

# Report of poaching of dwarf caimans *Paleosuchus* spp. (Alligatoridae: Caimaninae) for meat consumption in northern Brazilian Amazon

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In Brazil, commercial hunting of wild fauna was banned in 1967 (Law 5,197/67), however, illegal hunting of crocodilian skins continued at least through the 1970s inducing wild populations to collapse (Rebêlo and Magnusson, 1983). With the decline of the demand for crocodilian skins, hunters shifted to the bushmeat market, although it is economically less advantageous (Da Silveira and Thorbjarnarson, 1999; Mendonça et al., 2016; Marioni et al., 2020).

Species of *Paleosuchus* Gray, 1862 have a small body size (normally <2 m in total length) and well-developed osteoderms over most of the body and tail (Magnusson, 1992; Campos et al., 2010) – features that make its skin commercially unattractive. Thus, these species are subject to little hunting pressure from hunting when compared to the black or the spectacled caimans (Campos, 2015; Magnusson et al., 2019). Hunting for bushmeat is not as selective as hunting for skins and includes species of the genus *Paleosuchus*, *P. trigonatus* Schneider, 1801 and *P. palpebrosus* Cuvier, 1807 (Smith, 1981; Brazaitis et al., 1996). Subsistence hunting of *Paleosuchus* species is widely practiced by rural and indigenous communities throughout the Brazilian Amazon (Souza-Mazurek, 2001; Endo, 2005; Muniz et al., 2015) and the Cerrado-Caatinga transition (Campos and Muniz, 2019), and it is considered one of the threats to the species (Campos et al., 2019; Magnusson et al., 2019). There is no record of poaching of *Paleosuchus* species for the commercialisation of their meat, even though

there are reports that *Paleosuchus* species is sometimes poached preferentially over *Caiman* species (Campos et al., 2019; Magnusson et al., 2019). This study aims to take an overview of the poaching of *Paleosuchus* species in northern Brazilian Amazon by reporting local densities close to urban areas and recording subsistence and commercial hunting events.

We surveyed two areas of the Brazilian Amazon, both of which contain large swaths of pristine habitat. One area was the Amapá state located in eastern Amazon, and the second areas were the environs of São Gabriel da Cachoeira (upper Negro River) located in northwestern Amazon (Fig. 1). We surveyed seven water bodies in the Amapá state, most of them near urban areas and villages. Additionally, we visited local markets and contacted hunters indicated by residents in order to obtain records of caiman hunting and to identify which species were being hunted.

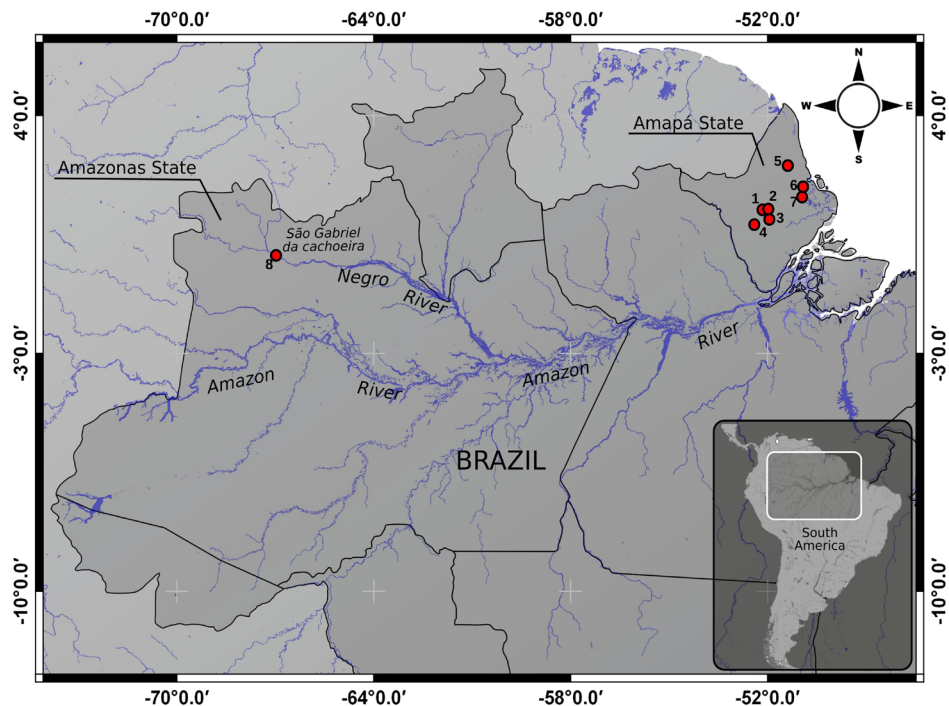
Caimans were caught using a steel loop attached to a stick and were immobilised using a homemade-catch-all. Biometric measurements, such as snout-vent length (SVL), total length (TL), head length (HL) and weight (W), as well as date and geographic coordinates, were collected. Sex was determined only for individuals of SVL > 40 cm. With the agreement of the hunters or merchants, we took photographs and took notes on catch conditions and purpose of the hunting. In this study, caimans were captured under License no. 13048-1 granted by the Brazilian Institute of Environment and Renewable Natural Resources (IBAMA).

