

Jaguar predation on Araguaian river dolphins: Material evidence and likely contexts for increased interactions

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River dolphins diverged from their marine ancestors (Rice, 1998; Reeves & Martin, 2009) and are currently represented by only a few Neotropical taxa, including *Inia araguaiaensis* (Araguaian river dolphin) from the Tocantins–Araguaia Basin (Hamilton et al., 2001; Hrbek et al., 2014; da Silva et al., 2023). The Araguaian river dolphin is listed as Vulnerable and is subject to multiple anthropogenic stressors, most notably habitat degradation and the progressive reduction of dry-season river flows across its range (ICMBio, 2022; de Moraes et al., 2024). These progressive hydrological alterations constrain habitat availability—creating fragmented and shallow river sections and drying oxbow and riverside lakes—forcing individuals to occupy marginal habitats. This increases their susceptibility to previously undocumented or under-reported predation (de Moraes et al., 2025).

Araguaian river dolphins are apex predators that consume a broad range of fish species, playing a key role in maintaining trophic balance (Gomez-Salazar et al., 2012; Das et al., 2022).

They display a foraging behavior locally known as “estouro do boto”, in which they drive schools of fish into shallow waters to facilitate capture (Dalpaz & Simões-Lopes, 2025), similar to cooperative strand-feeding behavior shown by marine dolphins. Despite their position at the top of the aquatic food web, these dolphins may occasionally fall prey to jaguars (*Panthera onca*) (Silveira et al., 2004) and black caimans (*Melanosuchus niger*).

Jaguars are highly opportunistic predators (Hayward et al., 2016; Miranda et al., 2016), being the only *Panthera* species specialized in hunting semi-aquatic and aquatic animals. Their diet includes capybaras, caimans, and fish in the Pantanal (Eriksson et al., 2022), crocodiles in Mexico (Pérez-Flores, 2018), and nesting sea turtles along the coasts of Central America (Fonseca et al., 2020). Although some of these prey species are relatively slow or vulnerable on land, jaguars are capable of subduing agile semi-aquatic prey such as caimans and capybaras even underwater.

All previous records of jaguars preying on river dolphins were based on photographic or video evidence, typically showing individuals feeding on beaches or riverbanks. Here we present the first material evidence (skulls with diagnostic jaguar canine punctures) and documented events of jaguar predation on Araguaian river dolphin. We then propose plausible ecological contexts under declining dry-season flows that could facilitate jaguar–dolphin encounters, and outline the conservation implications of such interactions. Rather than quantifying mortality, our goal is to ground hypotheses and identify testable predictions and monitoring needs.

Six predation events of jaguars on Araguaian river dolphins that occurred in the Tocantins-Araguaia River Basin were documented and are presented herein (Figs 1 and 2). The Tocantins-Araguaia Basin covers approximately 384,000 km², with sandy riverbeds and turbid waters (Aquino et al., 2005). The tropical climate features a rainy season from October to March and a dry season from April to September (Lininger & Latrubesse, 2016). During the dry season, the river channel narrows, forming sandbanks

