

building, communication, management and public policy topics. Approximately 56 stakeholders from 21 institutions are engaged in contributing to the implementation of these conservation actions. The Action Plan will have a 5-year cycle, which started in June 2023, with annual monitoring. It has been approved by Rio de Janeiro Botanical Garden and formalized through Ordinance N°14 of 12 May 2023, published in the Federal Official Gazette. This initiates the implementation stage, which includes the execution of conservation strategies through actions to mitigate impacts on the target species and their habitats.

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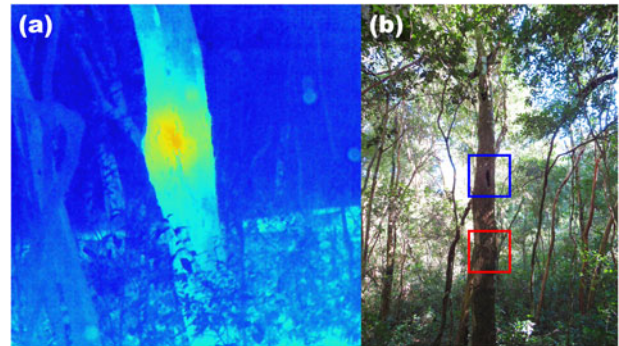
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### Thermal sensors as a potential tool for studying Endangered lion tamarins

Lion tamarins are small frugivorous and insectivorous primates endemic to the Brazilian Atlantic Forest that live in family groups of 2–8 individuals. All four species of the genus *Leontopithecus* are categorized as Endangered on the IUCN Red List because of habitat loss and fragmentation, and poaching for the wildlife trade. Their behaviour of hiding and sleeping in tree hollows protects them against predators and other adversity but hinders the study of them. However, technological advances are providing new tools for field research, including thermal cameras (Melo, 2021, *Oryx*, 55, 171).





To investigate the potential of using thermal cameras to study lion tamarins, we tested the detectability of a group hidden inside a tree hollow in a 33,845-ha forest fragment, in Teodoro Sampaio, São Paulo. We have monitored a group of black lion tamarins *Leontopithecus chrysopygus* comprising three adult males, one adult female and two juveniles (one male and one female) monthly since December 2022. They entered a hollow in a 9-m tall *Plinia rivularis* tree of 22.3 cm diameter at breast height (DBH) at 18.00 on 12 March 2023. The hollow was 2.2 m above the ground and 45 cm below the lowest external opening of the hollow. On the following morning we recorded this group at 6.00 inside the same hollow using the thermal camera on a drone, which had its thrusters off and was held in the hand. Because of the terrain and weather conditions, we were only able to test detection at distances up to 30 m. At this distance the heat contrast of the group inside the hollow remained distinguishable from the temperature of the surrounding environment.



(a) Group of black lion tamarins detected inside a tree hollow using a thermal camera, and (b) the hollow where the group was recorded (lower box) and the external opening of the hollow (upper box) in a *Plinia rivularis* tree. (Readers of the printed journal are referred to the online article for a colour version of this plate.)

At 9.00 one juvenile left the hollow and vocalized, emitting the species' typical long calls.

We recorded the group again on 28 March 2023 in the same tree hollow, confirming the frequent use of this site. On 25 May 2023 we obtained an additional record with a thermal camera of the same group but in a different tree hollow, 6 m above the ground in an unidentified 11-m tall tree of 45.2 cm DBH. These observations indicate the potential use of thermal sensors in lion tamarin research and management.

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### Largest known cat geoglyph in Chile identified as the Endangered Andean cat

Prehistoric art is one of the earliest ways in which early humans transmitted messages. Geoglyphs are believed to represent important beliefs in ancient cultures. With respect to Andean cultures, however, colonization often erased evidence of traditions, hindering interpretation.

