Journal of Mammalogy, 2026, **00**, 1–5
https://doi.org/10.1093/jmammal/gyag042
Perspective

OXFORD

Beyond good intentions in river dolphin rescues: climate change and agroindustry expansion demand policy action

Enzo Aliaga-Rossel*[1,2] and Randall R. Reeves[2,3]

[1]1Instituto de Ecología, Universidad Mayor de San Andrés, Andrés Bello Av. & 27st. Cota Cota, Campus Universitario, La Paz, Bolivia
[2]IUCN SSC Cetacean Specialist Group, Gland, Switzerland
[3]Okapi Wildlife Associates, Hudson, QC, J0P 1H0, Canada

*Corresponding author: Instituto de Ecología, Universidad Mayor de San Andrés, Andrés Bello Av. & 27st. Cota Cota, Campus Universitario, La Paz, Bolivia. Email: ealiagar@hotmail.com

Abstract

South America's freshwater cetaceans, including the endangered Bolivian River Dolphin (bufeo; *Inia boliviensis*), are exhibiting population declines, perhaps mirroring the tragic extinction of one of their Asian counterparts as a result of human activity. Over the past 15 yr, in the river networks of eastern Bolivia, dozens of individual dolphins that were marooned in isolated canals and tributaries were rescued and relocated to deepwater locations. These reactive measures, however, are merely palliative. Without effective policy reforms and interventions that prioritize habitat preservation, climate resilience, and coordinated land-use planning, Bolivia's land-locked dolphins might be doomed.

Keywords agro-industrial expansion, cetacean conservation, climate change, drought, policy reform, translocation

Más allá de buenas intenciones en los rescates de delfines de río: el cambio climático y la expansión de la agroindustria demandan acciones políticas

Resumen

Los cetáceos de agua dulce de Sudamérica, incluido el delfín boliviano (*Inia boliviensis*), especie amenazada en peligro de extinción, están experimentando una disminución de sus poblaciones, lo que podría reflejar la trágica extinción de una de sus especies homólogas en Asia causada por la actividad humana. Durante los últimos 15 años, en las redes fluviales del este de Bolivia, se rescataron y reubicaron en zonas de aguas más profundas a decenas de delfines que habían quedado aislados en canales y afluentes. Sin embargo, estas medidas de rescate son meramente paliativas. Sin reformas políticas e intervenciones efectivas que prioricen la conservación del hábitat, la resiliencia climática y una planificación coordinada del uso del suelo, los delfines de Bolivia, un país sin salida al mar, podrían estar condenados a la extinción.

Palabras clave cambio climático, conservación de cetáceos, expansión agroindustrial, sequía, reforma política, translocación

Globally, freshwater cetaceans are being pushed toward extinction faster than most of their marine counterparts (Braulik et al. 2023). The Amazon River Dolphin, *Inia geoffrensis* (Blainville in Desmarest, 1817), is classified by the IUCN Red List as Endangered (Da Silva et al. 2018), and a strong case has been made that the dolphin population endemic to rivers in Bolivia deserves recognition as a separate phylogenetic species, namely the Bolivian River Dolphin (bufeo, *Inia boliviensis* d'Orbigny, 1846; see da Silva et al. 2018; Emin-Lima et al. 2022). Until recently, South America's river dolphins have received limited attention on conservation agendas compared to freshwater cetaceans in Asia, such as the extinct baiji or Yangtze River Dolphin, *Lipotes vexillifer* Miller, 1918; the critically endangered Yangtze Finless Porpoise, *Neophocaena asiaeorientalis asiaeorientalis* (Pilleri and Gihr 1972); and the critically endangered riverine populations of the Irrawaddy Dolphin, *Orcaella brevirostris* (Owen in Gray, 1866), in Myanmar, Cambodia, and Indonesia (Campbell et al. 2022).