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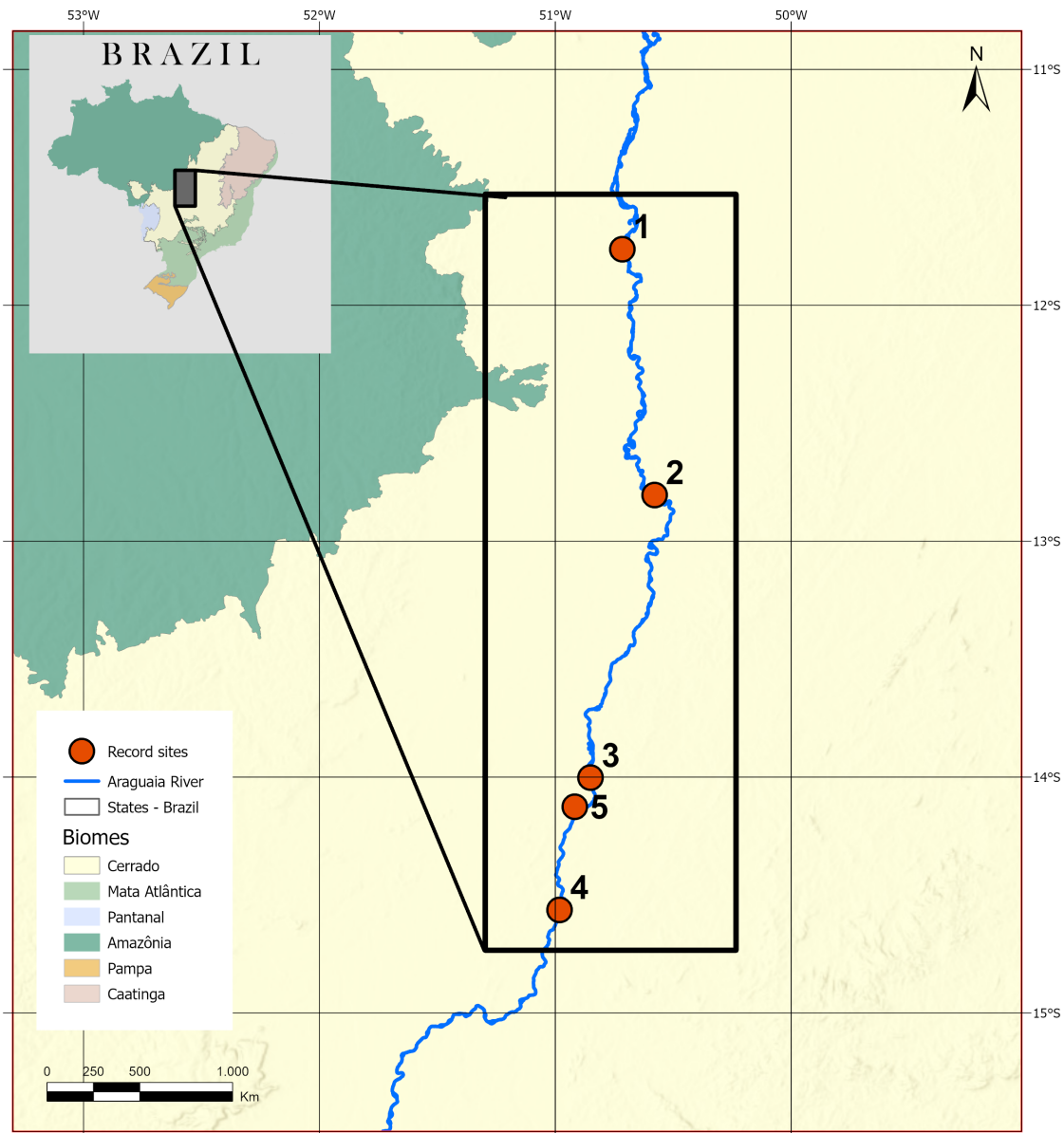


Figure 1. Geographical location of Araguaian river dolphin (*Inia araguaiaensis*) predation events by jaguars recorded along the Araguaia River.

used for recreational fishing that ease the detection of predation events (Latrubesse et al., 2019). Floods during the wet season increase system productivity, providing shelter and food for fish and dolphins (Junk, 2013).

Event 1: The first predation event occurred in the afternoon on March 2024 in the left bank of the Araguaia River, close to the São Felix do Araguaia city. Although the attack was not directly observed, fresh tracks in the sand showed that the dolphin was dragged approximately 30 meters through a beach from the water's edge into the gallery forest. A camera trap placed near the carcass recorded a female jaguar and her cub feeding on the remains for two consecutive days (Fig. 3). Bite marks on the skull, perforations nearly 1 cm in diameter, indicated the characteristic canine punctures of a jaguar's killing bite (Fig. 4a).

Event 2: The second event was witnessed by a local guide and fisherman around 09:00h, in the Araguaia River, close to the Luiz Alves city. A professional fisherman who also acts as fishing

guide observed a jaguar patrolling the beach, which fixated on a dolphin herding fish in shallow water, with part of its back out of the water. The jaguar ran a few meters along the shallows, leapt onto the dolphin, bit its melon, and carried it about 40 meters from the water's edge. After learning about the event, we searched for the carcass and collected the skull of the predated river dolphin (Fig. 4b and 4c).

