

Occurrence of *Caiman latirostris* and *Caiman yacare* in the Middle Delta of the Paraná River, Argentina

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There are two species of caiman in Argentina. The yacare caiman *Caiman yacare*, which is found in the provinces of Chaco, Corrientes, Formosa, Misiones, Salta and Entre Ríos, and the broad-snouted caiman *Caiman latirostris* that inhabits Chaco, Corrientes, Entre Ríos, Formosa, Jujuy, Misiones, Salta, Santa Fe and Santiago del Estero (Prado et al., 2012). Both species are listed as of Least Concern in the IUCN Red List (Siroski et al., 2020; Campos et al., 2020). There have been anecdotal reports of both species in various localities of the Middle Delta of the Paraná River in the north of Buenos Aires (Chebez, 2008). Caiman occasionally use rivers for dispersal, thus reaching more southern latitudes than is usual for them, these are generally adult individuals, often males that move south in the summer, but it is unknown if they manage to survive the winter (Restivo et al., 2011).

It has been proposed that between 30° and 34° south latitude, the thermal conditions may be incompatible for the feeding and digestion of *C. latirostris* for about 5 months of the year (Diefenbach, 1988). This is because, during winter and into early spring, the air temperatures and limited sunlight (due to short daylight hours, and a high frequency of cold and overcast days) do not allow the animals to reach their preferred body temperature. Furthermore, a critical limitation for the survival of *C. latirostris* eggs is the strong seasonality, with minimum temperatures dropping below 0 °C in winter (Simoncini et al., 2009; Viotto et al., 2022). The objective of the current study was 1) to record caiman occurrences in the Middle Delta of the Paraná River during the extraordinary low water of the Paraná River that occurred between 2020 and 2022, and 2) confirm the winter survival of caiman in this area.

We reviewed the data from observation reports of caiman received by the Directorate of Flora and Fauna of Buenos Aires, which originate from citizen complaints. Each record has been previously corroborated with photographs, videos and interviews with informants when necessary. Some photographs were deposited in the Digital Repository of Argentine Nature of the Félix de Azara Natural History

Table 1. Caiman recorded in the Middle Delta of Paraná River, 2020–2022

Species	Date	Locality	Catalogue number
<i>Caiman latirostris</i>	May 2020	Port of Campana, Campana district	
	April 2021	Santos Vega island, Ramallo district	CFA-IMG-2587
	June 2021	Vuelta de Obligado, San Pedro district	CFA-IMG-2589
<i>Caiman yacare</i>	May 2020	Coast of San Nicolás, San Nicolás district	
	May 2020	Club Náutico de San Nicolás, San Nicolás district	
	Sept. 2020	Lechiguanas islands, Ramallo district	
	April 2021	Celiz lagoon, San Pedro district	
	May 2021	KM 274 of the Paraná river, Baradero district	
	June 2021	Ternium factory, Ramallo district	
	June 2021	Las Pirañas stream, Baradero district	CFA-IMG-2591
	June 2021	Vuelta de Obligado, San Pedro district	CFA-IMG-2590
	January 2022	Coast of San Pedro, San Pedro district	
	June 2022	Paraná Miní, Tigre district	
Sept. 2022	La Rinconada lagoon, San Pedro district	CFA-IMG-2594	

Foundation (CFA). In addition, we monitored two specimens on the Santos Vega island (Ramallo district, 33° 32'48.23" S, 59° 52'21.78" W), travelling a 4 km transect weekly for three months by kayak in the stream of the island where



Figure 1. Observations of caiman in the Middle Delta of the Paraná River - **A.** Female *Caiman yacare* captured in Arroyo Las Pirañas (CFA-IMG-2591), **B.** Male *Caiman latirostris* captured near the fishermen's dock in Vuelta de Obligado (CFA-IMG-2589), **C.** Undetermined *Caiman latirostris* found in an internal stream on Santos Vega Island (CFA-IMG-2587)

they were. These two specimens, a *C. latirostris* and a *C. yacare* were captured in June 2021 by the park rangers of the Vuelta de Obligado Municipal Reserve and personnel from the Argentine Naval Prefecture, to avoid conflicts with the locals. They were then released in the Santos Vega island area on 15 & 17 June 2021, 10 and 40 km from where they were captured respectively and where the presence of another *C. latirostris* was already known (Fig. 1c) since April 2021. Between 2020 and 2022, during a historically low water event, eleven *C. yacare* and three *C. latirostris* were recorded in the north of Buenos Aires province (Table 1) according to the photos and videos received by Directorate of Flora and Fauna of the Province of Buenos Aires.

Regarding the monitoring of the caimans released on Santos Vega Island, we found that after being released, they remained in the water for a day before choosing a place to sunbath on land. The *C. yacare* specimen left the location a week after being released, while the *C. latirostris* stayed in the same place until it was last seen on 25 September 2021. This finding suggests that *C. latirostris* could survive the winter months (June to September) in the Middle Delta of the Paraná River.

Our observations suggest that current climatic conditions are suitable for the survival of *C. latirostris* during winters in the Middle Delta of the Paraná River, and the same could be assumed for *C. yacare*, since this species is known to

range further south. This would explain the appearance of so many specimens of both species of caiman in these latitudes during the historic low water event. We can assume that the specimens that arrive during the cyclical floods of the Paraná River, which occur approximately every three to seven years (the last one having been in 2016), settle in the internal lagoons of the islands, which would be a favourable environment for them. However, during the extraordinary low water phenomenon resulting from a severe drought caused by the La Niña year (negative ENSO phase; Penalba & Rivera, 2016) and other atmospheric oscillations such as Madden-Julian (Díaz et al., 2022), these lagoons remained completely dry. This forced the specimens from the Middle Paraná Delta to go to the streams and the main channel of the river in search of favourable environments, which allowed so many specimens to be sighted in a period of three years. Despite this, although adult specimens are capable of surviving in the area, the low density of individuals of both species would make encounters between males and females difficult. On the other hand, if there were nesting events, the clutches would not be able to survive due to the limitation imposed by temperatures below 0 °C in winter.

For the future, it would be of interest to collect long-term data on changes in water temperature to be able to project the distribution of these species in a climate change scenario.

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