In landlocked Bolivia, bufeos inhabit the upper Madeira Basin (Fig. 1), in rivers and tributaries of 3 sub-basins: Abuna, Mamoré, and Iténez (Aliaga-Rossel and Guizada Duran 2025). The entire Bolivian population of river dolphins is physically and genetically isolated from populations in Brazil by a series of natural barriers such as rapids and waterfalls (including Cachuela Esperanza), and the current is swift enough that bufeos cannot return upriver if they are swept or dragged downriver toward Brazil. Gravena et al. (2014)

Associate Editor: Michael McGowen
Received: November 13, 2025. **Accepted:** April 24, 2026
© The Author(s) 2026. Published by Oxford University Press on behalf of the American Society of Mammalogists, www.mammalogy.org. All rights reserved. For commercial re-use, please contact reprints@oup.com for reprints and translation rights for reprints. All other permissions can be obtained through our RightsLink service via the Permissions link on the article page on our site—for further information please contact journals.permissions@oup.com.

Downloaded from https://academic.oup.com/jmammal/advance-article/doi/10.1093/jmammal/gyag042/8690118 by ASM Member Access user on 21 May 2026

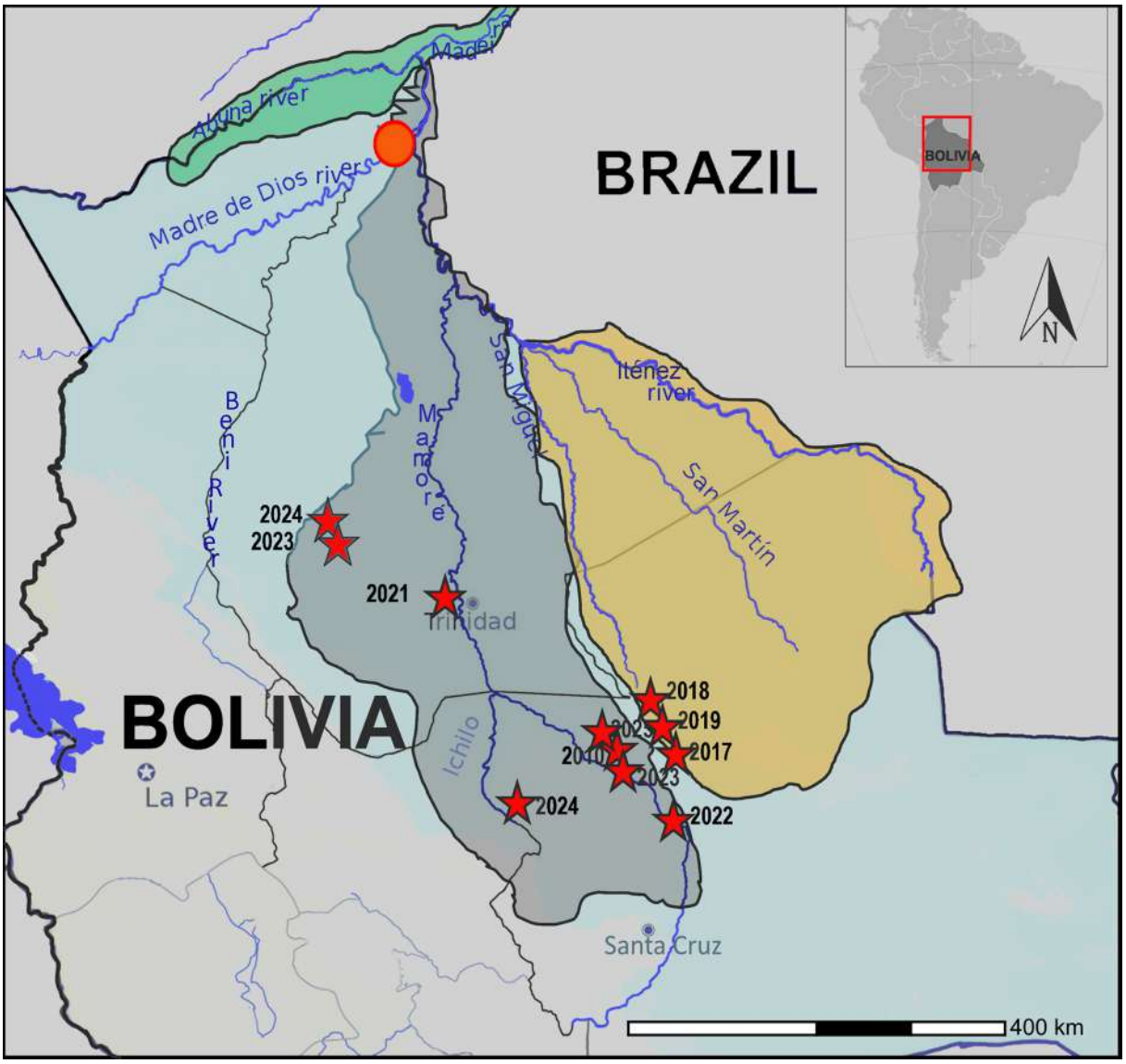


Fig. 1 Schematic map with the 3 subbasins in Bolivia: Abuna in the north; Mamore central; Iténez to the east. The circle marks the approximate location of the water cascades and rapids called Cachuela Esperanza, a natural barrier that prevents movement or migration of bufeos (*Inia boliviensis*) and excludes them from the Beni and Madre de Dios sub-basin. Stars are approximate locations of rescue operations that have taken place in the past (Table 1).

confirmed the separation and discreteness of populations of *Inia* by identifying 2 distinct genetic groups of genus *Inia*, 1 that is confined only to Bolivian river systems and another that is found in Brazil and elsewhere in South America. The construction of Jirau and Santo Antônio hydroelectric dams on the Brazilian upper Madeira River has further restricted the potential for connectivity (Gravena et al. 2015), thus exacerbating the isolation and increasing the vulnerability of the Bolivian population to local threats and environmental changes (Aliaga-Rossel and Guizada Duran 2025).