Event 3: In late July 2025, a river dolphin carcass was discovered by Araguaia fishing guides on a beach approximately 100 km upstream from the previous event, near Bandeirantes, a district of Nova Crixás (Goiás State). Upon reaching the site, the guide and accompanying tourists observed that the carcass had been partially consumed, with tissue removal concentrated on the melon, head, and neck. Multiple jaguar tracks were present in the surrounding area, along with a drag mark extending from the waterline and originating from the shallows. The research team was promptly notified and subsequently mobilized to recover the skull at the site.



Figure 2. Collection comprising six Araguaian river dolphin (*Inia araguaiaensis*) skulls, collected from the Araguaia River with evident jaguar (*Panthera onca*) bite marks and currently housed at the Jaguar Conservation Fund.

Event 4: In early September 2025, a new record of a river dolphin predated by jaguars was publicized through a video circulating online. The event occurred near the municipality of Aruanã, Goiás, more than 500 km upstream from the first documented record in São Félix do Araguaia. Upon learning of the case, the team contacted a fishing guide collaborating with the 'Araguaia Vivo 2030' Program to retrieve the skull at the site. The carcass showed consumption restricted to the melon, head, and neck regions. Unlike previous cases, however, the animal was found on a high riverbank adjacent to a deeper stretch of the river. This observation suggests that jaguar ambushes on river dolphins are not necessarily associated with shallow-water areas, expanding the understanding of the ecological contexts in which such events may occur.

Event 5: In late September 2025, a new record emerged through a video documenting a dead river dolphin found by fishing guides along the Araguaia River. Tracks in the sand clearly indicated that a jaguar had been responsible for the predation. Upon receiving this information, the research team contacted local partners to attempt to recover the samples. Unexpectedly, the event involved two individuals, both dragged to the same location in the interior of the beach, beneath a shrub. The skulls were well preserved and were collected by the fishing guides for subsequent transfer to the Jaguar Conservation Fund, where all six skulls are currently housed in the collection (Fig. 2).

Informal interviews conducted by some co-authors with local riverine communities suggest that such events may be more frequent than previously documented. Dolphins often herd fish

into shallow areas, splashing and partially exposing their bodies—behavior that may attract jaguars patrolling the riverside in search of prey like caimans and capybaras. The river's geomorphology, characterized by a deep main channel bordered by shallow waters, further facilitates these encounters. All six skulls exhibit characteristic signs of the jaguar's craniomandibular "lethal bite" behavior, in which the canine teeth pierce the jawbone or, in the case of dolphins, the skull (Fig. 4). This behavior, targeting the dolphin's melon—the organ responsible for echolocation and its jaw, which receives echolocation signals—demonstrates how effective jaguar attacks can be on dolphins.

Jaguars possess a bite force of approximately 4,939 N (503.57 kg-force) (Hartstone-Rose et al., 2012), strong enough to puncture a tapir's skull and crush tortoise shells up to 5 cm thick (Schaller & Vasconcelos, 1978; Emmons, 1989). Given this capacity and their ability to handle aquatic prey underwater, jaguars can prey on river dolphins (*Inia geoffrensis*). Silveira et al. (2004) reported 13 documented cases of jaguar predation on river dolphins along the Araguaia River, highlighting that such predator-prey interactions might have been occurring frequently and for longer than previously recognized.

The jaguar's current distribution overlaps entirely with that of South American freshwater dolphins, yet despite extensive research on both taxa, no detailed material evidence of active hunting had previously been documented. Here we present physical evidence confirming jaguar attacks on river dolphins (Fig. 4a, 4b, and 4c). Based on these material findings, it is now necessary to reconstruct the possible circumstances under which



Figure 3. Records obtained from a camera trap installed to monitor the consumption of an Araguaia river dolphin preyed upon by a jaguar, recorded in March 2024 on the left bank of the Araguaia River, near the municipality of São Félix do Araguaia.