We covered 66.0 km of streams and rivers during seven nocturnal spotlight surveys. Seven *Paleosuchus* species were observed in four of the seven water bodies surveyed (57.1%) – two *P. palpebrosus* and five *P. trigonatus* (Table 1). Four individuals were captured during the surveys: three males of *P. trigonatus* and one *P. palpebrosus* with undetermined sex. Two males of *P. trigonatus* were captured in the Amapá stream (SVL = 44.0 cm and SVL = 40.0 cm); the other male was captured in the Agamim stream (SVL = 49.0 cm);

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**Figure 1.** Sample map showing eight localities surveyed in the Amapá State and in the Upper Negro River surrounding São Gabriel da Cachoeira. Numbers represent each water body researched as follows: (1) Wilhame stream; (2) Cupixi River; (3) Cupixizinho River; (4) Amapá stream; (5) Agamim stream; (6) Redondo Lake; (7) Tartarugal River; (8) Acatunum stream.

a single specimen of *P. palpebrosus* was captured in the “Redondo” lake (SVL = 39.0 cm). We recorded carcasses of 10 caimans hunted by local residents near the surveyed areas, of which four were hunted for subsistence and six for commercial purposes

(Fig. 2). Subsistence hunting was recorded in the Amapá stream (three *P. trigonatus*) and in the Cupixizinho River (one *P. trigonatus*). Commercial hunting was recorded in the Flexal (one *P. trigonatus*) and Breu communities (two *P. palpebrosus*), in the Amapá state (Fig. 2A–C),

**Table 1.** Coordinates, survey distances, number of individuals counted per species and densities for each of the water bodies surveyed in Amapá state.

Sampled localities in Amapá State	Coordinates	Survey distance (km)	Species (n° of individuals)	Densities (caimans/km)
1. Wilhame stream	00.8000°N, 51.8833°W	7.9	0	0
2. Cupixi River	00.6500°N, 51.7167°W	12.4	0	0
3. Cupixizinho River	00.8167°N, 51.7500°W	18.4	0	0
4. Amapá stream	00.5833°N, 52.3167°W	9.3	<i>P. trigonatus</i> (04)	0.43
5. Agamim stream	02.4333°N, 51.4000°W	2.2	<i>P. trigonatus</i> (01)	0.45
6. Redondo Lake	01.7833°N, 50.8167°W	3.2	<i>P. palpebrosus</i> (01)	0.31
7. Tartarugal River	01.5667°N, 50.8000°W	12.6	<i>P. palpebrosus</i> (01)	0.08
TOTAL	---	66.0	7	0.1



**Figure 2.** Records of specimens of caimans hunted during the field trips to the Amapá state and São Gabriel da Cachoeira (SGC). (A) Three specimens of *P. trigonatus* stored in a freezer, which were hunted for subsistence in the Amapá stream. (B) Part of the head of *P. trigonatus* specimen hunted for commercialisation in Flexal community. (C) Frozen *P. palpebrosus* head of a specimen sold by residents of the Breu community. (D) Fresh head of a *P. palpebrosus* specimen bought by one resident of São Gabriel da Cachoeira. (E) Parts of one smoked *C. crocodilus* specimen being sold at one of the SGC fairs. (F) A specimen of *C. crocodilus* for sale displayed along with fishes in another SGC fair. Photographs by Zilca Campos.



and in the municipality of São Gabriel da Cachoeira (one *P. palpebrosus* and two *Caiman crocodilus*), in the Amazonas state (Fig. 2D–F). Even in the places where only subsistence hunting was recorded, hunters reported that sometimes they are hired to hunt caimans.

The commercialisation of specimens of *Paleosuchus* occurred in the houses of poachers in both regions, while *Caiman crocodilus* specimens were offered for sale in two local markets in São Gabriel da Cachoeira (Fig. 2F).

Hunters reported that the most commonly used method to catch caiman is to bait a hook and wait. The price paid for fresh caiman meat in the Amapá state was approximately R\$ 10.00 (US\$ 3.06, equivalent values at the time of survey) per kilogram, and in São Gabriel da Cachoeira price varied from R\$ 18.00 to R\$ 25.00 (US\$ 5.50–7.64, equivalent values at the time of survey). In São Gabriel da Cachoeira, caiman meat (*C. crocodilus* or *P. palpebrosus*) was also sold smoked or salted, with no change in price when compared to fresh meat.

In both surveyed regions caiman meat is much appreciated by residents, which encourages poaching for profit. Demand is so great that it can sustain a continuous local trade, especially in São Gabriel da Cachoeira, where the hunted caimans were sold openly at local markets. In the Amapá state, most of the hunters reported there was greater demand for the meat of *Paleosuchus* than for that of *Caiman crocodilus*, with demand rather than abundance driving which bushmeat is offered for sale. This preference for the meat of *Paleosuchus* by indigenous communities is well documented (Souza-Mazurek, 2001; Espinosa-blanco and Vargas-Clavijo 2014; Valeris, 2016). Furthermore, residents of the surveyed areas reported intense poaching activity practiced by people working in the illegal mining, which are usually located in the highlands where the caiman of the genus *Paleosuchus* predominate.

All the hunters reported that they had to travel long distances (10–60 km) to find game, including caiman. This, coupled to the many cases of hunting recorded in the short period of time we surveyed these areas, suggests that the vicinity of settlements is over-hunted which explains the low densities found in this study.

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