



## Reviewing our First Ten Years of Geoffroy's Cat Research in Argentina

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Geoffroy's cat is a small felid distributed from southern Bolivia and Brazil throughout southern Patagonia in Argentina and Chile. Because the distribution of this species covers almost the entire Argentine territory and just a few parts of other countries, research efforts on this species in Argentina may greatly contribute to its global conservation. Due to the lack of knowledge and concerns for the impact of human-related habitat changes upon its populations, Geoffroy's cat was upgraded to IUCN's "Near threatened" category in 2002. This species was heavily hunted for the international fur trade until the middle of the 1980s. At least 350,000 skins were exported solely from Argentina between 1976 and 1978. At present, habitat loss and poaching (mainly for control of predation

on domestic poultry) are probably the main threats to its survival.

Little previous effort has been made to study Geoffroy's cat in the wild and most of these studies were focused on its diet or spatial ecology in protected areas. As a result, there is almost no information on its demography, health, genetics, or its ecological flexibility. Also, it should be noted that the potential of protected areas as habitat for wildlife is usually limited by their size. Because conservation of wild cats must occur also in human-dominated landscapes, information about these landscapes is of a critical nature.

Faced with this outlook, I started a research and conservation project in 1999, with the purpose of gathering vital information about the natural history and conservation status of Geoffroy's cats. Most of the distribution range of Geoffroy's cats encompasses arid and semi-arid environments. For this reason, I selected the Lihué Calel National Park and neighboring cattle

ranches (37°57'S and 65°33'W), located in the endemic semi-arid biome of the "monte" as my study area. After the first steps in this extraordinary place of central Argentina, the "Gatos del Monte" project was born.

Since the beginning of this experience, several biologists and veterinarians from the Field Veterinary Program of the Wildlife Conservation Society (headed by Marcela Uhart), park rangers, sociologists, students and volunteers—with different research interests—have participated in the project. After 10 years of hard (but exciting) work, this is a good moment to look back and list some of the results achieved to date.

We have captured 40 Geoffroy's cats using box traps. While under anesthesia, cats' weight, sex, age, and standard body measurements were recorded and a complete physical exam was performed. Biological samples, including blood, feces, ectoparasites, and hair were collected from

all the animals. As a result of this work, a detailed protocol of capture and anesthesia has been developed for the species. Of these cats, 35 were radio-collared and monitored by radio-telemetry and information about their home range sizes, habitat preferences, activity, and movements was collected. This work produced thrilling new discoveries. To highlight, several Geoffroy's cats have moved away from the study area during periods of low prey densities, and they were found by conducting radio-telemetry from the air more than 100 km from our study area. These cats passed through natural fields, cattle ranches, and coops, indicating that they can disperse long distances. On the other hand, this information has been useful to establish Geoffroy's cat population dynamics, driving some hypotheses (and their related conservation implications) about the regional population structure of this species and the temporal fluctuations that they face in this arid environment. Now, we want to go forward and investigate the effects of this dispersal ability on the gene flow of this species, in order to count with brand new information to detect conservation needs.

During the course of our research, a severe drought took place in our study area.

This natural disturbance provided us with the opportunity to study the effects of extreme conditions on the abundance of prey and its consequences for Geoffroy's cat density and spatial behavior. Some of these findings have been published in the *Journal of Mammalogy*. Probably as a result of the climate change, drought periods are at present more frequent than in the past at central Argentina. This fact increases the value of our work, since nowadays similar situations are common there, and cats (and wildlife managers) have to face this problem.

In order to study the diet and prey preferences of this species, we have conducted seasonal analysis of feces during a three-year period. We found that small rodents were the most frequent prey item, whereas birds and reptiles were used as well but much less frequently. We also concluded that Geoffroy's cats have an opportunist behavior, consuming almost all prey species according to their availability in the field. Also in cattle ranches, Geoffroy's cats consume mainly rodents, but their trophic niche become wider.

As part of a monitoring program for Geoffroy's cat in places with different pro-



**Geoffroy and prey.**

tection levels, several camera trapping surveys have been conducted since 2006. Different individuals of this species can be easily identified by their unique spot patterns. Results showed a high density of this wild cat in the protected area (80-140 individuals / 100 km<sup>2</sup>), but values dropped nearly 50% in cattle ranches. A high proportion of transients seem to be common in the protected population.

