Cuvier's Smooth-fronted Caiman
Paleosuchus palpebrosus

Zilca Campos[1], William E. Magnusson[2] and Fábio Muniz[3]

[1]Embrapa Pantanal, CP 109, Corumbá, MS, Brazil 79320-900 (zilca.campos@embrapa.br)
[2]Instituto Nacional de Pesquisas da Amazonia/CPEC, CP 478, Manaus, Amazonas 69011-970, Brazil (bill@inpa.gov.br)
[3]Laboratório de Evolução e Genética Animal, Universidade Federal do Amazonas, Manaus, Amazonas, Brazil (fabiolm_bio@yahoo.com.br)

Common Names: Dwarf caiman, Cuvier's smooth-fronted caiman, Jacaré-paguá, jacaré-preto, jacaré-ferro, jacaré-tiritiri, Cachirre, musky caiman, Cocodrilo, jacaré-una

Range: Bolivia, Brazil, Colombia, Ecuador, French Guiana, Guyana, Paraguay, Peru, Suriname, Venezuela, Trinidad and Tobago

Figure 1. Distribution of *Paleosuchus palpebrosus* [based on Campos *et al*. (2013) and Ali *et al*. (2016)].

Conservation Overview

CITES: Appendix II

CSG Action Plan:
Availability of survey data: Poor
Need for wild population recovery: Low
Potential for sustainable management: Low

2018 IUCN Red List: Lower Risk/Least Concern. Widespread and remains locally abundant in some areas although quantitative data on trends are lacking (last assessed in April 2018; Magnusson *et al*. 2019).

Principal threats: Habitat destruction, local subsistence hunting, dams, urbanization, pollution

Figure 2. *Paleosuchus palpebrosus*. Photograph: Zilca Campos.

Ecology and Natural History

The two species of *Paleosuchus* are very similar to each other and are often confused. They are small, secretive, frequently sympatric, and well adapted to a terrestrial mode of life and in swift-running waters (Medem 1958). Early ecological work on the genus was carried out by Medem (1953, 1967, 1981), and much of what is known about the ecology of *P. palpebrosus* is summarized by Magnusson (1989) and Ouboter (1996). Recent ecological studies have been undertaken in Brazil, in Central Amazonia (Botero-Arias 2007; Campos and Sanaiotti 2006; Campos *et al*. 2015a), areas surrounding the Pantanal (Campos *et al*. 1995; Campos and Mourão 2006) and the Guaporé-Madeira Rivers (Vasconcelos and Campos 2007).

Paleosuchus palpebrosus occurs in the Amazon and Orinoco River drainages and the Atlantic coast drainages that lie between the Paraguay-Paraná River (except the Pantanal;

Campos, Z, Magnusson, W.E. and Muniz, F. (2018). Cuvier's Smooth-fronted Caiman *Paleosuchus palpebrosus*. Pp. xx-xx *in* Crocodiles. Status Survey and Conservation Action Plan. Fourth Edition, ed. by S.C. Manolis and C. Stevenson. Crocodile Specialist Group: Darwin.

Campos *et al*. 2013) and the São Francisco River (Medem 1983). Small populations inhabit the upper Paraguay River drainage in Paraguay (Medem 1983; Scott *et al*. 1990). Recently, *P. palpebrosus* was reported for the first time on the island of Trinidad (Ali *et al*. 2016). Salas-Gismondi *et al*. (2015) recovered the first unambiguous fossil of the genus *Paleosuchus* at the Pebas Mega-Wetland System, from the Middle Miocene.

Dwarf caimans inhabit a range of aquatic habitats in the Central Amazon basin, including flooded forests near the major rivers and lakes (Magnusson 1985) and roadside borrow pits (Botero-Arias 2007). In the Guaporé-Madeira-Abunã River region the species occurs in quiet stretches of large rivers and around rapids. In Bolivia, the species occurs on the border with Brazil in the Beni River (Z. Campos, unpublished data). King and Videz-Roca (1989) report both species of *Paleosuchus* present in large rivers and small streams in Bolivia, usually along stretches of bare shore and frequently in association with dead trees. The species occurs on the Brazilian shield (Rebelo and Louzada 1984; Carvalho Jr. and Batista 2013) and in the Caatinga biome (Lima *et al*. 2011; Roberto and Albano 2014). In Venezuela it occurs in the Mauritia palm swamps (Godshalk 1982) and streams lined by gallery forest (Thorbjarnarson 1992). It generally does not inhabit small forest streams that drain large rainforest tracts, a principal habitat for *P. trigonatus* (Magnusson 1992). Ouboter (1996) considered it a species of the shallow margins of blackwater rivers in Suriname.