In February 2023, the largest known geoglyph depicting a felid was discovered in the Atacama Desert in northern Chile. This geoglyph is located at a site known as Cerro Unitas, an important ceremonial site that includes the so-called Atacama giant, an anthropomorphic geoglyph (Briones & Alvarez, 1984, *Estudios Atacameños*, 7, 296–305). First recorded in a drone video, the felid geoglyph



The newly discovered Andean cat geoglyph in the Atacama Desert, Chile.

most likely re-emerged as a result of the removal of sand by strong winds. A preliminary assessment dates the site to c. 500 B.C. The geoglyph has a total length of 62 m from the head to the termination of the tail. For comparison, the so-called Nazca cat geoglyph discovered in Peru in 2020 is 37 m long.

The characteristics of the geoglyph suggest that it represents the Endangered Andean cat *Leopardus jacobita* rather than either of the other sympatric felid species in northern Chile (the puma *Puma concolor* and Pampas cat *Leopardus colocolo*). The long, broad, wide-ringed and uniform tail that does not taper towards the end differentiates the Andean cat from the Pampas cat, and the body shape and proportions, especially the legs and width of the tail, and spots on the flank, differentiate it from the Puma.

In the Andean worldview, the Andean cat has a role related to fertility and water, typically rainfall. Various modern ceremonies performed with desiccated but otherwise whole Andean cats decorated with brightly dyed llama wool are still performed in all four range countries of the Andean cat (Argentina, Bolivia, Chile and Peru), to ensure favourable harvests. The lines emanating from the head and forelegs of the Andean cat geoglyph probably depict the mediator between heaven and earth through the water and rain.

Although the subject of numerous research projects and despite threat reduction actions throughout its range, the Andean cat remains threatened. Our discovery connects the species to ancient sacred beliefs that endure today, and reinforces the importance of the Andean cat for ancient but persistent Andean cultures and of conservation action to ensure it remains extant for future generations.

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## Trade in sperm whale curios in Bali

The Vulnerable sperm whale *Physeter macrocephalus* is the largest of the toothed whales and used to be a prime target of the whaling industry. It was added to Indonesia's protected species list in 1980, but fishermen in Lembata Island kill up to 40 sperm whales annually, with no legal basis for the killing.

Sperm whales are captured by men who jump from wooden boats and drive bamboo harpoons into the whale's back. This traditional hunting has made whaling in Lembata the focus of several high-profile articles and documentaries. This coverage, and the rise in tourism in Indonesia, has increased interest in the hunting of sperm whales and trade in sperm whale parts. Sperm whales are included on Appendix I of CITES and export and import permits are required for any cross-border trade. Indonesia has never reported the legal export of sperm whale parts to the CITES Secretariat, and the sale and export of sperm whale parts is illegal.

In May–June 2023 we surveyed curio, antique and traditional Indonesian art shops in Bali for sperm whale parts. Bali is one of Indonesia's premier tourist destinations and known for its trade in animal curios (Nijman & Nekaris, 2014, *TRAFFIC Bulletin*, 26, 31–36). Over the same period, we searched the internet for offers of sperm whale parts by Indonesian-based traders.

In six shops in Ubud and Sanur we found eight small containers made from sperm whale teeth, three single teeth, one necklace containing 12 teeth, and five combs made from bone; all were said to have been sourced from Lembata. The shops we visited target international tourists. None of the traders mentioned CITES or the protected status of sperm whales in Indonesia. One trader wrongly stated that Indonesia has no legislation in place for whales and others indicated that exporting these items would not be a problem as tourists do it all the time.

Online, traders in Bali offer rings made of sperm whale teeth, and cigarette pipes, bracelets, figurines and combs made from bone. These include offers on private sellers' websites and on e-commerce platforms Bukalapak.com and Tokopedia.com, which in their terms and conditions preclude the sale of protected wildlife.

At the Bale Nagi Festival on 11–15 April 2023, a local government-sponsored event in eastern Flores, a delegation from Lembata was selling sperm whale curios and promoting them as souvenirs. Media reports give