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Cantão State Park is a 90000 hectare protected area located at 09°31'S, 050°00'W, in the wetlands of the Araguaia River in central Brazil, where the Cerrado and Amazon biomes meet in a sharp ecotone (Figure 1). It is formed by the inland delta of the blackwater Javaés River where it flows into the Araguaia, and consists of a mosaic of seasonally flooded *igapó* forest and marshes, crisscrossed by channels and dotted with over 850 oxbow lakes. Cantão's aquatic environment is exceptionally rich and productive, hosting over 298 species of fish, whose abundance is among the highest known for Amazonia (Ferreira *et al.*, 2011). The combination of large oxbow lakes and abundant fish prey forms an ideal habitat for giant otters (*Pteronura brasiliensis*). Local fishermen who were active in the fur trade when it was legal report that by the mid-1980s, giant otters were practically extinct in the Araguaia region, with month-long hunting expeditions through the Cantão and Bananal regions going by without a single sighting. By the time the first flora and fauna study of the area was carried out, in 1999-2000, giant otters were found to occur in most areas of the newly established state park¹. In the years since, visiting scientists, park authorities, and local conservationists report that sightings are becoming increasingly frequent in Cantão. But since giant otters have not recovered in most of their original territory in South America, the species is listed as 'endangered' by the IUCN².

In 2010, the Instituto Araguaia, a local NGO, started a program to protect and monitor giant otters, and to use them as an umbrella and flagship species for the conservation of the Cantão ecosystem. Through a cooperative agreement with the state park agency Naturatins, the Instituto Araguaia maintains a research station in a pristine area of the park, and patrols the area for fish poachers, whose activities bring them into direct conflict with the otters, both through depletion of fish stocks in individual lakes and because poachers often shoot or harass animals they view as competitors, such as giant otters. As part of the program, a census was carried out to determine the giant otter population of a group of 16 lakes in the park, and this population was monitored over a 28-month period spanning three breeding seasons, between September 2010 and December 2012.

The study site includes 16 oxbow lakes and 9300m of river channels near Instituto Araguaia's field station. In 2010 and 2011, 11 lakes and 5800m of river channels were surveyed; in 2012 the study area was expanded to include an additional five lakes and 3500m of additional river channels, where a pilot ecotourism project was implemented in June 2013 (Figure 1). The largest of these lakes, Lago Grande, is 2220m long and 110m wide, and remains connected to the river channel year-round. The other lakes range from 230m to 1218m in length. During the low water season, the river channels themselves become a string of long deep pools, ecologically very similar to oxbow lakes¹, separated by shallow sandbanks. These lakes and channels are contained within an area of approximately 1500 hectares of *igapó* flooded forest and marshes. During the high water season (mid-December to mid-June) the river rises between six and nine meters and floods almost the entire

¹Tocantins (2004) *Avaliação Ecológica Rápida do Parque Estadual do Cantão*. Secretaria do Planejamento e Meio Ambiente do Estado do Tocantins, Palmas.
²Duplaix, N., Waldemarin, H.F., Groenendijk, J., Evangelista, E., Muanis, M., Velasco, M. and Botello, J.C. (2008) *Pteronura brasiliensis*. The IUCN Red List of Threatened Species. Version 2014.2. Available online at <www.iucnredlist.org>. Consulted on 2 September 2014

