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Case Study

Feral horse management in Parque Provincial Ernesto Tornquist, Argentina

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Abstract: The number of feral horses (*Equus ferus caballus*) in the world has been estimated at 1.5–2 million, of which 5,000–10,000 occur in Argentina. Feral horses are considered an invasive alien species in Argentina, and as such, create a problem for biodiversity conservation. Only the population in Parque Provincial Ernesto Tornquist, Buenos Aires province, has been managed. In this paper, I discuss the conflicts between feral horse advocates, government authorities, and researchers that occurred after management actions were implemented and identify some factors that contributed to the conflict in positive and negative manners as well as some confusing concepts and ideas. I also summarize the studies that have been completed to describe this feral horse population demography and impact on biodiversity in Argentina. Lastly, I elaborate on the challenges impeding the future management of feral horses in Argentina.

Key words: Argentina, biodiversity, *Equus ferus caballus*, feral mammals, invasive species, management conflict

Invasive alien species (IAS) are defined as those species that are transported outside of their native range, and that establish populations and cause environmental damage (Convention on Biological Diversity [CBD] 2017). Feral horses (*Equus ferus caballus*) were introduced by humans in many countries worldwide. They now are found on every continent except the Antarctic (Lever 1994, Long 2003). The number of feral horses in the world has been estimated at 1.5–2 million (Nuñez et al. 2016), of which 5,000–10,000 occur in Argentina. Because wild horses in Argentina are largely free-roaming, most populations are considered to be feral (The Wildlife Society 2016). Feral horse management has usually been a very conflicting and controversial issue with complex social and political implications (Dobbie et al. 1993, Beever and Brussard 2000, Nuñez et al. 2016).

The purpose of this paper is to describe the history, status, management, and available scientific evidence for setting feral horse policy in Argentina. I also explore aspects of the management and policy process that continue to fuel conflicts between a group of horse advocates and government authorities. Lastly, I highlight some gaps in knowledge and challenges for future feral horse management in Argentina.

Horses in Argentina

In Argentina, there were horses during the Pleistocene epoch from the genus Equus (Alberdi and Prado 2004). The species present in Argentinean fauna was E. neogeus, similar to but different from fossils of E. ferus caballus (Alberdi and Prado 2004) and from the domestic breeds that were artificially selected by man for millennia. The factors that caused the Pleistocene extinction of horses in the Americas are not entirely known (Alberdi and Prado 2004, Prado and Alberdi 2017). Recently, some evidence suggests that vegetation change (Sánchez et al. 2006) or a synergism between climate change and human actions (i.e., hunting) were the most probable causes (Prado and Alberdi 2017).

The first domestic horses were brought to Argentina by Spaniard colonizer Pedro de Mendoza when he founded Buenos Aires city in 1536 (Cabrera 1945). During this century, many other horses entered Argentina from Chile and Peru with the Spaniard colonizers. The horses

that escaped established the first populations of feral horses. Later they expanded rapidly to inhabit the Pampean, Northeast and Central regions of Argentina, and also the Andes mountain region (Cabrera 1945). They were of Andalusian-Barb ancestry and originated the Argentine Criollo breed.

The Argentine Criollo horses have played a vital role in the rural way of life of Argentina (Brailovsky and Foguelman 1991, Taboada 1999, Dowdall 2003). Argentina and particularly Pampas were historically famous worldwide for their livestock and are still considered a "horse nation," where livestock breeding is a traditional and economically important activity (Instituto Nacional de Estadísticas y Censos [INDEC] 2010).

Many voyagers and historical chroniclers like Faulkner, Paucke, Dobritzhoffer, Azara, D`Orbigny, and Darwin also noted that feral horses were incredibly abundant (Taboada 1999). Later, when the era of big livestock ranches began, feral horses were viewed by rural people as a problem species and thus controlled (Brailovsky and Foguelman 1991, Taboada 1999). By the twenty-first century, most feral horse populations in the more human-populated areas of Argentina were hunted for their fat and hides, captured and tamed, and for the most part totally eliminated.

Figure 1. Geographic location of Parque Provincial Ernesto Tornquist (PPET) in Argentina.

