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Endangered Andean cat distribution beyond the Andes in Patagonia

The endangered Andean cat *Leopardus jacobita* was considered an endemic of the Andes at altitudes above 3,000 m, until it was discovered in the Andean foothills of central Argentina in 2004. We carried out surveys for Andean cats and sympatric small cats in the central Andean foothills and the adjacent Patagonian steppe, and found Andean cats outside the Andes at elevations as low as 650 m. We determined that Andean cats are widespread but rare in the northern Patagonian steppe, with a patchy distribution. Our findings suggest that the species' distribution may follow that of its principal prey, the rock-dwelling mountain vizcacha.

The Andean cat was previously believed to be endemic to the Andes above 3,000 m (Yensen & Seymour 2000), until an opportunistic photograph in 2004 produced the startling finding of two Andean cats at only 1,800 m, in the Andean foothills of central Argentina (Sorli et al. 2006). The distribution of the Andean cat's principal prey, the mountain vizcacha *Lagidium viscacia* (Walker et al. 2007a, Napolitano et al. 2008), a large, rock-dwelling rodent, extends throughout the Andean highlands and into lower elevations of the Patagonian steppe ecological region, to the east of the southern Andes. Our purpose was to estimate the distribution of the Andean cat in the central Andean foothills, and determine whether it followed that of the mountain vizcacha into the adjacent Patagonian steppe.

Methods

During 2007-2009, we surveyed approximately 31,000 km² in Mendoza and Neuquén provinces, Argentina (Fig. 1), using a two-tiered sampling scheme (Sudman & Kaltan 1986), as the Andean cat is likely to have a patchy

distribution if it does indeed follow that of the mountain vizcacha. First, to avoid bias for particular habitats beyond the Andes we placed a 2 x 2 km grid over the area with ArcGIS. We selected 105 grid cells, using stratified random sampling to ensure broad geographic coverage, and interviewed the rural inhabitants nearest to each cell (n= 36: nearest inhabitant was the same for some cells, others could not be located). Secondly, we conducted targeted surveys at 14 sites in the foothills and the steppe with large expanses of exposed basaltic rock, the habitat of mountain vizcachas (Walker et al. 2007b). We interviewed 15 inhabitants, asking them to name and describe the small cat species which occurred where they lived, and if they had skins, took tissue samples for species identification with genetic analysis (Cossíos & Angers 2006). Descriptions by informants of the "gato overo" corresponded to the Geoffroy's cat *Leopardus geoffroyi*, of the "gato amarillo", to the pampas cat *Leopardus colocolo*, of the "gato moro", to the jaguarundi *Puma yagouaroundi*, and of the "once" or "onza", to the Andean



Fig. 1. Location of new records and unconfirmed reports of Andean cats in Mendoza and Neuquén provinces (black dots), relative to previous known distribution in Argentina (grey area).

cat. We also searched rock outcrops for fresh feces for genetic identification.

Results and Discussion

In the 36 random interviews, presence of the Geoffroy's cat was indicated by 94% of informants, pampas cat by 68%, jaguarundi by 9%, and Andean cats by only 3% (Fig. 2). In large areas of rocky habitat results were quite different, with the presence of pampas cat indicated by 93% of the 15 informants, Andean cat by 80%, and Geoffroy's cat by 68%. Seventy percent (n = 19) of fecal samples were pampas cat, 11% (n = 3) were Andean cat, and 19% (n = 5) were Geoffroy's cat. Thus, the Geoffroy's cat is the most abundant small cat at a regional scale, but the pampas cat is more

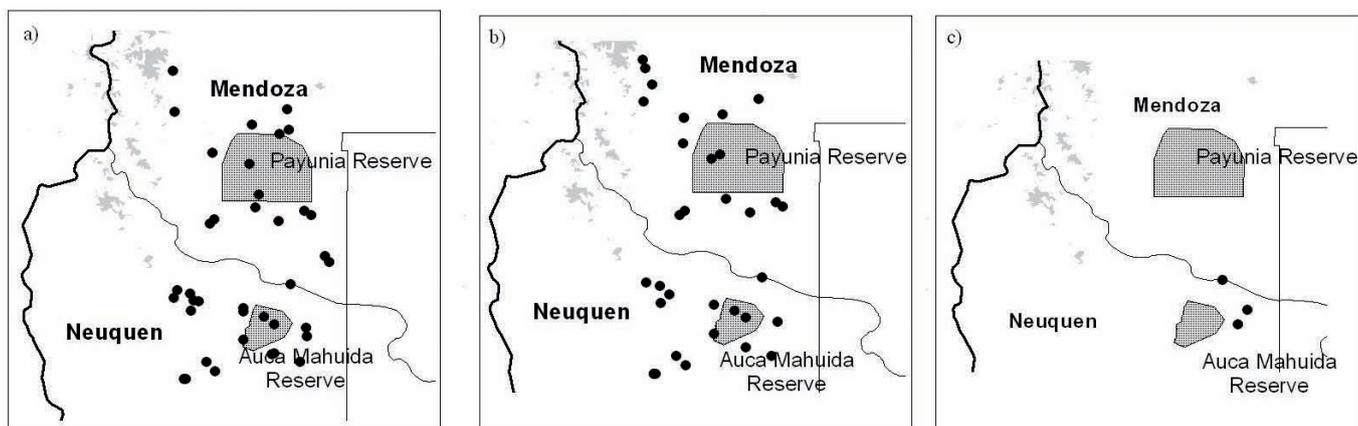


Fig. 2. Locations where informants indicated presence of small cat species: a) Geoffroy's cat; b) pampas cat; c) jaguarundi.

abundant in habitats where Andean cats are found. Although the Andean cat is sympatric with the jaguarundi at a regional scale, they appear to occupy different habitats.

