

First record of *Leopardus colocola* (Molina, 1782) in Northern Patagonia, Aysén Region, Chile, and behavioral scent-marking observations

Primer registro de *Leopardus colocola* (Molina, 1782) en Patagonia Norte, Región de Aysén, Chile y observaciones de comportamiento de marca territorial

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ABSTRACT

Scarce records of Pampas cats exist in the extreme south of Chile (Patagonia). Through camera traps, we captured the first confirmed record of *L. colocola* in northern Patagonia of Chile. Besides, records of its marking behavior through feces and urine were captured and discussed to understand this poorly known wild cat.

Palabras clave: carnívoro, *pajeros*, pequeño felino, trampas cámaras.

RESUMEN

Escasos son los registros de gato Colo-Colo en el extremo austral de Chile. Mediante cámaras trampas capturamos el primer registro confirmado de *L. colocola* en la Patagonia Norte de Chile. Además, se aportan registros de su conducta de marca territorial a través de heces y de orina, los que han sido escasamente documentados para felinos salvajes.

Keywords: carnívoro, *pajeros*, small cat, trail cameras.

The Colo-Colo (*Leopardus colocola*) or Pampas cat is one of Chile's least known wild cat species. This cat has a wide geographical distribution in South America, ranging from north to south from Ecuador to Argentinean Patagonia and from east to west from Brazil to Chile (Nowell & Jackson 1996). Recently, it has been considered a rare wild cat species in almost all its distribution range (Lucherini *et al.* 2016). The Pampas cat has great phenotypic variability in all its range, which confuses its taxonomy. The most recent taxonomic review by the Cat Specialist group (Kitchener *et al.* 2017) establishes seven subspecies with a great genetic difference. Recently, Do Nascimento *et al.* (2020) has made a new taxonomic proposal for the species but have not been assessed or approved by the IUCN Cat Specialist Group. In

Chile, there are three subspecies: *L. colocola colocola*; *L. c. wolffsohni* Garcia-Perea 1994; y *L. c. pajeros* Desmarest 1816. The subspecies *L.c. pajeros* presents a distribution mainly in Argentina (Garcia-Perea 1994; Kitchener *et al.* 2017). Some authors believe that this subspecies would not be present in Chilean Patagonia (Kitchener *et al.* 2017). Wolffsohn (1908) is the first who refers to the presence of *L. colocola* at Southern Patagonia in Chile. However, it is not clear the veracity of this record due to color differences and its possible misunderstanding with the sympatric Geoffroy's cat (*Leopardus geoffroyi*). Indeed, these differences, together with differences in cranial measurements, led Garcia-Perea (1994) to raise it to full species. Johnson *et al.* (1990) is the first to confirm this species's presence by capture in the southern

Patagonia of Chile (at a small town located 50 km to the south of Torres Del Paine). Then, García-Perea (1994) registered this cat from two individuals from Southern Patagonia (in Puerto Prat and Cerro Castillo, based on an individual from a museum and Johnson *et al.* 1990, respectively). Since that date, no records of *L. colocola* exist in Patagonia in Chile.

The field of study is located close to Ingeniero Ibañez-Pallavicinni's border crossing (20 km east from the city of Puerto Ingeniero Ibañez). The vegetation of the zone is Andean temperate grassland of *Nassauvia dentata* and *Senecio portalesianus* (Luebert & Plissock, 2018).

Here the first record in Northern Patagonia and the southernmost record of *L. colocola* in Chile since 1990. We set eighteen camera traps (Stealthcam models STC-G45NGX, STC-G45NGMAX, and STC-DS4K; Browning model BTC-5HDX; Rainbowday model DEER CAM and Camtrap model KAMTRAP); We installed five units in front of carnivore's dens, and 13 units in animal trails (based on footprints and other signs). All camera traps were set to record videos for

40 seconds in order to register behavior. The work area is delimited north by latitude 46° 14'1" S, westward 71° 48'14" W, eastward along the Argentine border, and covers 12 km². To the south, it borders the parallel 46° 18'25" S. Each camera trap is separated from another by a distance of approximately 1 km, except for two cameras facing each other in a cave.

