



SAREM Series A
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Investigaciones Mastozoológicas

VOLUME 3

INTRODUCED INVASIVE MAMMALS OF ARGENTINA

MAMÍFEROS INTRODUCIDOS INVASORES DE ARGENTINA



Alejandro E. J. Valenzuela, Christopher B. Anderson, Sebastián A. Ballari and Ricardo A. Ojeda, EDITORS

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Introduced invasive species are a major driver of local to global environmental change, including important negative impacts on biodiversity, ecosystem processes, economies, health and other social values. At the same time, however, different social actors can hold diverse representations of these species, particularly of introduced invasive mammals (IIMs). Such divergent values and perceptions can lead to conflicts regarding the management of IIMs, but also invite researchers and managers to be reflexive regarding their own work at a more fundamental level. Therefore, it is key that we advance towards a holistic understanding of IIMs and develop strategies to manage them based on solid technical information and plural perspectives regarding their multiple values. Despite a rich history of initiatives in Argentina to study and manage IIMs, until now there has not been an opportunity to assess the state-of-the-art knowledge in our country. This book seeks to provide rigorous, relevant and legitimate information to support research, policymaking and management decisions regarding IIMs in Argentina. With this objective in mind, the book presents a series of chapters selected to highlight priority topics concerning the conceptualization and implementation of IIM research and management. Then, fact sheets are provided for the different IIMs found in Argentina. Finally, beyond the realm of academic inquiry, the timing of this publication is ideal to re-enforce policy and decision-making, such as the recently approved National Invasive Exotic Species Strategy, which seeks to implement actions and enhance institutional capacities related to invasive species management in Argentina, and the Convention on Biological Diversity's new Global Biodiversity Framework, which also addresses biological invasions as part of broader efforts to attain the 2050 Vision for Living in Harmony with Nature.

Dr. Alejandro E.J. Valenzuela
Dr. Christopher B. Anderson
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CONTENTS

LIST OF REVIEWERS.....	VII
FOREWORD.....	IX–X
DANIEL SIMBERLOFF	
1 INTRODUCED AND INVASIVE MAMMALS: CONCEPTUAL AND HISTORICAL PERSPECTIVES FOR ARGENTINA.....	1–30
S. YASMIN BOBADILLA, ANDREA DEL PILAR TARQUINO-CARBONELL AND RICARDO A. OJEDA	
2 RECONCEIVING BIOLOGICAL INVASIONS AS A SOCIO-ECOLOGICAL PHENOMENON USING THE CASE STUDY OF BEAVERS IN PATAGONIA.....	31–51
CHRISTOPHER B. ANDERSON AND J. CRISTOBAL PIZARRO	
3 CHARISMA AS A KEY ATTRIBUTE FOR THE EXPANSION AND PROTECTION OF SQUIRRELS INTRODUCED TO ARGENTINA.....	53–73
M. LAURA GUICHÓN, MARIELA BORGNA, VERÓNICA BENITEZ AND A. CECILIA GOZZI	
4 HUNTING AS A DRIVER OF MAMMAL INTRODUCTIONS.....	75–93
SEBASTIÁN A. BALLARI, M. NOELIA BARRIOS-GARCÍA, JAVIER SANGUINETTI, HERNÁN PASTORE AND M. FERNANDA CUEVAS	
5 IMPACT OF INTRODUCED INVASIVE HERBIVORES IN PATAGONIAN FORESTS.....	95–110
M. NOELIA BARRIOS-GARCÍA, CAROLINA QUINTERO, YAMILA SASAL, SEBASTIÁN A. BALLARI, AGUSTÍN VITALI AND MARIANO A. RODRIGUEZ-CABAL	
6 MANAGEMENT OF FERAL HORSES AS INVASIVE MAMMALS: BIODIVERSITY CONSERVATION VERSUS CULTURE?.....	111–126
ALBERTO L. SCOROLLI	
7 PROGRESS OF BIOLOGICAL INVASION GENETICS AND THE MANAGEMENT OF INVASIVE MAMMALS IN ARGENTINA.....	127–141
MARTA S. LIZARRALDE, MARIANA FASANELLA, SEBASTIÁN POLJAK AND MAGALI GABRIELLI	
8 DISEASE RISKS FROM INTRODUCED MAMMALS.....	143–172
MARCELA M. UHART	
9 EXOTIC SPECIES IN THE FORMAL EDUCATIONAL SPHERE IN ARGENTINA.....	173–191
CLAUDIA M. CAMPOS, GONZALO M. BERMUDEZ, GABRIELA B. DIAZ AND ALFREDO VILCHES	
10 MEDIA REPRESENTATIONS OF INTRODUCED INVASIVE MAMMALS: A COMPARISON BETWEEN TRENDS IN ARGENTINA AND TIERRA DEL FUEGO PROVINCE.....	193–205
VALERIA CAR, NATALIA ADER, CHRISTOPHER B. ANDERSON AND ALEJANDRO E.J. VALENZUELA	
FACT SHEETS ON THE INTRODUCED INVASIVE MAMMALS OF ARGENTINA	
<i>Antilope cervicapra</i> blackbuck, antílope negro.....	209–213
SEBASTIÁN A. BALLARI	
<i>Axis axis</i> chital, ciervo axis.....	215–221
JUAN F. TELLARINI, MARIANO L. MERINO AND JAVIER A. PEREIRA	
<i>Bubalus arnee bubalis</i> wild water buffalo, búfalo asiático.....	223–229
LUCÍA I. RODRÍGUEZ-PLANES, SEBASTIÁN CIRIGNOLI, DIEGO VARELA, MARTA S. KIN AND MARTÍN MONTEVERDE	