In recent years, the natural ecological conditions of these waterways have been badly degraded, exacerbating the impacts on dolphins already suffering from increasingly frequent and severe droughts (Acebey et al. 2023; Marengo et al. 2024). Reports of dolphins becoming marooned and trapped or stranded in isolated, desiccated water bodies have prompted a growing number of emergency interventions. The first large-scale rescue and translocation operation took place in 2010 when 26 dolphins were captured in the Pailas tributary and moved to the main Rio Grande River (Aliaga-Rossel and Escobar-ww 2020). That event was widely covered by international news media, and it marked a turning point for local conservation efforts. The operation demonstrated that such complex interventions were feasible even in remote regions, but it also served as a warning sign of the broader impacts of agro-industrial expansion. Since 2010, with varying levels of media coverage, rescues have been reported almost annually in the same region, rescuing/translocating from 1 individual up to 27 dolphins (Table 1; Venegas et al. 2023).

While volunteer locals and scientists from various institutions and organizations throughout Bolivia have rallied valiantly to save a few individual animals, the root causes of these increasingly frequent events continue unchecked. The impacts of droughts on aquatic life, including dolphins, are exacerbated by climate shifts and upstream water extraction. As admirable and heartwarming as the interventions and rescues by local conservation networks are, the hard truth is that such rescues can only be a temporary, partial, band-aid

Downloaded from https://academic.oup.com/jmammal/advance-article/doi/10.1093/jmammal/gyag042/8690118 by ASM Member Access user on 21 May 2026

Table 1 Documented rescues or attempted rescues of Bolivian river dolphins (*Inia boliviensis*).

Year	# bufeos	Area	Month	Observation	Sources Supplementary Data S1
2010	26	Rio Pailas	September		Aliaga-Rossel and Escobar 2020, (1,2,3)
2011	7	Pailas region	August	From a newspaper interview with M. Escobar	M. Escobar, pers. comm., (1)
2015	15	Pailas region/San Pedro	?	From a newspaper interview with M. Escobar	M. Escobar, pers. comm., (1)
2017	7		September	From a newspaper interview with M. Escobar	M. Escobar, pers. comm., (1, 4, 5, 6, 7)
2018	15	El Puente. La Pistola	October		(8, 9, 10)
2019	18	El Puente. La Pistola	February		(11, 12, 13)
2021	1	Near Mamore River	February	Found dead	EAR, personal observation
2022	7	Rio Grande basin	August		(14,15,16,17,18,19)
2023	5	Pampas de Yacuma	October	Locals helped open a small canal	B. Elias, pers. comm.
2023	24	San Pedro	December		(20, 21, 22, 23, 24)
2024	2	Pampas Yacuma	November	2 individuals, almost starving	Photos and video in social media
2024	2	Tributary of the Yapacani River	April	Rescued by the local government	(25,26)
2025	27		June		(27, 28, 29, 30, 31,32, 33, 34,35, 36, 37, 38, 39)