We captured five events of *L. colocola*, during 6570 trap nights in 12 months. These events correspond to marking behaviour records related to the use of dens, such as defecation and urine spraying. During the check of camera trap in front of a burrow, we identify feces of *L. colocola* by morphological features (Figs. 1A and 1B). The feces found in the caverns match the description for small wild cats (Palacios 2007; Muñoz-Pedreras 2010). Also, the feces found cannot be confused with the Patagonian skunks' excrement because they differ significantly in their anatomy (Travani *et al.* 1998; Medina *et al.* 2009).

In site 3, we captured *L. colocola* observing and entering the den to mark the site (Figs. 2A, 2B, 2C). This action

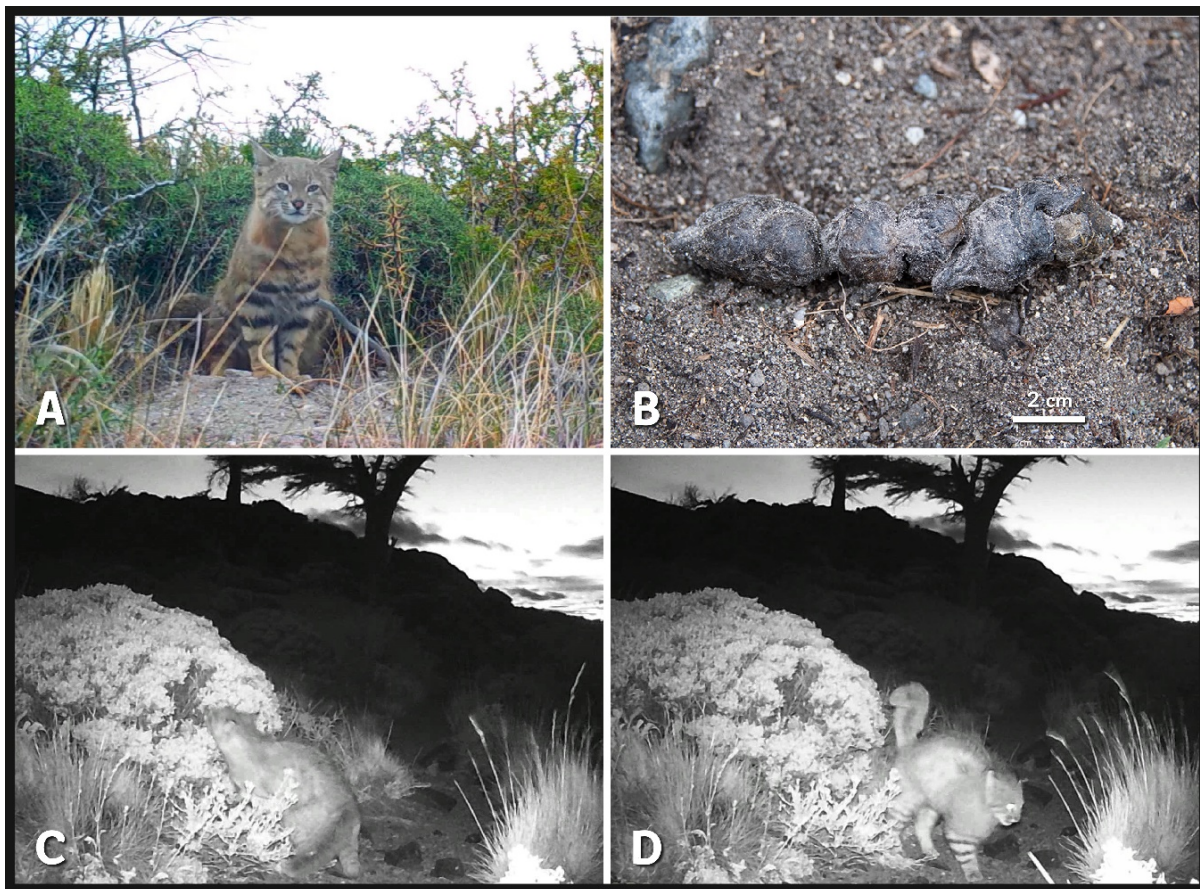


FIGURE 1. A) Pampas cat defecating in abandoned burrow. B) Faeces of Pampas Cat found in the burrow. C) Pampas cat sniffing. D) Pampas cat spraying. / A) Gato Colo-Colo defecando en una cueva abandonada. B) Heces de gato Colo-Colo encontradas en la cueva. C) Gato Colo-Colo olfateando. D) Gato Colo-Colo rociando orina.

coincides with those registered by Rodgers *et al.* (2015) for ocelots (*Leopardus pardalis* Linnaeus, 1758). In this case, we could not register the feces; probably because a *Conepatus chinga humboldti* Gray 1837 inhabited this den (Fig. 2D). The third recorded behavior corresponds to a Pampas cat marking by urine spraying after smelling (Figs. 1C and 1D).

