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This issue is dedicated to Linda Sweanor

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Searching for puma-rancher coexistence in Central Argentina

Mauro Lucherini[1], Estela Luengos Vidal, Sabrina Martinez, Maria Lina Linardi, Nicolas Caruso[2], Grupo de Ecología Comportamental de Mamíferos (GECM), INBIOSUR, UNS-CONICET, Departamento de Biología, Bioquímica y Farmacia, Universidad Nacional del Sur (UNS)
1– Recipient of the 2015 Latin American Wild Felid Research Grant & the 2019 Latin American Wild Felid Action Grant
2- 2011 Wild Felid Legacy Scholarship recipient

The puma (*Puma concolor*) is listed as Least Concern in Argentina but in many areas its populations are threatened by habitat loss and hunting. This is the case for central Argentina, a region that was once occupied by natural grasslands and xeric woodlands and that has been largely transformed by expansion of the agriculture frontier. These transformations also led to increased proximity between pumas and livestock. When natural prey became less available than domestic animals, pumas began preying on livestock, particularly sheep (Fig.1). The human response was retaliatory and preventive killing (Fig. 2), which brought local puma populations close to extirpation in the second half of last century. More recently, economic changes and some severe droughts led to abandonment of farms and recovery of puma populations, which, in turn, caused intensification of puma-livestock conflicts. Although Buenos Aires province government forbids puma hunting, it does not manage conflict ,and retaliatory killing of pumas and Pampas foxes (*Lycalopex gymnocercus*), a canid also blamed for preying on lambs, is extremely common and socially accepted. In fact, in other neighboring provinces, puma and fox hunting is allowed and encouraged by a bounty system.



Figure 1. Puma predating on sheep



Figure 2. Retaliatory killing in response to livestock depredation

Our team began working in this area ~15 years ago. Initially, we investigated puma habitat preferences (Caruso et al. 2015), their local food habits in comparison to those in other areas of southern South America (Guerisoli et al. 2021), and activity and habitat use patterns (Guerisoli et al. 2019). However, we soon realized that conflicts were an important problem, both for predators and local people, and we completed a quantitative assessment of the losses caused by predation on livestock, the response by ranchers (Guerisoli et al. 2017), and a review of the impact of surplus killing events (Lucherini et al. 2018). The next logical and ethically sound step was to engage in ways to mitigate conflicts and support the existence of an ecologically functional population of pumas.

A relatively large amount of research exists on effectiveness of different tools to mitigate carnivore-livestock conflict (e.g., Miller et al. 2016, Eklund et al. 2017, Van Eeden et al. 2018) and that information can be offered to ranchers when proposing to switch to more conservation-friendly practices. However, it has been largely shown that: 1) knowledge transference alone hardly results in significant changes in practices (Pooley et al. 2017) and 2) there is no silver bullet to understand and mitigate conflicts (Zimmermann et al. 2021). We need to get our hands dirty, stop considering scientific research as the only useful source of knowledge, and start a discussion with local people. By listening to ranchers that we can hone-in on a list of viable possible methods to reduce predation and focus on a few potentially suitable tools such as: changes in livestock management, Livestock Protection Dogs (LPDs), and deterrent lights (Foxlights®).

Our project is currently has 3 primary objectives. We are testing the efficacy of LPDs and Foxlights in productive farms in strict cooperation with ranch owners and governmental agencies. To evaluate the performance of these tools, we are collecting predation reports of ranchers and records of puma and Pampas fox presence through camera trapping. To understand how LPDs interact with wild carnivores, we are also monitoring LPD movements via GPS collars and we live-trapped, radio-collared, and tracked Pampas foxes. By proving how these methods can be adopted by ranchers to reduce predation on livestock, we expect an increase in ranchers' willingness to use them (Baker et al. 2008). However, we also gathered interviewed-based information indicating that perception of effectiveness is more important than true effectiveness and that local customs and social acceptability strongly affect ranchers' decisions (Volski et al. 2021). Thus, to increase chances that proposed conflict mitigation strategies are adopted by ranchers, we are co-constructing, through workshops with local stakeholders, a conservation communication strategy (Verissimo et al. 2019). Finally, we are creating a procedure to identify hotspots of conflict between humans and carnivores, and protocols to monitor them, to support decision making processes by local governmental agencies. Conflicts are still strong in our project area, but coexistence no longer looks like a utopia and we feel that we identified a multi-pronged path leading there.