Data were obtained from multiple online articles and social network news, found using the key words identified in Supplementary Data SD1. The Source numbers given here in parentheses indicate the order listed in SD1, unless otherwise indicated.

solution to an ongoing and intensifying systemic hydrological crisis in eastern Bolivia and the Amazon basin in general (Marengo et al. 2024; Colque et al. 2025).

The entrapment or stranding of river dolphins in Bolivia is driven by aggressive agro-industrial expansion, widespread land trafficking, land clearing, burning, and logging. Large portions of the region have been subjected to unlawful forest fires and widespread deforestation, with an estimated 12 million hectares lost to burning in 2024 alone (Colque et al. 2025). Additionally, rivers, tributaries, streams, and other water bodies are increasingly being rerouted to irrigate for industrial-scale soybean production destined mainly for export (Aliaga-Rossel and Escobar-ww 2020). These activities disrupt the annual water cycle, alter river hydrodynamics, impede sediment flow, and degrade essential ecological functions. Climate change intensifies the pressure on dolphins and other aquatic wildlife, with severe droughts (de Lima et al. 2024; Marengo et al. 2024) and lethal spikes in water temperature. In 2023, for example, in Brazil, over 300 river dolphins died in less than a month when water temperatures exceeded 40 °C (Fleischmann et al. 2025).

Globally, the conservation of river dolphin habitat is challenging due to the limited distributions of these animals and their specialized ecological requirements (Campbell et al. 2022). The decline of Bolivia's river dolphins (Guizada Duran et al. 2024) is worsened by weak enforcement of environmental legislation—most notably the Mother Earth Law (Ley N° 300, 2012, Articles 24 to 27), which nominally committed the State to sustainable water management, biodiversity protection, and watershed governance. Article 24 mandates integrated and regenerative agriculture and livestock systems; Article 25 compels sustainable forest management; Article 26 regulates extractive activities to prevent ecosystem harm; and Article 27 requires comprehensive watershed planning that maintains ecological connectivity. Yet in practice, these legal provisions are routinely circumvented by agro-industrial lobbying (Armenteras and de la Barrera 2023; Lapola et al. 2023) and illegal land trafficking (Lapola et al. 2023; Rights and Resources Initiative 2025; https://rightsandresources.org), leaving huge gaps in environmental protection that directly threaten critical river dolphin habitats. The consequences are stark: the deforestation rate in the department of Santa Cruz ranks among the world's highest yearly (Robbins 2024), while climate models project increasingly severe droughts and further reduced river flows (Moreira et al. 2025; Rufino et al. 2025). These pressures leave Bolivia's river dolphins vulnerable, with local extirpations, especially in the upper Mamore sub basin, inevitable within the next few decades if trends persist (Guizada Duran et al. 2024).

Rescue and translocation protocols have been developed (e.g., Aliaga-Rossel and Escobar-ww 2020; Venegas et al. 2023; Fritzen and da Silva 2025), and dolphin rescue efforts have reached even into remote areas of the Amazon. Yet many cases undoubtedly go unseen and unrecorded as dolphins suffer and perish in isolated channels or drying pools where no one notices or before help can arrive. The dedication and collaboration of organizations and individuals have led to remarkable achievements, but relying on these reactive measures is not a sustainable strategy in the long run. Each operation involves challenging logistics, requires intensive veterinary care, countless volunteer hours, and inevitably adds to stress on an animal (Singh et al. 2023).

The situation in South America has begun to mirror that in Asia, where decades of neglect led to extinction of the baiji in China (Reeves and Gales 2006; Turvey et al. 2007), the severe population declines of the Ganges River Dolphin (*Platanista gangetica*) in India, Nepal, and Bangladesh (Singh et al. 2023), and the similarly rapid declines of riverine Irrawaddy dolphins in Myanmar, Cambodia, and Indonesia (Minton et al. 2017). Irrigation channels, agricultural runoff, river damming, and habitat fragmentation caused by the rapid and uncontrolled expansion of agro-industrial frontiers across densely populated regions of southern Asia have become major drivers of habitat degradation for those species and many others.