Current status of feral horse populations in Argentina

Feral horses are considered invasive in many countries (Lever 1994, Long 2003), including Argentina (Novillo and Ojeda 2008, Invasiones Biológicas en Argentina [InBiAr] 2017). They are included in the IAS scientific databases but still not officially listed as such. Feral horse populations in Argentina are mainly distributed in the Andean zone of Cuyo and Patagonia regions, but their precise geographic location, size, and origin remain mostly unknown (Scorolli 2016).

Some populations occur in natural protected areas, two of them in National Parks located in Santa Cruz province, in the Patagonia region: Parque Nacional Bosques Petrificados de Jaramillo (PNBPJ) and Parque Nacional Los Glaciares (PNLG). The largest and most studied feral horse population of Argentina occurs in Parque Provincial Ernesto Tornquist (PPET), a provincial natural protected area located in southwestern Buenos Aires province, in the Pampas region (Merino et al. 2009).

Argentina has signed the Convention on Biological Diversity (https://www.cbd.int/) and as part of this multi-lateral treaty, has obligations about conservation of biodiversity and invasive species management. Feral horses in Argentina are not legally protected. At the national level the Administración de Parques Nacionales (APN) has legal authority in all national parks of Argentina. Their official position is to manage invasive species to minimize the impact on biodiversity (APN 2007). In Buenos Aires province, the law Nº 10,907 clearly mandates that invasive species should be managed in the natural protected areas of this territory. Outside protected areas, in private and public lands of Argentina, many feral horse populations still remain that are not covered by this legislation,

Figure 2. The Parque Provincial Ernesto Tornquist (PPET) is a natural protected area of 6,770 ha. Without predators and with very scarce competitors, feral horses (*Equus ferus caballus*) became the main large herbivore in PPET (*photo courtesy of A. Scorolli*).

mostly in remote regions with low human populations. Currently, an IAS National Strategy for Argentina, Estrategia Nacional de Especies Exóticas Invasoras (ENEEI), is under development with financial support from the United Nations Environment Programme (UNEP)/Food and Agriculture Organization (FAO) of the United Nations, and wide participation of government and academic institutions (FAO 2016). This strategy will hopefully include actions and recommendations about the management of feral mammals like horses, burros (*E. asinus*), and goats (*Capra* spp.).

In Argentina, the management of feral horses has been inconsistent and unorganized. In the mentioned national parks, only a preliminary diagnosis was conducted in PNBPJ in 2006 (Nuñez et al. 2016). Management was only initiated in the PPET in 2006, where Buenos Aires provincial government authorities decided to reduce the size of the feral horse population to mitigate the environmental impact. Years later, this management caused a serious conflict between horse defenders and the government (Scorolli 2016).

Study area

Parque Provincial Ernesto Tornquist (PPET) is a natural protected area of 6,770 ha located in the Ventana Hills of the Pampas region, in southwestern Buenos Aires province (38°00 and 38°10' S; 61°45' and 62°8' W; Figure 1). The main management goal of the area is to preserve the biodiversity of the hill-grassland ecosystem (Fiori et al. 1997), one of the few areas in Argentina that protects grassland ecosystems, and without doubt one of the most modified environments (Bilenca and Miñarro, 2004). The area has a rich plant community with more than 600 species (Long and Grassini 1997), and the presence of endemic plant and animal species brings special value to this reserve (Kristensen and Frangi 1995).

Horse demography and the PPET

In 1942, domestic horses of Argentine Criollo breed, donated to the government of the Buenos Aires province, were introduced to PPET without any clear purpose and soon became feral. The population was not managed and increased to occupy >2,000 ha, 30% of the reserve area. Feral horses outside PPET in the Pampas region

Figure 3. Very high foal survival, even when densities are high, promotes population size increases in the Parque Provincial Ernesto Tornquist (*photo courtesy of A. Scorolli*).

Figure 4. Feral horses (*Equus ferus caballus*) graze year-round on most available grassland in the Parque Provincial Ernesto Tornquist. Too many feral horses result in short grasses and dominance of flowering annuals (*photo courtesy of A. Scorolli*).

disappeared during the twenty-first century.