We present the first Colo-Colo records in the Northern Patagonia (Región de Aysén), which confirms this elusive feline in Chile near the Argentinean frontier. Confirmed records of *L. colocola* in the southern part of Chile corresponded to southern Patagonia in Región de Magallanes and Antártica Chilena (Johnson *et al.* 1990; Garcia-Perea 1994). We highlight the fact that no records existed since 1990 in this macro zone of the country. In addition, we recorded the first images of marking behaviour through defecation and urine spraying for the pampas cat in Patagonia. In the extreme north of Chile, it has been described that the *Leopardus colocola* uses small caves between rocks at the bottom of the creek or in rocky outcrops (Vega *et al.* 2018) as well as the sympatric Andean cat (*Leopardus jacobita* Cornalia 1865) (Napolitano *et al.* 2008;

Marino *et al.* 2010). Napolitano *et al.* (2008) documented that these species would share these caves as latrines. However, this “sharing” could be a marking behavior related to territory competition. These studies agree with our records of the Colo-Colo using dens or small caves of other carnivores such as *Conepatus chinga humboldti*. Thus, it is possible to infer that these species use feces as an important intra or interspecific communication for territory marking. It has documented that latrines have great potential as communication centers in felines of the *Leopardus* genus (Rodgers *et al.* 2015)

Luque-Fernández *et al.* (2019) report by camera traps a *L. colocola* in a den of burrowing owl (*Athene cunicularia*). These authors assume this behavior as a predatory action. According to what is reported in this work maybe it is establishing a latrine. Probably small caves and dens have great importance in this species’ spatial ecology in habitats of Patagonia grasslands. However, more studies about space ecology of this wildcat are needed in forest and grassland areas, since it has been reported that trees are often used as latrines by the genus *Leopardus* (Soler *et al.* 2009; Figueroa *et al.* 2018).



FIGURE 2. A) Pampas cat examining the cave, B) hanging out, C) defecating, E) chingue who used the cave. / A) Gato Colo-Colo examinando la Cueva, B) gato Colo-Colo dando la vuelta, C) gato Colo-Colo defecando, D) chingue que usaba la cueva.