Downloaded from https://academic.oup.com/jmammal/advance-article/doi/10.1093/jmammal/gyag042/8690118 by ASM Member Access user on 21 May 2026

Over the past 15 yr, dedicated rescue missions led by volunteers have successfully freed numerous bufeos from canals, river segments, or isolated tributaries where they were trapped. These intense logistically challenging efforts have been critical to the survival of this species in the area. Yet, as noted above, we must emphasize that the rescues are merely palliative, as the root causes of habitat degradation and destruction continue unabated. As the chances of a dolphin surviving from 1 season to the next are jeopardized, conservation becomes an endless cycle of triage due to this glaring imbalance, where emergency intervention takes precedence over systemic protection.

Without swift and comprehensive policy reform and effective governance, Bolivia's river dolphins are at risk of following an all too familiar path, with valiant but ultimately futile efforts overshadowed by systemic failures (Smith 2009; Choudhury et al. 2019; Das et al. 2024). Bolivia and neighbor countries can still choose a different path to safeguard the future of this species—investing in solutions that strike at the roots of the problem, enforcing environmental laws, rigorously protecting the habitats that still remain in key aquatic ecosystems, and implementing riparian buffer zones. Asia's rivers serve as silent and polluted reminders of what inaction costs. Bolivia's dolphins—and the country's conservation legacy—hang in the balance.

Acknowledgments

E.A.R. thanks A Wood of Whale and Dolphin Conservation for supporting his efforts to study and conserve river dolphins in Bolivia. He also acknowledges and thanks the South American River Dolphin Initiative SARDI. Thanks to D. Edinger and S. Gardner for their comments on the document. The authors acknowledge the volunteers, scientists, and director of the Natural History Museum, Noel Kempff Mercado, for all their efforts over the years to care for river dolphins. We acknowledge the editor and reviewers for their suggestions to improve the manuscript.

Author contributions

Enzo Aliaga-Rossel (Conceptualization, Investigation, Visualization, Writing—original draft, Writing—review & editing) and Randall Reeves (Investigation, Visualization, Writing—original draft, Writing—review & editing)

Supplementary data

Supplementary data are available at *Journal of Mammalogy* online.

Supplementary Data SD1. Links of the media reports from 2010 to 2025 on the rescues of River dolphins (genus *Inia*), trapped or stranded.

Funding

The authors declare that no funds, grants, or other support were received during the preparation of this manuscript.

Conflict of interest

None declared.

Data availability

The information and data from social media used in the article are available online (Supplementary Data SD1).

References

Acebey S, Gómez R, Polanco R, Aliaga-Rossel E, Gamba C, González Valencia A, Fernandes M, Paredes-Leguizamón G, Colomo C, Guerrero G, et al. 2023. In: Corvalán ME, editor. Resumen para tomadores de decisiones. Evaluación rápida de la diversidad biológica y servicios ecosistémicos en la región amazónica. Brasília: OTCA, Proyecto OTCA/BIOMAZ, GIZ-Brasil, BMZ, Instituto Humboldt; p. 1–50.

Aliaga-Rossel E, Escobar-ww M. 2020. Translocation of trapped Bolivian river dolphins (*Inia boliviensis*). Journal of Cetacean Research and Management 21:17–23.