In 1990, the feral horse population of PPET was considered a potential conservation problem, but nothing has been studied about their ecology or impact. Science-based management is often claimed as the best available option to manage feral horse populations, and better knowledge about feral horse demography and environmental impact is a necessary requisite before any management attempts (Dobbie et al. 1993, Dawson et al. 2006, NAS 2013). Given this situation, research on the PPET feral horse population was initiated in 1995 with a focus on their demography and later on horse environmental impact (Figure 2).

Results

The research suggested that the feral horse population was growing with moderate rate of increase (6%), and in the years 2001–2002, when food limitation occurred, female survival was low (0.80–0.85) and fecundity moderate (0.50).

Feral horse density at this time was 35 horse/km^2, and adult females numbered 210 (Figure 3). The population was approaching a logistic curve estimated carrying capacity of 220 adult females (Scorolli and Lopez Cazorla 2010).

A matrix population model that projected population size based on 8 years of demographic data is currently being validated with a new data set (Scorolli 2012*a*). A body condition conceptual model for population control decision making has been developed (Scorolli 2012*b*) and is currently being refined.

Ecological impacts

Feral horses in PPET graze year-round on most of the available grassland habitat. Important evidence was obtained from the year 2000 onward about the impact at high density of feral horses on some components of PPET biodiversity, mostly vegetation (Figure 4). The studies use exclosures to compare grazed and ungrazed plots. Most of them were conducted when feral horse density was at a maximum in 2003, and others in 2006–2007 when feral horse density was 20–25 horses/km^2.

Results suggested that feral horse herbivory changed the vegetation composition and structure, exotic plant species cover and richness increased (Loydi and Distel 2010) forbs, rosettes and perennial grasses were more abundant (de Villalobos and Zalba 2010). Some invasive plant species are associated with the presence of feral horse dung piles (Loydi and Zalba 2009), while invader trees like pines (*Pinus halepesis*) are facilitated by horse grazing (de Villalobos et al. 2011). The impact on plant biodiversity is significant, but the recovery potential of the grassland ecosystem when horse density is low seems to be high (Loydi et al. 2010, Loydi et al. 2012, de Villalobos 2016). The effect of feral horses on the grassland bird community was also studied, and on grazed grassland, lower total bird density, richness, and higher nest predation rate were observed (Zalba and Cozzani 2004).

Management controversies

In 2006, provincial government authorities, in charge of the PPET, decided to initiate management of the feral horse population. Their decision was based on an assessment of previous years made by university researchers, and the process was briefly described in Nuñez et al. (2016) and Scorolli (2016). The goal, defined by a Buenos Aires governor's decree, was to eradicate the feral horse population. The university was not directly involved nor consulted, and the plan proceeded without public knowledge.

Feral horses were trapped with mobile-corrals during 2006–2007, and in 10 sessions, 220 horses were captured. Most of them were relocated on government lands owned by the army, navy, and gendarmerie, but 80 were euthanized by Army Equine Veterinary Division decision (Scorolli 2016).

In 2011, a group of feral horse advocates initiated a series of public protests in the local and regional media against the management (Scorolli 2016). They criticized government authorities and also the researchers, rangers, and conservation organizations that promoted the management; later, the conflict escalated. Horse advocates opposed the PPTE management goal, denied the impact on biodiversity, and opposed the methods used and the labeling of horses as invasive alien species (Scorolli 2016). They claimed feral horses are a native, reintroduced species, have a cultural and historical value, are genetically unique, and adapted to the grassland habitat.

A Facebook group of feral horse advocates was created and grew to >5,000 members in a few months. This group founded the non-governmental organization called Asociación Civil Cimarrón Equino (ACCE) with the goal of conserving all feral equid populations, including horses and burros, in Argentina (ACCE 2011). In response to the growing opposition, provincial authorities in charge of PPET suspended feral horse management in 2013. Since 2008, the feral horse population increased in size and reached a density similar to the previously registered (Scorolli 2016). Subsequently, the public controversy abated, but the management problem continues unsolved today.

Discussion

In retrospect, some aspects of the PPET management process contributed to the negative perception from the public and exacerbated the conflict. For purposes of this paper, I have categorized the factors as

negative, positive, and contradictory, based on their role in fueling the controversy.