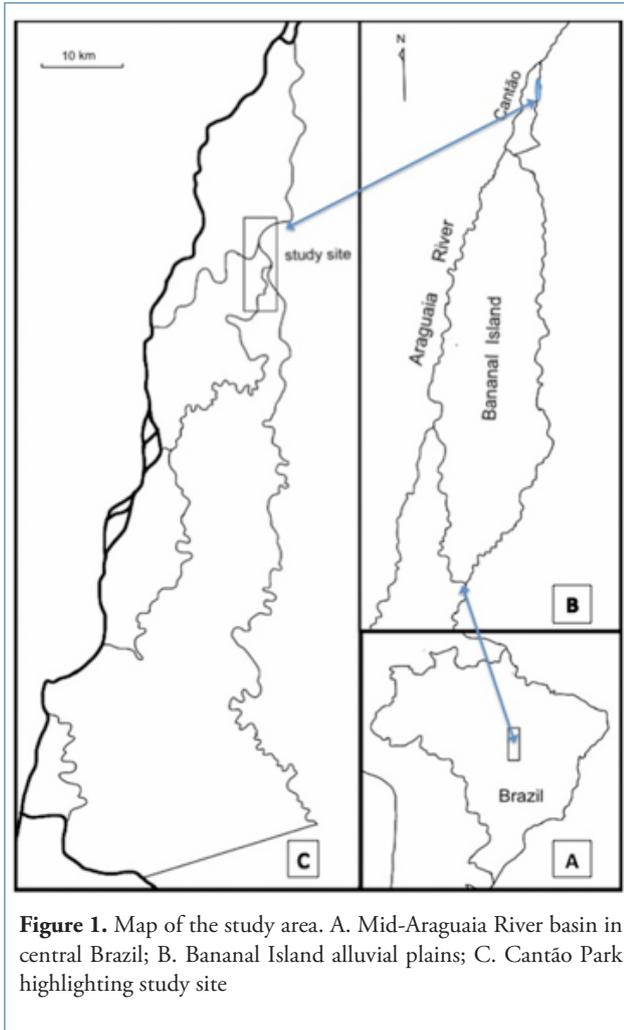


Figure 1. Map of the study area. A. Mid-Araguaia River basin in central Brazil; B. Bananal Island alluvial plains; C. Cantão Park highlighting study site

site, connecting the lakes and channels. Most forest and marsh plants bear fruit during this season, and abundant frugivorous fish are a key link in the aquatic food chain. The study site is representative of the Cantão ecosystem as a whole, containing roughly proportionate samples of each of the park's five natural communities: *igapó* flooded forest, semideciduous forest on higher ground which rarely floods, marshes, beaches with scrub vegetation, and backwater lakes and channels¹.

Monthly surveys of the study area were conducted between September 2010 and December 2012, each lasting between three and 20 days, for a total of 1150 hours of fieldwork covering every month except for December 2010, January 2011, and February 2012. Field procedures followed the 'Population Census Methodology Guidelines for the Giant Otter' as outlined in Groenendijk *et al.* (2005). During the low water season, the river channel and lakes connected to it were surveyed by canoe, and isolated lakes were surveyed on foot. During the high water season, lakes, channels, *igapó* forest, and marshes were surveyed by canoe. Traditional dugout canoes powered by a 44-pound electric motor were used. It was found that the electric

motor causes less disturbance to giant otters than paddling, as it allows the observer to remain silent and motionless. This is especially useful during the high water season, when a current varying between one and two knots runs throughout the study area.

Surveys were conducted between sunrise and 11:00h, and also between 15:00h and sunset, coinciding with the giant otters' peak hours of activity (Duplaix, 1980; Staib, 2005; S. Campello, pers. obs). All aquatic habitats in the study area were surveyed at least once in every field trip. Whenever the giant otters were sighted, location, number of individuals, and behavior were recorded, and the group was followed from a distance long enough to avoid alarming the animals (between 30 and 100 meters, depending on the behavior of the group). A Panasonic DMC-FZ35 camera with 18x optical zoom was used to film and photograph the giant otters, allowing subsequent identification of individuals and accurate counts of group size. Data from field surveys was complemented with pictures obtained with Reconyx HC500 camera traps, which were placed near giant otter campsites and along game trails between lakes. A sighting catalog for individual giant otters of the study area was developed according to Groenendijk *et al.* (2005).

As of December 2012, 41 individual giant otters were recorded in the study area. By the end of the 2010 low water season, 17 adult individuals had been identified by the individual variations in their throat patch, in four groups composed respectively of 7, 4, 3, and 3 adults. No cubs were observed during this season. In 2011 17 individuals were identified, six of which were new to the survey and 11 of which were identified during the previous year. Thirteen of the otters were formed into four groups, with 6, 3, 2 and 2 adults, respectively, while three animals were solitary, but were seen repeatedly in the study site over a period of months. The group of six, which was composed of five members of the group of seven seen in 2010 plus a new adult male, which had joined the group, had a single cub, which first emerged from the den at the end of October. The total number of animals at the end of the season was 18.

In 2012, 20 adult giant otters were recorded in the expanded study site, 16 of which were seen within the original study site boundaries. Six of these were new to the survey and 10 had been recorded in the area in 2011; seven of these were also seen in 2010. An additional group of four animals was recorded in the lakes that were surveyed for the first time this year. In all, four stable groups were observed, three composed of four adults and one composed of three adults, while an additional five animals were solitary or formed temporary associations of two animals. At the end of the breeding season, one group of four animals had three cubs, while the remaining three groups had two cubs each. Cubs first emerged from dens

between late August and late October, when water levels are at their lowest, generally within 10cm of the low water mark for the year. As of December 2012, eight of the cubs were alive and one, born to the group of three otters, had disappeared. The total number of animals at the end of the season was thus 28, of which 26 had been observed within the last 30 days.

While nine of the 16 lakes in the study area appear to be used by a single group of giant otters, the remaining seven lakes were seen to be used by more than one group, although never at the same time. Lago Grande in particular was seen to be repeatedly used by as many as three different groups during the same season, and sometimes during the same day. Animals from at least three different groups actively maintained some dens and campsites along this lake. Groups remained in the area throughout the year, and during the floods ranged deep into the marshes and flooded forest, maintaining campsites on high ground up to 500 meters from the nearest open water, and often using vegetation to haul out and rest where no dry ground was available. Most foraging activities took place within the flooded vegetation in this season, and fish captures were rarely observed in open water between December and May.