Aliaga-Rossel E, Guizada Duran L. 2025. Bolivian River Dolphin *Inia boliviensis* (d'Orbigny, 1834). In: Siciliano S, editor. Mammals of Middle and South America: Cetacea and Sirenia. Handbook of the Mammals of Middle and South America. Cham: Springer; p. 1–20. https://doi.org/10.1007/978-3-031-23847-5_19-1

Armenteras D, de la Barrera F. 2023. Landscape management is urgently needed to address the rise of megafires in South America. Communications Earth & Environment 4(1):305. https://doi.org/10.1038/s43247-023-00964-6

Braulik GT, Taylor BL, Minton G, Notarbartolo di Sciara G, Collins T, Rojas-Bracho L, Crespo LE, Ponnampalam LS, Double MC, Reeves RR. 2023. Red-list status and extinction risk of the world's whales, dolphins and porpoises. Conservation Biology 37(5):e14090. https://doi.org/10.1111/cobi.14090

Campbell E, Alfaro-Shigueto J, Aliaga-Rossel E, Beasley I, Briceño Y, Caballero S, da Silva VMF, Gilleman C, Gravena W, Hines E, et al. 2022. Challenges and priorities for river cetacean conservation. Endangered Species Research 49:13–42. https://doi.org/10.3354/esr01201

Choudhury NB, Mazumder MK, Chakravarty H, Choudhury AS, Boro F, Choudhury IB. 2019. The endangered Ganges river dolphin heads towards local extinction in the Barak river system of Assam, India: a plea for conservation. Mammalian Biology 95:102–111. https://doi.org/10.1016/j.mambio.2019.03.007

Colque G, Tinta E, Mamani P, Cordero L. 2025. Incendios forestales 2024 – Tras las huellas del fuego: informe de investigación. Fundación TIERRA, Bolivia.

da Silva VMF, Trujillo F, Martin A, Zerbini AN, Crespo EA, Aliaga-Rossel E, Reeves R. 2018. *Inia geoffrensis*. The IUCN Red List of Threatened Species 2018: e.T10831A50358152. https://doi.org/10.2305/IUCN.UK.2018-2.RLTS.T10831A50358152.en

Das GC, Usmani AA, Sharma SP, Guha S, Ali SZ, Barthwal S, Sarkar A, Mahar N, Rawat A, Gokulakrishnan G, et al. 2024. Conservation planning for Gangetic dolphin (*Platanista gangetica*) in smaller rivers of the Ganga River Basin, India. Global Ecology and Conservation 51:e02900. https://doi.org/10.1016/j.gecco.2024.e02900

de Lima LS, FEOe S, Anastácio PRD, Kolanski MMP, Pereira ACP, Menezes MSR, Parandela EL, Macedo MN. 2024. Severe droughts reduce river navigability and isolate communities in the Brazilian Amazon. Communications Earth & Environment 5:370. https://doi.org/10.1038/s43247-024-01530-4

Emin-Lima R, Machado FA, Siciliano S, Gravena W, Aliaga-Rossel E, de Sousa e Silva J, Jr, Hingst-Zaher E, de Oliveira LR. 2022. Morphological disparity in the skull of Amazon River dolphins of the genus *Inia* (Cetacea, Iniidae) is inconsistent with a single taxon. Journal of Mammalogy 103(6):1278–1289. https://doi.org/10.1093/jmammal/gyac039

Fleischmann AS, Papa F, Hamilton SK, Melack J, Forsberg B, Val A, Collischonn W, Laipelt L, Rossi JB, de Andrade BC, et al. 2025. Extreme warming of Amazon waters in a changing climate. Science 390(6773):606–611. https://doi.org/10.1126/science.adr4029

Fritzen C, da Silva VMF. 2025. Guia Para emergências com mamíferos aquáticos amazônicos em situações de seca extrema. 1st ed. ICMBio.

Downloaded from https://academic.oup.com/jmammal/advance-article/doi/10.1093/jmammal/gyag042/8690118 by ASM Member Access user on 21 May 2026

Gravena W, Farias IP, Silva MNF, Silva VMF, Hrbek T. 2014. Looking to the past and the future: were the Madeira River rapids a geographical barrier to the boto (Cetacea: Iniidae)? Conservation Genetics 15:619–629. https://doi.org/10.1007/s10592-014-0565-4

Gravena W, Silva VMF, Silva MNF, Farias IP, Hrbek T. 2015. Living between rapids: genetic structure and hybridization in botos (Cetacea: Iniidae: *Inia* spp.) of the Madeira River, Brazil. Biological Journal of the Linnean Society 114(4):764–777. https://doi.org/10.1111/bij.12463