We confirmed the presence of Andean cats at 36% (n=5) of the targeted sites with mountain vizcachas (Table 1). In 2006 we collected feces of two different Andean cats in Caverna de las Brujas in the Andean foothills of Mendoza. Approximately 80 km east of the Andes, in Agua de Perez, Mendoza, three adult Andean cats had been killed between 2002 and 2007 at a goat corral under a cliff. In Neuquén, also 80 km east of the Andes, two adult males were killed in 2005 and 2008 (Neuquén-Agrío and Chihuidos). In 2008 we found Andean cat feces in Las Carceles, southeast of the Chihuidos plateau. Andean cats were reported from seven other locations, all within the range defined by confirmed records, but we were unable to confirm these reports (Fig. 3).



Fig. 3. Andean cat skin from Chihuidos (Photo A. Novaro).

The newly-confirmed records are the lowest ever reported, extending the distribution of the Andean cat into steppe and scrub habitats within the Patagonian steppe ecological region. Combined with a recent report from Cerro Nevado (Martinez et al. 2008; Fig. 3), they indicate that the species is widely distributed outside of the Andes. Nevertheless, as it was reported in only 3% of the random interviews, yet confirmed at 36% of the targeted sites with mountain vizcachas, it appears to have a patchy distribution, which may depend on the availability of its principal prey species. Because the distribution of the mountain vizcacha extends even further south and east in Patagonia, the Andean cat may have or have had in the past an even larger distribution than is currently known. Our team is continuing to survey areas with



Fig. 4. Habitat where Andean cats occur in Chihuidos (Photo A. Novaro).

mountain vizcachas in Neuquén and Mendoza, and it is important to carry out surveys in other parts of Patagonia, to determine if other populations of Andean cats exist. Andean cats in this area appear to represent an evolutionary lineage distinct from the species in the Andes (D. Cossíos, pers. comm.). Ecological and morphological studies to evaluate local adaptations of the lowland Andean cats are also important. In Patagonia, goat herders

who killed Andean cats believed them to be preying on their goats, generating high conflict with the main livelihood of local people, and thousands of kilometres of oil exploration trails destroy habitat and provide access to remote areas for poachers (Fiori & Zalba 2003). The conservation of this newly-discovered, distinct population of Andean cats depends on adequately addressing these threats.

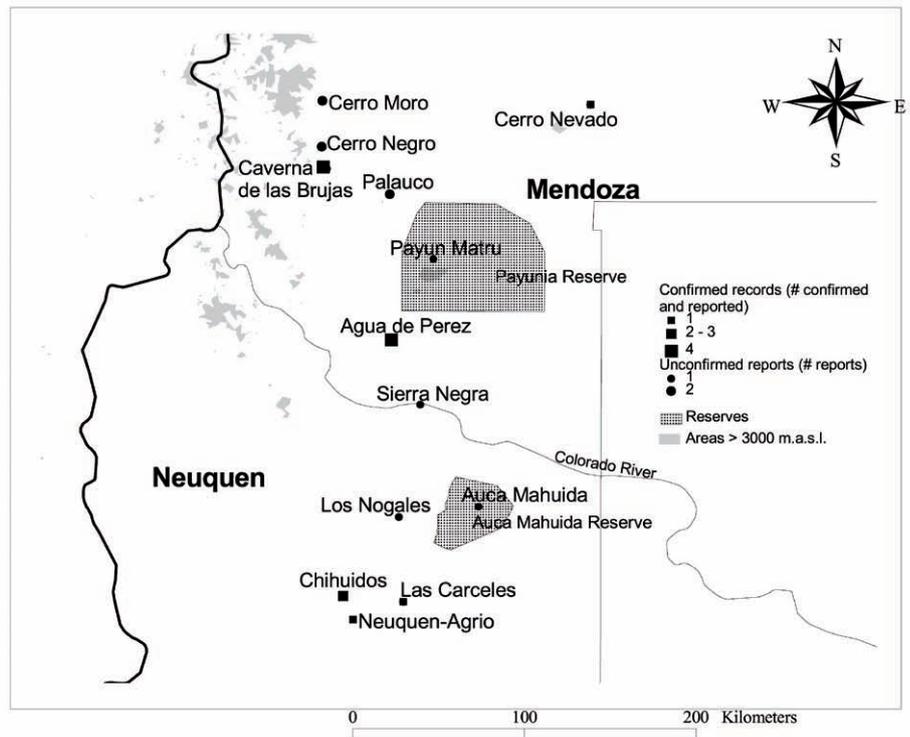


Fig. 5. Confirmed and unconfirmed records of Andean cats from this report and Martinez et al. (2008, Cerro Nevado), and areas above 3,000 m, previously considered the lower altitudinal limit of the species' distribution.

Table 1. Location of confirmed records of Andean cats and type of evidence used for confirmation. All evidence confirmed with DNA analysis.

Location	Latitude	Longitude	Elevation	Type of evidence
Agua de Perez	-36.79004	-69.43932	1740	Two skulls and one skin
Las Carceles	-38.28361	-69.37056	962	Feces
Chihuidos	-38.25194	-69.71278	650	Skin
Neuquén-Agrio	-38.38694	-69.65472	650	Skin
Caverna de las Brujas*	-35.80207	-69.82408	1800	Feces (2)

*Site where 3 Andean cats were photographed in 2004 (Sorli et al. 2006). This finding indicates the continued presence in 2006 of at least two individuals.

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Fig. 5. Andean cat tail from Agua de Perez, southern Mendoza (Photo A. Novaro).