<i>Callosciurus erythraeus</i> Pallas's squirrel, ardilla de vientre rojo	231-242
A. CECILIA GOZZI, VERÓNICA BENITEZ, MARIELA BORGNIA AND M. LAURA GUICHÓN	
<i>Canis lupus familiaris</i> domestic feral dog, perro doméstico asilvestrado.....	243-248
IAN BARBE, ALFREDO Ñ. CLAVERIE AND ALEJANDRO E.J. VALENZUELA	
<i>Castor canadensis</i> North American beaver, castor americano	249-254
CHRISTOPHER B. ANDERSON AND CATHERINE ROULIER	
<i>Cervus elaphus</i> red deer, ciervo colorado.....	255-263
JO ANNE M. SMITH-FLUECK AND WERNER T. FLUECK	
<i>Chaetophractus villosus</i> large hairy armadillo, peludo	265-271
SEBASTIÁN POLJAK, MAGALI GABRIELLI, JULIETA SÁNCHEZ AND MARTA S. LIZARRALDE	
Rodentia: Muridae commensal rodents, roedores comensales	273-286
<i>Mus musculus</i> house mouse, ratón doméstico	
<i>Rattus norvegicus</i> Norway rat, rata parda o noruega	
<i>Rattus rattus</i> black rat, rata negra o de los tejados	
REGINO CAVIA AND ISABEL E. GÓMEZ VILLAFANE	
<i>Dama dama</i> fallow deer, ciervo dama.....	287-291
M. NOELIA BARRIOS-GARCIA	
<i>Felis sylvestris catus</i> domestic feral cat, gato doméstico asilvestrado.....	293-299
IAN BARBE, ALFREDO Ñ. CLAVERIE AND ALEJANDRO E.J. VALENZUELA	
Feral livestock, ganado cimarrón.....	301-309
<i>Equus ferus caballus</i> feral horse, caballo cimarrón	
<i>Equus africanus asinus</i> feral donkey, burro orejano	
<i>Bos primigenius taurus</i> feral cattle, vaca	
<i>Capra aegagrus hircus</i> feral goat, cabra	
ALBERTO L. SCOROLLI	
Lagomorpha European hare and rabbit, liebre y conejo europeos	311-317
<i>Lepus europaeus</i> European hare, liebre europea	
<i>Oryctolagus cuniculus</i> European rabbit, conejo europeo o de Castilla	
ALEJANDRO E.J. VALENZUELA	
<i>Lycalopex gymnocercus</i> Pampa fox, zorro gris.....	319-322
ALEJANDRO E.J. VALENZUELA	
<i>Neogale vison</i> American mink, visón americano	323-328
ALFREDO Ñ. CLAVERIE, IAN BARBE, L. ALEJANDRO VILLAGRA AND ALEJANDRO E.J. VALENZUELA	
<i>Ondatra zibethicus</i> muskrat, rata almizclera.....	329-333
GUILLERMO A. DEFERRARI	
<i>Sus scrofa</i> wild boar, jabalí.....	335-340
M. FERNANDA CUEVAS	