Guizada Duran LA, Aliaga-Rossel E, Frias MP, Zerbini AN. 2024. Bolivian river dolphin trends: a long-term analysis in the Mamore basin. PLoS ONE 19(10):e0308806. https://doi.org/10.1371/journal.pone.0308806

Lapola DM, Pinho P, Barlow J, Aragão LEOC, Berenguer E, Carmenta R, Liddy HM, Seixas H, Silva CVJ, Silva-Junior CHL, et al. 2023. The drivers and impacts of Amazon forest degradation. Science 379(6630):eabp8622. https://doi.org/10.1126/science.abp8622

Marengo JA, Cunha AP, Espinoza J-C, Fu R, Schöngart J, Jimenez JC, Costa MC, Ribeiro JM, Wongchuig S, Zhao S. 2024. The drought of Amazonia in 2023-2024. American Journal of Climate Change 13(03):567–597. https://doi.org/10.4236/ajcc.2024.133026

Minton G, Smith BD, Braulik GT, Kreb D, Sutaria D, Reeves R. 2017. *Orcaella brevirostris* (errata version published. The IUCN Red List of Threatened Species 2017: e.T15419A123790805in 2018. https://doi.org/10.2305/IUCN.UK.2017-3.RLTS.T15419A50367860.en

Moreira D, Papa F, Fassoni-Andrade A, Fleischmann A, Wongchuig S, Paiva R, Paris A, Frappart F, Melo J, Crétaux J-F, et al. 2025. Widespread and exceptional reduction in river water levels across the Amazon Basin during the 2023 extreme drought revealed by satellite altimetry and SWOT. Geophysical Research Letters 52(11):e2025GL116180. https://doi.org/10.1029/2025GL116180

Reeves RR, Gales NJ. 2006. Realities of baiji conservation. Conservation Biology 20(3):626–628.

Rights and Resources Initiative. 2025. Ucayali, Peru: land trafficking encourages violations of Indigenous peoples' rights. [accessed 25 Jan 2026]. https://rightsandresources.org/blog/ucayali-peru-land-trafficking-encourages-violations-indigenous-peoples-rights/

Robbins S. 2024. Bolivian Amazon faces threats from all sides. In: Ramires MF, Robbins S, Cardenas JD, Pforzheimer A, Doherty S, editors. Stolen amazon: the roots of environmental crime in Bolivia. The Igarapé Institute/ InSight Crime; p. 1–70.

Rufino PR, Gücker B, Volk M, Strauch M, Cardozo FS, Boëchat IG, Faramarzi M, Pereira G. 2025. Modeling the nexus of climate change and deforestation: implications for the blue water resources of the Jari River, Amazonia. Water 17(5):660. https://doi.org/10.3390/w17050660

Singh S, Singh A, Dutta S, Srivastava S. 2023. Rescuing Ganges river dolphins (*Platanista gangetica*) from irrigation canals in Uttar Pradesh, North India, 2013–2020. Journal of Cetacean Research and Management 24(1):175–188. https://doi.org/10.47536/jcrm.v24i1.349

Smith BD. 2009. Witness to extinction: how we failed to save the Yangtze River dolphin by S. Turvey [book review]. Marine Mammal Science 25(4):987–991. https://doi.org/10.1111/j.1748-7692.2009.00331.x

Turvey S, Pitman RL, Taylor B, Akamatsu T, Barrett LA, Zhao X, Reeves RR, Stewart B, Wang KR, Wei Z, et al. 2007. First human-caused extinction of a cetacean species? Biology Letters 3(5):537–540. https://doi.org/10.1098/rsbl.2007.0292

Venegas C, Zabala-Pedraza JC, Michelle E, Deem S, Bronson E, Spickenbom J, Quintanilla M. 2023. Estructura social, resultados preliminares de salud y desplazamiento de bufeos (Inia *boliviensis*) rescatados en Santa Cruz, Bolivia. IX Bolivian Meeting of Mammalogy; abstract book. Red Boliviana de Mastozoología and Museo de Historia Natural Noel Kempff Mercado; p. 70.

Downloaded from https://academic.oup.com/jmammal/advance-article/doi/10.1093/jmammal/gyag042/8690118 by ASM Member Access user on 21 May 2026