In Venezuela, *P. palpebrosus* occurs in lowlands (<400 m asl) in oligotrophic rivers and streams (Seijas 2007), and terrestrial movement may be extensive in order to reach ephemeral wetlands (Paolilla and Gorzula 1985). In Brazil, Dwarf caimans move short distances to roadside borrow pits in the dry season (Botero-Arias 2007). There are ongoing radio-telemetry studies of movements and thermoregulation in small streams and rivers near the Pantanal. Dwarf caimans in these areas aestivate during the dry season in burrows, and in this situation their body temperatures normally remain low (20ºC) for many days in winter (Campos and Magnusson 2013a). Campos *et al*. (2017) investigated the effect of dam construction on the movement of *P. palpebrosus* in the upper Madeira River - home ranges varied between <1 and 91 km^2. The authors reported relatively little effect on movement of Dwarf caimans before and after periods of inundation.

Hrbek *et al*. (2008) investigated the phylogenetic relationships of South American alligatorids and identified signs of strong population genetic structuring in *Paleosuchus* spp. in the upper Madeira River. Muniz *et al*. (2017) used a genomic approach to investigate the genetic structuring of *P. palpebrosus* along the Amazon and Paraguay River basins. They identified lineages deeply diverged and proposed the existence of at least three evolutionary significant units (ESUs) - Amazon, Madeira-Bolívia and Pantanal. Researchers from the Universidade Federal da Amazônia, Instituto Nacional de Pesquisas da Amazônia and Embrapa Pantanal are undertaking morphometric, distributional and genetic studies (eg multiple paternity in *Paleosuchus* spp. nests in the Amazon basin).

The Dwarf caiman has been considered the smallest extant species of crocodilian, with the maximum size of males reported to be about 1.6 m TL (Medem 1981). Ouboter (1996) reported animals of 1.8 m in Suriname. However, the maximum size of Dwarf caiman in Brazil may exceed 2.0 m for males and 1.4 m for females (Campos *et al*. 2010).

Reproduction in *P. palpebrosus* was first described by Medem (1971). Davenport (1995) reported evidence for a possible sperm storage event in a captive *P. palpebrosus* female. In the wild, females first reproduce at about 8 years and 60 cm SVL (Campos *et al*. 2012b, 2013b). Females lay 6-21 eggs in mound nests at the end of the dry season in the Amazon and in the wet season in the Pantanal (Campos *et al*. 2015a). The number of eggs was correlated with body mass for 9 females at Amazonian sites (Campos *et al*. 2015a). Females attend nests during incubation (Campos and Sanaiotti 2006) and continue to provide parental care for groups of hatchlings for up to 21 months after hatching at three sites (Pantanal, Guaporé and Amazon) investigated by Campos *et al*. (2012b). Nunes *et al*. (2011) recorded a *P. palpebrosus* nest with bivouacs of army ants in the Brazilian Cerrado, at which no parental care was observed. Female *P. palpebrosus* and their eggs are eaten by people in Central Amazonia and areas surrounding the Pantanal. Ziegler and Olbort (2007) provided photographs of the clitero-penis of male and female *P. palpebrosus* measuring 60 cm and 49 cm SVL, respectively. The relationship between temperature and sex determination has not been determined for the species. Morais *et al*. (2010) reported *Amblyomma rotundatum* parasitizing *P. palpebrosus* at the western border of the Pantanal.

Figure 3. *Paleosuchus palpebrosus*. Photograph: Zilca Campos.

Studies of diet in small individuals revealed a variety of vertebrate (mainly fish) and invertebrate prey (Magnusson *et al*. 1987; Campos *et al*. 1995; Botero-Arias 2007; Milàn *et al*. 2010; Dutra-Araújo *et al*. 2017). Villamarín *et al*. (2017) combined stable-carbon-isotope and spatial analyses and found evidence of dietary differences between the two species of *Paleosuchus* independent of habitat selection.