FOREWORD

Biological invasions by introduced species are one of the great changes rapidly transforming the globe today, with innumerable impacts on economics, human health, ecosystem services, and biodiversity. Mammals are among the most impactful of invasive species, transmitting diseases to humans, livestock, and native animals, trampling native grasslands, voraciously devouring vegetation from groundcover to saplings of forest trees, fouling water, causing erosion, and preying on and outcompeting native animals. They were among the first species humans introduced worldwide and in Argentina, both deliberately (*e.g.*, livestock) and inadvertently (*e.g.*, rats and mice). They have been introduced for sport (*e.g.*, deer, boar) and companionship (*e.g.*, cats, dogs), or simply as attractive ornamentals (*e.g.*, squirrels). Some that are meant to be kept in captivity, such as cats, dogs, and squirrels, escape and establish feral populations.

Argentina looms large in the history of biological invasions by introduced mammals. The earliest permanent European settlers of Buenos Aires in 1580 discovered huge herds of feral horses already on the pampas, and soon after, Vázquez de Espinoza described feral horses in Tucumán that were “in such numbers that they cover the face of the earth...”. Many sheep were in Tucumán as well at that time, and of course later sheep were enormously numerous in Patagonia, effecting huge changes in the vegetation and driving land degradation and desertification to this day. When Charles Darwin visited the La Plata region in 1832 during the voyage of the *Beagle*, he reported that “...countless herds of horses, cattle, and sheep, not only have altered the whole aspect of the vegetation, but they have almost banished the guanaco, deer and ostrich. Numberless other changes must likewise have taken place; the wild pig in some parts probably replaces the peccari; packs of wild dogs may be heard howling on the wooded banks of the less-frequented streams; and the common cat, altered into a large and fierce animal, inhabits rocky hills.”

Approximately 40 mammals have been introduced to South America, of which 25–30 have established populations; most of these are in the Southern Cone. In Argentina, I count 23 successfully introduced mammal species, including feral cats, dogs, and cows. Many, such as rats, rabbits, boar, and goats, are widely distributed around the world. By contrast, the hairy armadillo has been introduced nowhere else but from the mainland of Patagonia to Tierra del Fuego Island. Strikingly, except for the rats and house mouse, all these mammals were brought to Argentina deliberately; this is very different from, say, introduced insects. A few of these invasive mammals, like the squirrel, were not intended to be released, but I hesitate to term such invaders truly “accidental,” because the people who brought them should have realized that escapes or later releases were almost inevitable. Of course, almost all of these mammals were introduced before the late twentieth century, which was when most scientists and the public began to recognize the extent and importance of impacts of introduced species. However, the squirrel and armadillo introductions were recent enough that potential impacts should have been foreseen. Things could be worse, of course—mammals deliberately brought to Argentina that either were released, but did not establish persistent populations or have not yet escaped from hunting preserves include reindeer, silver fox, mule deer, African buffalo, white-tailed deer, Père David’s deer, thar, barbary sheep, wisent, mouflon, chamois, and ibex.

The technology of eradicating introduced invasive mammals has made enormous strides in the last thirty years—at least 31 mammal species have been eradicated from islands worldwide, including relatively large islands like South Georgia. Both Norway and ship rats have been eradicated hundreds of times, and house mice about 100 times. Most large mammals, such as deer and horses, are technologically easier eradication targets—many can simply be tracked and shot, for instance. However, mammals more than any other introduced species pose the complication that many people—especially hunters—simply do not want to eradicate them, and many animal welfare advocates, even those recognizing the damage some invaders cause, object to eradicating them by the only currently feasible means—killing them, humanely if possible. Even rat eradication has been impeded on animal rights/animal welfare grounds, and free-ranging dog and cat populations frequently are seen more as animal welfare issues than as conservation problems to broad sectors of some societies. In Argentina, the problem of implementing feasible eradication programs for invasive mammals is epitomized by the rather schizophrenic attitude taken by the National Parks Administration (Administración de Parques Nacionales—APN) towards red deer. The APN's conservation imperative is supported by the section of Law #22,351 that forbids propagating introduced animals, yet red deer, known to damage native species and ecosystems, are managed in Lanín National Park to foster ongoing hunting, and even to improve the size and quality of the deer for better hunting trophies. Additionally, there is often inconsistent and inadequate funding for managing and eradicating invasive mammals in protected areas, almost always constituting a supervening impediment even when a rational and effective goal is stated.