The Cantão ecosystem is a challenging environment for giant otter surveys. This explains the relative lack of knowledge about the giant otter population of Cantão. Previous surveys were limited to the low water season, and to rivers that remain navigable to motorboats during that season³. Giant otters tend to avoid navigable channels during that season, and to seek isolated lakes where fish become concentrated and human disturbance is minimal. In the high water season giant otters enter the flooded forest and marshes, again following the fish, and cannot be followed by motorboat.

We found that by using a dugout canoe powered by an electric motor, complemented by data from camera traps, we were able to locate and identify giant otters during all seasons of the year. It was thus possible to confirm that the resident groups remained in the study area throughout the flood seasons of 2011 and 2012. The 2011 flood peaked in Cantão at 7.7m above low water level, and remained well above the 6.0m average peak for nearly two months, leaving very little dry ground in the study area and flooding all dens. The 2012 flood was also above average, peaking at 7.0m. Nevertheless the giant otters remained, and were observed maintaining campsites on small dry areas and vegetation tangles 100-500m inside the flooded forest. No active dens were found in this season, and it was not possible to determine where the otters were spending

the night, as it is dangerous to travel through the flooded forest in small canoes after dark. We hope to use camera traps with night vision capability to gather such data in the future.

The high number of individuals that use the study area year-round is noteworthy, especially as most of these belong to resident groups whose territories overlap. Most territorial overlap occurs on Lago Grande. In southeast Peru, territorial overlap between giant otter groups was observed in streams, but not in oxbow lakes, each of which was home to a single resident group (Staib, 2005; Groenendijk and Hajek, 2006). It is likely that Lago Grande, being the largest lake in the area, is at a node where several group territories overlap, with the smaller groups using it opportunistically when the largest resident group is foraging in neighboring lakes. It is possible that Cantão's complex and rich environment generates a dynamic distinct from that observed for the species elsewhere. The profusion of lakes makes it impossible for a dominant group to effectively defend its territory against opportunistic incursions by neighboring groups. At the same time, the abundance of fish prey may make such territorial overlap more tolerable.

In Peru it was found that larger giant otter groups tend to reside in larger lakes, and that these groups reproduce more successfully (Schenk, 1999; Groenendijk and Hajek, 2006). Lago Grande fits the pattern, having been regularly used by the largest group of the study site during the three years of the survey. This group was also the most reproductively successful, having had a cub in 2011 (the only one seen in the study site that season) and three in 2012, the largest litter observed to date in the study area.

Also noteworthy is the high yearly variation in cub production observed in the population residing within the original study area of 11 lakes. Even though the population remained stable, with 16-17 adult animals at the beginning of each breeding season, cub production varied from none in 2010 to one in 2011 and seven in 2012. We note that while 2011 and 2012 were years of above-average floods, which resulted in more fish production due to the greater extent of flooded habitat, 2010 was the driest year on record for this part of Amazonia. We also note that the study itself caused a marked decrease in trespassing incidents by fish poachers within the survey area due to the regular but peaceful presence of researchers and field assistants, which may have decreased disturbance during critical breeding months. For instance, in July 2011, 36 trespassing incidents were recorded at the Instituto Araguaia field station, while in July 2012 only seven incidents occurred.

Cantão State Park contains about 40 lakes equal to or larger than Lago Grande in area, and nearly 50 times more oxbow lakes and aquatic habitat than the study area. Most of this area is uninhabited, although fish poachers target the more accessible lakes. Researchers throughout

³Silveira, L. and Almeida, R.L.M. (2007) Distribuição e ecologia da ariranha no Parque Estadual do Cantão-TO. Page 13 in *Resumos, Ações de pesquisa e conservação com relação ao estudo de ariranhas Pteronura brasiliensis no Brasil*, 2007, Instituto de Desenvolvimento Sustentável Mamirauá, Tefé, AM, Brazil.

the park have observed giant otter signs such as latrines and dens. Even if we assume that population density of giant otter over most of the park is only a fraction of that observed in the study site, it is likely that the park's total population might be high. Further studies are necessary to reliably estimate the actual number of giant otters in the park. Nevertheless, because it contains 80% of the oxbow lakes in the entire Araguaia basin¹, Cantão State Park is one of the most important patches of protected habitat for the species in eastern Amazonia. Continued monitoring of the population is especially important in the context of the park's ecotourism activities, as well as the growing pressure of fish poachers on the park's lakes as stocks elsewhere in the region are overfished.

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