

The importance of conservation strategies for *Leopardus jacobita*

Introduction

The Andean Cat (*Leopardus jacobita*) is a small carnivore with a moderately vast range in South America. It is the most threatened cat species in the world (Sanderson 2006).



The Andean Cat (*L. jacobita*) is small in size when compared to other felids. Measurements taken from pelts show that adults vary in total length from 740 to 850 mm while adolescents vary from 577 to 600 mm. Their distinct tail measures 410-485 mm in adults and 330-420 in adolescents. Weight has only been taken from 2 specimens in Peru both weighing about 4 kg (Villalba 2004).

Ecology

The Andean cat is well adapted to the severe climate that is found at high elevations in the Andes of Argentina, Bolivia, Chile, and Peru. These areas are sparsely decorated by thola shrubs and free water which attract the Mountain vizcachas and waterfowl. The distribution of the

shrubs, water, waterfowl, and vizcachas plays a large part in influencing the distribution of *L.*

jacobita since this is one of the Andean Cat's primary sources of prey (Villalba 2004). Scat analysis using polymerase chain reaction (PCR, a process for amplifying DNA) has given researchers a better idea of the diet of *L. jacobita* (Cossios 2006). In these areas, other similarly sized carnivores compete with the Andean cat including foxes, grison, skunk, and pampas cat as well as the larger puma (Villalba 2004).

Little is known about the biology of the Andean cat, however many conjectures can be made based on what is known of other similarly sized cats. It is likely that *L. jacobita* is a solitary species inhabiting large areas with relatively low densities. The territories which this cat inhabits are mostly influenced by resource availability and also the presence of females during mating season. It is believed that the mating season for the Andean cat is between September through December with births occurring between October and April (the Spring season in the Southern hemisphere). Though the average litter size is unconfirmed, two separate observations have witnessed two cubs (Villalba 2004).

Population status and history

It is likely that *L. jacobita* naturally are found in low density populations. Studies on population are of utmost importance to the conservation of the Andean cat. Methods to estimate the population size and range include scat analysis and camera traps.

The coat of *L. jacobita* has an ash base color with yellow-brown blotches which resemble continuous stripes with the tail displaying 6-9 dark rings. When this cat is young to sub-adult, it strongly resembles its main competitor, the Pampas Cat. The similarity in young Andean Cats to the Pampas Cat have made population estimation very difficult. As *L. jacobita* matures the tail

length and rings become more distinct and unique to allow for easier differentiation compared to the Pampas Cat (Villalba 2004).

Scat analysis is useful for determining the distribution, abundance and diet and is especially useful when used in studies of rare animals. DNA methods utilize the intestinal cells found in feces. Using PCR, it is possible to amplify portions of the mitochondrial genome and measure the size of the segments to differentiate between different species. The tests look for specific proteins that are only associated with specific species. This allows researchers to obtain a better grasp on population size and distribution of the Andean cat (Cossios 2006).