Argentine scientists have participated heavily in the rapid growth of modern invasion science since its inception in the 1980s, and they and overseas colleagues have conducted substantial research on the biology and impacts of many of the introduced invasive mammals in Argentina, as well as other invasive species. Some of the threats posed by these mammals have even become widely known to the general public in Argentina and beyond—the spread of the beaver from Tierra del Fuego to the mainland has been an international news story. *Introduced Invasive Mammals of Argentina* is therefore an exciting and timely addition to the literature on invasions in southern South America for both the Argentine public (and its political representatives and environmental managers) and scientists worldwide. The many authors assembled for this book explore how these biological invasions happened in the first place, how they spread, what they do to biodiversity, ecosystems, and human enterprises, what has been done about them so far, what can be done about them now, and what might be done with them in the future. The editors and authors are to be congratulated for an excellent exposition of the Argentine part of a growing global phenomenon.

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Lycalopex gymnocercus Pampa fox, zorro gris

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Resumen. El zorro gris (*Lycalopex gymnocercus*) es una especie de cánido pequeño, oportunista y de hábitos plásticos. Nativo al sector continental de Argentina, fue introducido en la Isla Grande de Tierra del Fuego en 1951 con el objetivo de controlar la población de otro mamífero introducido invasor, el conejo de Castilla (*Oryctolagus cuniculus*). Luego de su introducción en el sector norte, el zorro gris colonizó casi la totalidad de la isla, incluso cruzando a algunas islas en el Canal Beagle. Actualmente, es común verlo hasta en la ciudad de Ushuaia y en algunos sectores del Parque Nacional Tierra del Fuego. El zorro gris es omnívoro y como tal puede afectar a un gran número de especies por depredación o por competencia. También se mencionó la posibilidad de hibridación con el zorro colorado fueguino (*Lycalopex culpaeus lycooides*). Adicionalmente, esta especie puede transmitir diversas enfermedades y parásitos a la fauna nativa local. Si bien la caza está permitida, no existen planes de manejo de la especie en Tierra del Fuego.

General description of the species

The Pampa fox (*Lycalopex gymnocercus*) is a small canid that ranges in size from about 2.5 to 4.5 kg (Fig. 1). It reaches sexual maturity at approximately one year of age and gives birth to a litter of between four and six pups during spring. *L. gymnocercus* is a very plastic species that adapts to inhabit a broad diversity of habitats, from grasslands to urban areas. Its diet is opportunistic and generalist, consuming small mammals, birds and reptiles, insects, fruits and even carrion (Luengos Vidal *et al.*, 2019).

History of the invasion

Native to mainland Argentina, 24 Pampa foxes were intentionally released near Onaísín, in the Chilean side of Tierra del Fuego Island in 1951 (Pine *et al.*, 1979). Lizarralde and Escobar (2000) also indicate that 32 individuals were released near Cullen ranch on the Argentine side of the island in 1980. The objective of these introductions was the biological control of invasive European rabbits (*Oryctolagus cuniculus*; Fabbro, 1989), but there is no evidence this goal was achieved (Quintana *et al.*, 2000).

Patterns of expansion and current distribution

The Pampa fox is now common throughout most of Tierra del Fuego Island (Fig. 2) with the exception of the southwest portion, and additionally, it has been reported to have crossed to Gable Island in the Beagle Channel (Valenzuela *et al.*, 2014). Its southward dispersal to the shores of the Beagle Channel was confirmed in 1997, and currently is present in the city of Ushuaia, even reaching the Parque Nacional Tierra del Fuego (Luengos Vidal *et al.*, 2019). The species became very abundant in the areas where it was first released, but despite being heavily exploited for their pelts, the Pampa fox seems to have not declined in numbers (González Del Solar and Rau, 2004).