We have located litters by radio-tracking females or by searching known sites where females have bred previously. In this way, we have recorded seasonality the births, mean litter size, and cub survival. An average of 1.8 cubs per litter was recorded during summer or spring, and no reproductive activity was recorded during the rest of the year. The severe environmental conditions of this arid zone probably preclude a greater litter size, common in other areas of the distribution of this cat. Radio telemetry has also been helpful in determining survival of adult Geoffroy's cats and their main mortality causes. Deaths due to starvation, high parasite loads, or predation by puma were common findings during drought periods, whereas road accidents and illegal hunting were frequent on cattle ranches.

Threats to the health of wildlife from anthropogenic influences are often associated with increased contact that wildlife has with domestic animals and livestock. In order to identify potentially limiting factors that may negatively affect the Geoffroy's cat population growth, a preliminary health



**Tracking Geoffroy radio collars by air.**

assessment has been carried out in the study area. Some of the animals tested positive for feline calicivirus, toxoplasmosis, canine distemper, and infectious feline peritonitis. This implies that Geoffroy's cats from our study populations are exposed to various pathogens common to domestic felids and canids. These findings support the need to continue monitoring the health of wild and domestic populations in order to understand the role of diseases in population dynamics and their significance for the conservation of wild felids.

As a result of necropsies practiced on dead cats and the analysis of fresh feces, new species of helminthes were found for the first time in Geoffroy's cats and other helminthes have been reported for the first time in South America as well. On the other hand, infections with other helminthes might be the result of interactions with domestic cats. These findings have activated a more profound study of parasitic diseases in this wild cat, which is currently being carried out by a member of our team, Pablo Beldoménico.

On the other hand, another member of our team, Julio Rojo, is studying the variation of Geoffroy's cats along its distribution range with molecular genetic techniques, based on DNA extracted from museum and live animals. Results of this study and those obtained by the way of skull morphology (also performed by Julio) could be analyzed together to accurately establish different evolution units and to propose conservation priorities for the species based on a full knowledge of the species variation. Current Geoffroy's cat taxonomy has been described more than 25 years ago, based on few individuals and skull characters. We are including in our analysis new methods (such as molecular genetics and geometric morphometry) and a lot of new samples to assess if a new arrangement of subspecies is supported.

Finally, we are continuously interviewing the local people living in cattle ranches as the easiest and most cost effective way to assess the perception and attitudes of local inhabitants toward carnivores. In this manner, management models or conservation strategies based on concrete ecological information can be outlined in order to make the preservation of wildcats possible within the framework of regional and

social economic development. We believe that the only way to conserve these magnificent cats in the wild is creating awareness in local people about the need to harmonize their production with the conservation of wildlife in their lands.

Several Argentinean and international institutions have decided to support the "Gatos del Monte" project, including the Rufford Foundation (UK), the Cleveland Metroparks Zoo (USA), the Roger Williams Park Zoo (USA), Idea Wild (USA), the Amersfoort Zoo (Netherlands), Le Parc des Felines (France) and the Wildlife Conservation Society (USA). We are very pleased to invite the Feline Conservation Federation to join us to face the exciting challenge of conserving Geoffroy's cats in the wild. •

*The FCF Conservation Grants Committee has recommended approval to award \$1,400 for a research proposal titled "Effects of Landscape Pattern and Human Activities on the Gene Flow and Genetic Structure of Geoffroy's Cat" (Leopardus geoffroyi).*

*This project presented by Javier Pereira has already received \$10,000 in funding from Amersfoort Zoo. The FCF will partner with this Netherlands zoo and pick up*

*cost of laboratory supplies to finish the research.*

*The anticipated project outcome include descriptions of natural and human barriers that affect Geoffroy's cat population's connectivity, better understanding of intra-specific genetic differentiation applicable to conservation, and an overview on implications of different landscape features on the habitat requirements of Geoffroy's cat that will establish a relationship between the population genetic diversity and its related habitat characteristics. Further, this proposal will produce an outline of habitat requirements necessary to maintain a healthy population of Geoffroy's cat, and assess how different land uses affect the species and which activities have greater impacts on population genetics of Geoffroy's cat. These findings will develop basic conservation guidelines to maintain connectivity between populations aiding conservation strategies for Geoffroy's cat compatible with the regional production systems and land use patterns. Finally, a complete collection of Geoffroy's cat samples (DNA, skulls, skins, bones) will be housed at the Argentinean Museum of Natural Sciences' collection (MACN), the most important scientific collection in Argentina.*