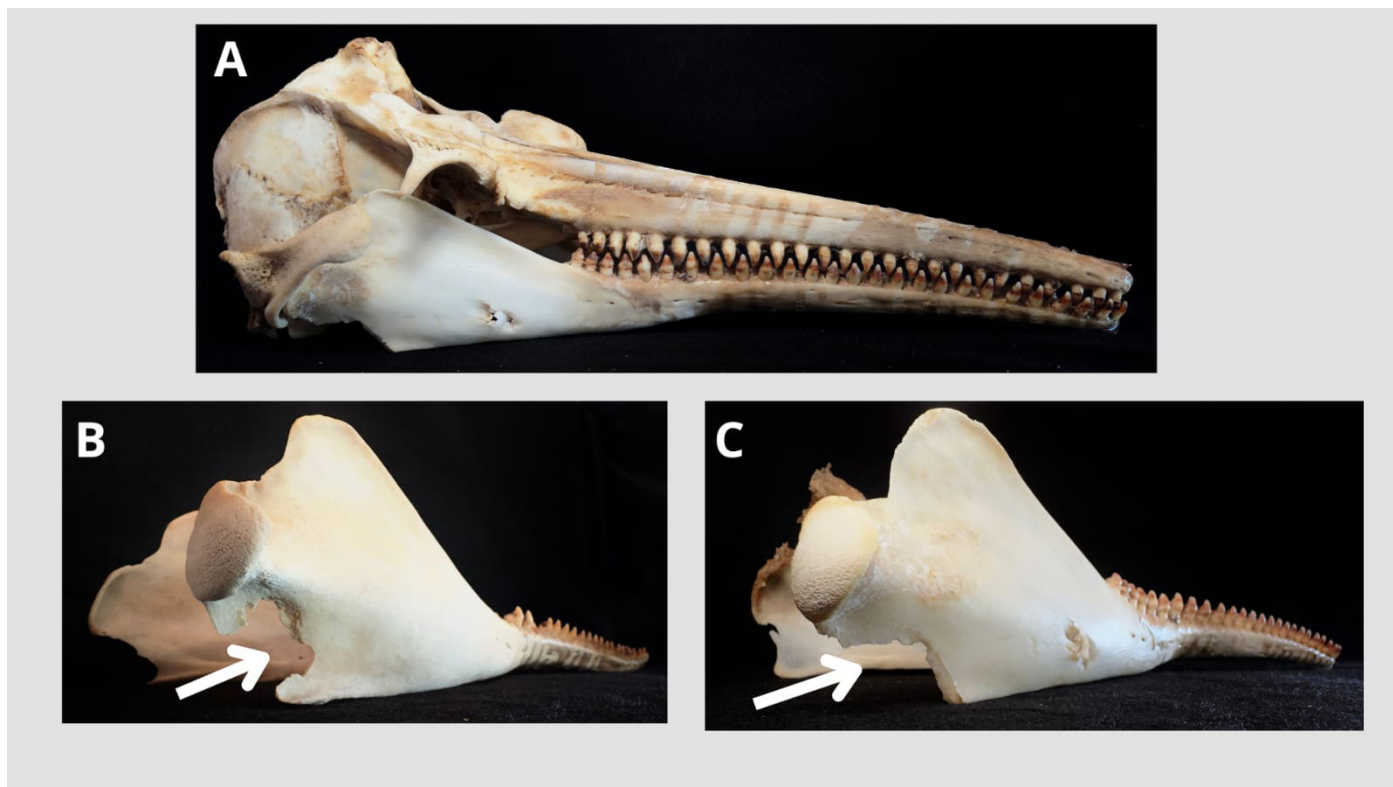


Figure 4. Three skulls of the Araguaian river dolphin (*Inia araguaiaensis*) showing jaguar (*Panthera onca*) bite marks, with the characteristic canine perforations produced during a fatal bite. A) skull found on the left bank of the Araguaia River, near the city of São Félix do Araguaia; B) and C) skulls found along the Araguaia River, near the city of Luiz Alves.

these events are occurring, especially in light of reduced river flow, which may be altering habitat conditions and potentially facilitating increased predation on dolphins. Thus, it will be possible to gain further insight into an interaction that is crucial for understanding jaguar ecology and the broader predation dynamics within Amazonian aquatic systems.

The rarity of documented cases might be explained by infrequent encounters between jaguars and dolphins. Furthermore, dolphins' lack of hair makes their detection challenging through traditional jaguar diet analyses, such as hair identification in scats, limiting documentation primarily to carcasses (Negroes et al., 2011). Closer examination of this ecological interaction reveals a combination of factors that facilitate such predation events. A key landscape feature enabling this interaction is the river's structure itself. The Araguaia River, within the dolphins' distribution range, is relatively shallow and fragmented during the dry season. Dolphins commonly fish by herding fish schools into shallow areas, frequently exposing their bodies above water.