Negative factors

Feral horse population control in PPET proceeded without public knowledge. Given the contentious nature of the issue, government officials wrongly decided to act fast, ignoring advice, and ultimately putting at risk the management success. There was no stakeholder consultation during any phase of the process, in attempts to avoid public opposition, even when public participation was promised. Many horses were euthanized by equine veterinarians, but the criteria for euthanasia were not made publicly available. No technical document or feral horse management plan was produced to guide decisions and population management. Government agencies remained almost silent throughout the process and failed to use social networks or mass media as communication tools.

Positive factors

Sufficient scientific evidence about ecology and horse impact has accumulated over the last 20 years that could have been applied in management planning in PPET. No court process has occurred during the conflict, probably because litigation against government actions in Argentina is incredibly slow. The legal framework governing invasive species in Argentina clearly states how management should be carried out.

Personal experience indicates many pro-horse individuals will accept the need for feral horse management when arguments and evidence are clearly explained. There is considerable opportunity for collaboration between the government, park rangers, and university researchers. Joint work has been fruitful and positive in the recent past.

Contradictory concepts and ideas confusing the issue

Carrying capacity of the ecosystem is a fact, not an opinion, and if no action is taken, food limitation will imply the death by starvation for many feral horses in the near future. This welfare implication is usually ignored or even denied by feral horse defenders and should be more clearly explained to the public and discussed. Eradication of feral horses could eventually be achieved by non-lethal methods such as live trapping and relocation, but horse defender group members oppose this option as a management goal.

Most people in Argentina live in cities (INDEC 2010), and while many know the Argentine Criollo horse breed, only a few have ever seen a feral horse with their own eyes. The concept of feral or "cimarrón" and their biology is poorly understood by urban dwellers, while rural people have a clear distinction between domestic and feral horses.

The management options during the conflict were mostly depicted by the authorities as yes/no alternatives, when the solution probably lies in a middle path. A win-win situation for all the stakeholders, given that some members of horse defender groups oppose all methods or alternatives, seems unrealistic today.

Future directions

An aspect of feral horse management considered crucial for success is to understand human dimensions, and recent reviews highlighted the surprising paucity of studies that quantify this theme (Nimmo and Miller 2007, Linnell et al. 2016). Such a study has not been conducted in Argentina and would be very important to quantify the extent to which the opposing views in the conflict represent the general public perception. It is possible that the polarized situation is perhaps not an accurate reflection of reality.

Some authors proposed that feral horses in Argentina should be considered a reintroduced species and managed as part of a landscape restoration or trophic-rewilding strategy (Naundrup and Svenning 2015, Svenning and Faurby 2017). Given the potential environmental impact reported and the pleistocene horse extinction causes that are still debated in Argentina, this approach does not seem fully warranted.

Public participation in the management planning process seems necessary and must be considered a priority. It is by no means a panacea, as learned in Australia where community consultation was part of the draft for a Feral Horse Management Plan in Kosciuzko National Park (ITRG 2016). Strong public opposition and lack of political support

precluded implementation of any planned action.

Recently, our research team has presented a proposal for feral horse management to the PPET authorities (Scorolli 2016). The goal of the proposal was to reduce the feral horse population size with corral live trapping followed by relocation or adoption of the captured horses. The project considered a key issue to take an adaptive active management approach. The ecosystem response should be carefully monitored and horse density adjusted accordingly. At present, this proposal has not been implemented, but conversations with present authorities are promising.

Some important challenges still remain to achieve solutions. It is crucial to share scientific evidence with the public that justifies the management through the media and social networks. The active participation by horse advocacy groups should be encouraged, as should transparency of the governmental authorities during herd reduction programs.

Research is still needed for most feral horse populations in Argentina, and knowledge about their geographic distribution, size, and potential environmental impact could aid management decisions. In Argentina, science-based Feral Horse Management Plans should be developed for the different populations, especially in areas of conservation value and included in the current IAS National Strategy for Argentina (ENEEI). Feral horse management in Argentina is a complex task, and the issue should be treated in a more strategic and collaborative manner to arrive at a solution.

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