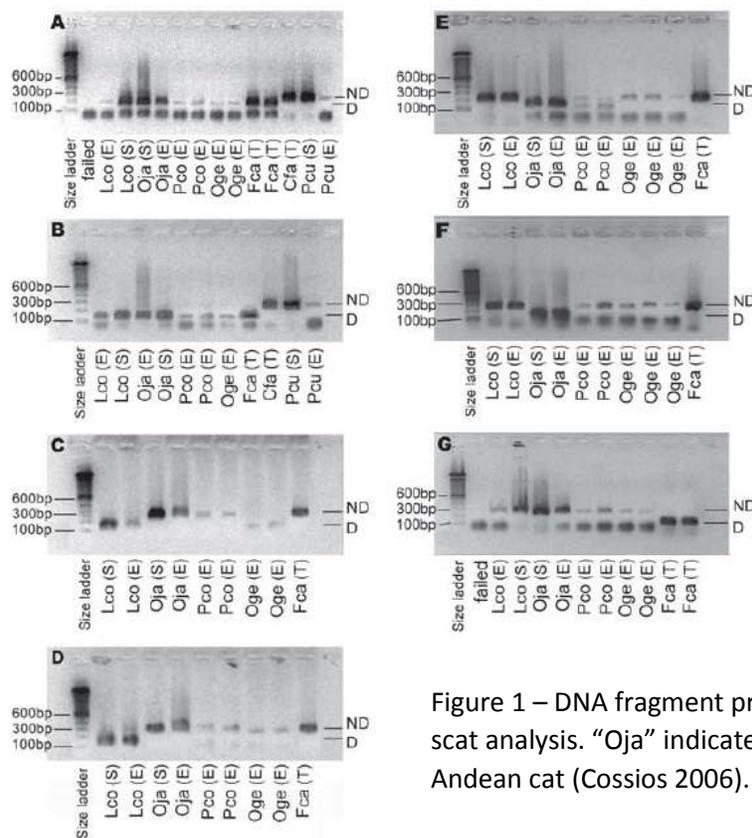


Figure 1 – DNA fragment profiles from scat analysis. “Oja” indicates the Andean cat (Cossios 2006).

It is difficult to acquire physical observations of the Andean cat (potentially due to their nocturnal behavior) and because of this camera traps are often used in population estimates. A study conducted between October through December of 2006 and April through June of 2007

utilized camera traps and paired the results with probably and density model analysis. The research was carried out at elevations around 4,200 meters in the Andean region of Argentina. The results of this study and the subsequent mathematical analysis demonstrated the density of the Andean cat to be 0.07 individuals/km² in 2006 and 0.12 individuals/km² in 2007. The same methods were carried out regarding the Pampas cat in the same region which was found at a density of 0.74 individuals/km² in 2006 and 0.79 individuals/km² in 2007. This gives a decent representation of the rarity of the Andean cat, especially compared to one of its main intraguild competitors (Repucci 2011).

Current and Historic Range

Little information is available pertaining to the past range of the Andean cat, but some evidence suggests that its range may have been more extended, indicating less constrained movement and the potential to cross valleys between high elevations. The current range of *L. jacobita* includes Southern Peru, Bolivia, Northern Chile, and Northwest Argentina. The specialization of the habitat in which the Andean cat resides also makes it vulnerable to natural habitat fragmentation. Due to its specialization for these particularly high zones, the Andean cat is considered an endemic species to these areas (Villalba 2004).

Many studies for the cat have been carried out in Argentina, Chile, and Bolivia (Repucci 2011, Sanders 2006). These studies have shown relatively low densities in these areas, which may be due to the presence of intraguild competitors. Villages in Northwest Argentina have been the target of several conservation projects involving education (Luchrini 2008).



Figure 2 – Locations of records of Andean Cat presence from 1984-2004 (Villalba 2004).

Legal Status

As of 2002, the Andean cat is categorized as endangered according to the IUCN under the criteria which signifies a population of less than 2500 mature individuals, a decreasing population trend, and no presence of sub-populations with more than 250 mature individuals. The Convention for International Trade of Endangered Species (CITES) protects *L. jacobita* by imposing strict regulation on the commerce of this cat including live specimens, skins, and other

body parts. Other more specific rules are put in place by the countries which are part of the range for the Andean cat. Despite the prohibitions, hunting of *L. jacobita* still persists as it is difficult to enforce the laws (Villalba 2004).

In Argentina, National Law 22421 protects the Andean cat by prohibiting hunting commerce and export. Bolivia has protected *L. jacobita* since 1990 under the Supreme Decree N°22641 which is a general ban on the pursuit, capture, storing, and conditioning of wild animals. Since 1972, Chile has protected all felid species under Law N°19473 which fines up to US\$6000 and imprisonment of up to 3 years for the hunting of felines. Under Supreme Decree N°013-99-AG of 1999, Peru prohibits hunting, commerce, and possession of the threatened Andean cat (Villalba 2004).

Threats to survival

Many factors threaten the survival of *L. jacobita* including habitat fragmentation, hunting, competition, reduction of resources (prey), and the simple fact that it exists in small populations (Villalba 2004).