Jaguars, known to patrol riverbanks and beaches hunting semi-aquatic prey such as caimans, turtles, and capybaras, are naturally attracted by the splashes dolphins produce when hunting. Indeed, local residents along the Araguaia River report jaguars emerging from forests specifically in response to such splashes, anticipating dolphin presence (L. Silveira, unpub. data). We assume this behavior rises from river dolphins offering jaguars a high-reward meal—rich in meat and fat, easy to consume thanks to their soft, edible skin, larger than any terrestrial prey except tapirs, and obtained with minimal risk of retaliation.

Significant landscape alterations, such as deforestation, dam construction, and subsequent fragmentation of aquatic ecosystems, profoundly impact the availability and distribution of

food resources for river dolphins. These environmental changes modify dolphin foraging behavior, frequently forcing them into more restricted and shallow habitats, thereby increasing their exposure to predation risk by jaguars (Campbell et al., 2022; Ferreira et al., 2022; de Moraes et al., 2025). Additionally, dolphins forage in forested small streams during the high-water season and may be exposed to predation under conditions that make detection by people even more difficult. Consequently, such environmental modifications may enhance opportunities for jaguars to exploit dolphins as prey, directly influencing predation dynamics and altering trophic relationships in Amazonian aquatic ecosystems. Jaguars are well-documented aquatic predators and opportunistic scavengers, also observed feeding on marine dolphin carcasses (da Silveira et al., 2010; Castañeda et al., 2013; Dias et al., 2025). On the northern coast of Honduras, two male jaguars scavenged a dolphin carcass washed ashore, dragging it inland and consuming it over several days, demonstrating behaviors such as sniffing and rolling on remains (Castañeda et al., 2013). Similarly, at Maracá-Jipioca Ecological Station off Brazil's Amapá State, a female jaguar and her cub scavenged a Guiana dolphin (*Sotalia guianensis*) carcass, likely a bycatch from illegal fishing, defending it against vultures and repeatedly feeding on it (Dias et al., 2025). These observations suggest jaguars may opportunistically learn to exploit dolphins as prey resources by initially scavenging carcasses, underscoring the potentially underestimated role of dolphins in jaguar foraging ecology and as critical bioindicators of aquatic ecosystem health (Das et al., 2022). The occurrence of jaguar predation on these dolphins may reflect important shifts in local ecological balance, such as changes in feeding strategies or forced displacement of dolphins into more vulnerable habitats due to reduced fish availability (da

Silva et al., 2018; Moraes et al., 2025). Therefore, we suggest that studies aimed at understanding predation interactions between jaguars and river dolphins will not only elucidate key aspects of jaguar trophic ecology, but also provide valuable insights into the environmental conditions and stability of Amazonian aquatic habitats, especially given the widespread informal reports of predation on other *Inia* species across the basin.

The middle-northern section of the Araguaia River, approximately 2,000 km long, presents structural characteristics that create unique opportunities for jaguar-dolphin interactions. Key factors include shallow waters, the dolphins' "beach-fishing" behavior, and the jaguars' riverside patrolling habits. Jaguars in this ecoregion have likely learned to associate river splashes with dolphin hunting behavior, which attracts them to the scene. This behavior described by locals is supported by ecological evidence. The relatively high number of videos available on the internet (e.g., YouTube) showing jaguars feeding on dolphin carcasses—or at least evidence of scavenging—supports the assumption that interactions between these top predators occur more frequently than previously expected. The reduction in flooded areas and water flow in the Araguaia basin indicated by dos Santos et al. (2024) contribute to the increase in shallow areas and greater exposure of the dolphin during foraging. During the dry season, when the Araguaia River becomes shallower, the dolphins' "beach hunting" behavior likely increases the chances of encounters between these two predators. These scenarios may play a significant role in the diet of jaguars whose home ranges include the river. Future studies should focus particularly on the dry season to monitor jaguar-dolphin interactions more intensively, considering the dolphins' role as critical indicators of ecosystem health, thereby guiding integrated conservation actions within the Araguaia River region.

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