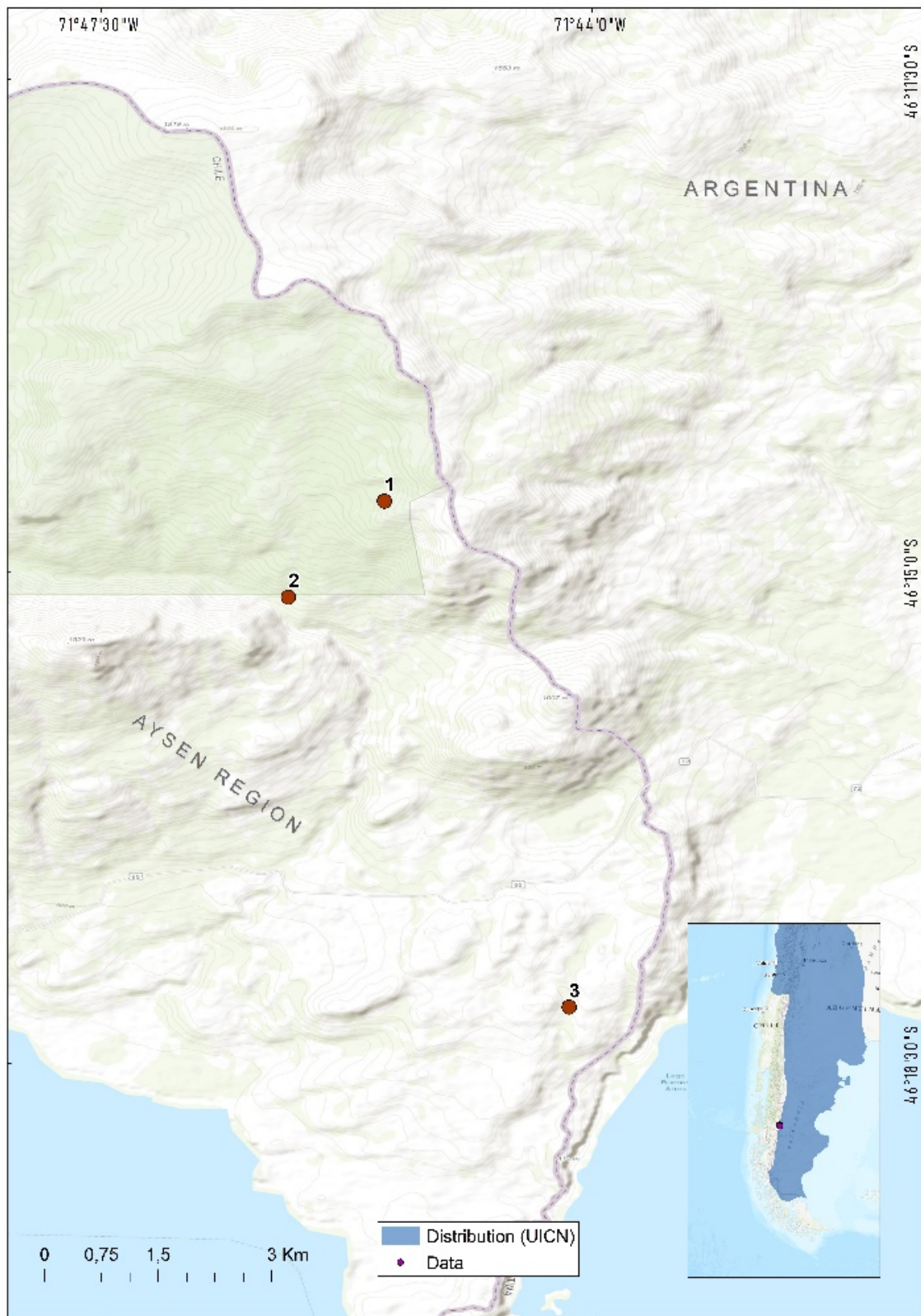


FIGURE 3. Study área, the red points represent the pampas cat records. / Área de estudio, los puntos rojos representan los registros de gato Colo-Colo.

In our records, *Leopardus colocola* uses a large diameter plant like the neneo (*Mulinum spinosum*) to spray urine as a scent mark. Further studies are necessary to determine which plants prefer carnivores to communicate marking behavior. Indeed, the selection of plant species by carnivores for marking behavior has been sparsely documented (Piñeiro & Barja 2012). Callahan & Dulaney (1997) described *Leopardus colocola* in captivity does not scratching wood to mark its territory, assuming urine spraying could be more important than scratching in *L. colocola* marking behavior. Based on our reports and available literature we can asseverate that small wildcats use small caves or dens, and plants to mark its territory. It is important to highlight that at least one of the dens used as latrine was inhabited by any carnivore.

We hypothesized that there could be reciprocal benefits between the Colo-Colo, and the Patagonian hog-nosed skunk, since the burrow would serve as a refuge for the *Conepatus chinga humboldti* and as a latrine for the *Leopardus colocola*. Due to there is no temporal segregation between both species, both have night-time habits mainly (Lucherini *et al.* 2009; Castillo *et al.* 2014), and they differ in the consumed prey (Palacios *et al.* 2012). Even though the Colo-Colo has the potential (size and weight) to prey the Patagonian hog-nosed skunk (Oliveira & Pereira, 2013), it would not do so because it benefits from the caves that they make.

Carnivores use urine, glandular secretions, and feces as chemical signals to inter and intraspecific communication. The roles that these scent marks play is described as territory defence, indicators of reproductive status, and preventing agonistic encounters (Eaton 1970; Smith *et al.* 1989; Zub *et al.* 2003; Wemmer and Scow 1977; Molteno *et al.* 1998; Broomhall *et al.* 2003; Smith *et al.* 1989; Müller and Manser 2007). In Chile, scarce knowledge about how rare and threatened small wild cats socialize in wild areas. Thus, it would be important for ecology and conservation to understand how small wildcats use defecation and urine behavior to interact with competitors, sympatric, predators and prey species.

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