A biochemical study of the paracloacal-gland lipids has been undertaken by Shafagatie *et al*. (1989), but the function of these glands needs to be examined through behavioural studies in the wild. Examination of α- and β-globin amino acid sequences in P. palpebrosus revealed a unique combination of substitutions at key effector binding sites compared to other vertebrate and crocodilian hemoglobins (Weber *et al*. 2013).

Milàn and Hedegaard (2010) investigated the tracks and trackways of 12 crocodilian species to map track morphological variation from extant crocodilians and create a base of reference for describing tracks and trackways from fossil crocodilians. The authors described the tracks and trackways produced by one juvenile and one adult *P. palpebrosus* at the Crocodile Zoo in Denmark.

Conservation and Status

Both species of *Paleosuchus* have well-developed osteoderms over most of the body. This characteristic, together with small size, make the skin virtually worthless commercially, and has resulted in limited hunting pressure. Basic surveys have been conducted in the majority (80%) of Range States. Most surveys were undertaken to determine the status of other crocodilians, but reported on *Paleosuchus* as well. Night-count densities of 0.83-2.20/km on the Rio Curaray in Ecuador have been recorded (T. Hines and P. Wilkinson, pers. comm.). Alvarez (2009) reported densities of 0.28-2.3/km in the Venezuelan Llanos. In the areas surrounding the Pantanal and Brazilian Amazon, densities of 0.0-2.0/km have been recorded (Z. Campos, unpublished data; Campos *et al*. 1995; Muniz *et al*. 2015). Campos and Magnusson (2016) estimated the absolute densities of *P. palpebrosus* from a 5.6 km^2 area flooded by the construction of the Santo Antônio Dam on the upper Madeira River, Brazil. The authors reported a density of 28.5/km, suggesting that the species may be one of the world's most abundant crocodilians.

In Brazil, threats identified for *P. palpebrosus* include habitat loss and hunting (Campos and Mourão 2006; Campos *et al*. 2012a, 2013c, 2015b; Muniz *et al*. 2015). Surveys of the Lajeado Hydroelectric Dam and regions of the Tocantins River indicated that the species was little affected by river modification (Villaça 2004). Campos (2015) found the dead *P. palpebrosus* due to hunting in the Santo Antônio Hydroeletric Dam area. Mudrek (2016) evaluated the effects of urbanization on some population parameters and diet of *P. palpebrosus* in urban streams in Central Brazil. Campos *et al*. (2015b) registered habitat loss in the Araguaia-Tocantis region. Road kills of *P. palpebrosus* suggest there may be a loss of connectivity between habitats (Campos *et al*. 2012a, 2013c). Those authors recommended the establishment of permanent aquatic reserves for the protection of the species in marginal areas even though the species occurs in the majority of reserves within its distribution.

Subsistence hunting takes place widely, and can locally reduce *Paleosuchus* densities, but populations of this species do not appear to have been impacted significantly. However, gold mining activities, urbanization, and agricultural expansion with their resultant pollution are increasing and have an impact on the species in some areas, especially on the borders of the Pantanal. The Dwarf caiman holds little potential for the development of commercially-oriented management programs. The primary value in most countries is for subsistence hunting by rural inhabitants, and *Paleosuchus* spp. are sometimes taken preferentially over *Caiman* spp. Commercial exploitation in Guyana is based on the capture and sale of Dwarf caiman for the pet trade, currently with a CITES annual export quota of 500 live animals. Conservation of *P. palpebrosus* is dependent on maintaining the forest and headwaters of the many watersheds in which it occurs. This is especially important in areas, such as the Pantanal, where there are geographically restricted evolutionarily significant units.

Priority Projects

<u>High priority</u>

1. **Monitoring of abundance and habitat degradation.** *Paleosuchus palpebrosus* appears to resist the pressures of habitat destruction and hunting within the Central Amazon and the areas surrounding the Pantanal. Whilst probably not threatened throughout its distribution, more complete surveys in all Range States are needed to evaluate the conservation status of local populations and propose conservation areas.

2. **Investigations on ecology and population biology.** The species is perhaps the least known of the New World crocodilians. Even such basic topics as prey, habitat preference, behaviour, survival rates, growth and reproduction are poorly known. Ecological interactions with other crocodilians and the effects of subsistence hunting are important management topics to address. Areas where ecological investigations could be undertaken include the headwater streams of the Pantanal, Brazilian Amazon, Guyana, and the Venezuelan-Guyana region. Bolivian populations have long been isolated from disturbance and should also be studied.

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