The habitat for the Andean cat is naturally fragmented, making it very susceptible to habitat changes. In Bolivia, quinoa trees are found in abundance in the high rocky areas which are inhabited by the Andean cat. These trees are the primary firewood source for people living in the region and are thus heavily harvested. This may affect the Andean cat by disturbing cat dens and prey habitats as well. Habitats in Peru face the same threat from the removal of quinoa trees. Habitat threats are not as significant in Chile and Argentina (Villalba 2004).

Hunting is a major threat to the species in its entire range. The pelt of the Andean cat is used in different ceremonies which many of the Andean cultures still practice. Along with the use in

cultural ceremonies, the skins are also often sold to tourists. Though less frequent, hunting is also seen in areas that determine *L. jacobita* to be a pest to livestock. Killing them for no apparent reason seems to occur with little frequency. The docile nature of the Andean cat makes hunting easy; the cat will easily walk up to humans. One of the main methods for killing the cat is to simply drop a rock on it (Sanderson 2006).

While there is little studied information regarding intraguild competition for the Andean cat, it is very likely that it competes with the Pampas cat. The Pampas cat appears in greater number and is roughly the same size as the Andean cat. Newer data does hint at a strong overlap in the distribution of these two cats (as well as with the Andean fox) which in turn hunt the same prey (Villalba 2004).

In each country within the range for *L. jacobita* a major decline in prey species is considered a high threat. Mountain chinchillas (*Chinchilla spp*) are thought to have been the primary prey for *L. jacobita*. The regional extinctions of the Mountain chinchillas throughout the range of the Andean cat is one of the largest factors affecting Andean cat decline. Vizcachas, now thought to be the primary source of prey for the Andean cat, are hunted not only by other predators, but also by humans for their meat and skin. The European hare (*Lepus europaeus*) is an invasive species which is posing a serious threat to the vizcachas as well as livestock in the areas where it has been introduced. This could also be affecting the Andean cat as the vizcacha in those areas decline (Villalba 2004).

Limited population studies have demonstrated that the Andean cat naturally occurs at low populations which are highly fragmented. This already puts this species at risk because they are more likely to succumb to local extinction by stochastic events. While more studies need to be

done regarding genetic variability, the available information shows that genetic variability is moderate. It is likely that the genetic viability is even lower than what has been studied and therefore poses a greater risk for disease, especially those carried by domestic animals which receive little to no health care (Villalba 2004).

Developments in conservation

Protecting biodiversity as a major goal of conservation biology is well achieved when many species can be protected as a result of the protection efforts for one particular species. This is possible when the species in question is found in an expansive range, such is the case with the Andean Cat. A better understanding of the Andean Cat will benefit not only the cat itself, but many other species as well. One of the main focuses of conservation efforts for *L. jacobita* currently is to establish a better understanding of the range and population (Sanderson 2006). Interacting with local communities to gain an insight to their perceptions regarding *L. jacobita* as well as improving their outlook on the species is also crucial to their continued survival (Lucherini 2013).

The Andean Cat Alliance is a conservation group which focuses on conservation strategies for *L. jacobita*. Continuing studies on the population and density statuses is integral for the prolonged survival of the Andean cat. While these studies are carried out, emphasis must also be placed on education programs for the people residing in local villages (Sanderson 2006). Programs to begin ecotourism activities in Northwestern Argentina were initially successful, but unfortunately fell through due to lack of employee involvement. Employment incentives were difficult to achieve partially due to underfunding and also the nearby activity of a mining facility which offered more competitive wages (Lucherini 2013).

Surveys of locals of the Argentina Puna region found that they generally consider the Andean cat positively; schoolchildren in particular were opposed to killing the cats. When asked about active hunting, many locals said they would hunt pumas and foxes actively, but did not pay much attention to small carnivores such as *L. jacobita*. Hunting is primarily carried out for the protection of livestock; Andean cats are found to mostly prey upon hens when going after livestock. The locals surveyed will usually only hunt Andean cats to protect their hens. It is likely that many cats are killed by loose dogs, which is common in the area (Lucherini 2008).

Education programs may be the best defense for the cultural significance of the Andean cat. Many local communities revere the *L. jacobita* as a symbol of fertility and abundance however they are also used for ceremonies for crops and herds. Funding for these education projects is crucial to protect the Andean cat from being used in these cultural ceremonies (Sanderson 2006).

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