Figure 1. *Lycalopex gymnocercus* in Tierra del Fuego province, Argentina. (Photo: Nicolás Easdale).

Impacts

As an omnivore, the Pampa fox could affect multiple native species and trophic levels (Ballari *et al.*, 2016). It has been shown, for example, to have niche overlap with the endemic and endangered Fuegian red fox (*Lycalopex culpaeus lycooides*; Valenzuela *et al.*, 2014). Its ecological impacts can include both competition and food web effects, and also probable

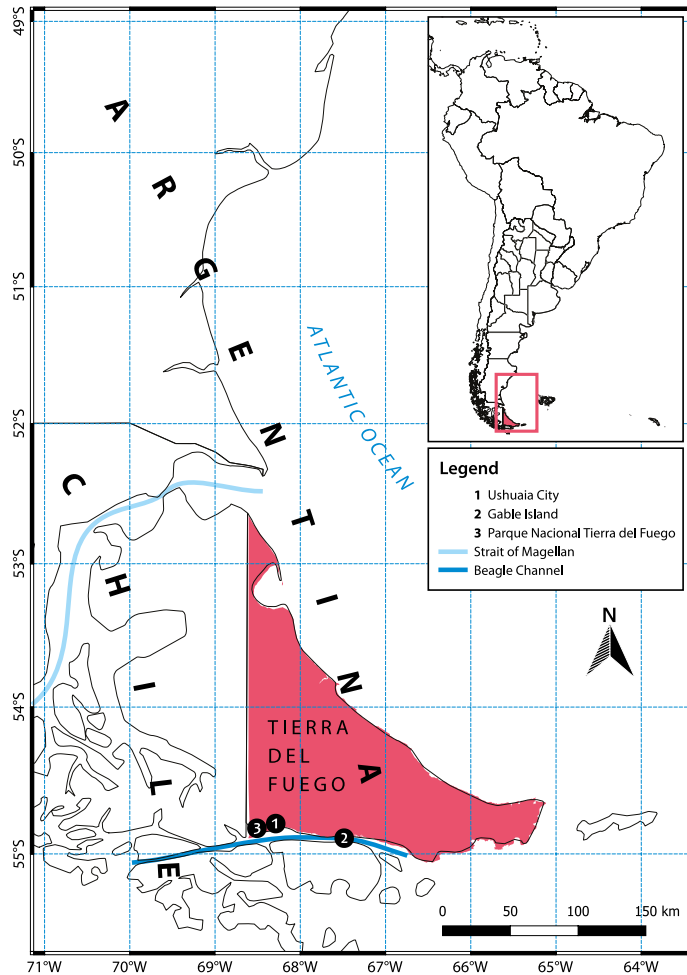


Figure 2. Introduced invasive distribution of *Lycalopex gymnocercus* in Argentina. Modified from Anderson *et al.* (2019). (Mapping: Ian Barbe and Alfredo Claverie).

hybridization with the native fox, but there is no research focused on these issues (Valenzuela *et al.*, 2014). Studies also have shown that these foxes can carry viral diseases such as distemper (González-Acuña *et al.*, 2003) and host several parasites (*e.g.*, *Toxascaris leonina*, *Uncinaria stenocephala*, *Taenia* sp. and *Echinococcus granulosus*) that can be transmitted to native fauna (Aguilera, 2001).

Management

There are no formal systematic efforts to control Pampa fox in Tierra del Fuego, but hunting is permitted; however, their population appears to be increasing on the island (Ballari *et al.*, 2016).

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INTRODUCED INVASIVE MAMMALS OF ARGENTINA

Introduced Invasive Mammals (IIMs) are a major driver of global and local environmental change, including negative impacts on biodiversity, ecosystem processes, economies, health and other social values. However, as complex social-ecological systems, invasive species cannot be conceived solely as “negative,” nor merely as “biological” invasions. This book presents conceptual and practical perspectives from 49 authors with expertise in communication, ecology, education, genetics, history, philosophy, social sciences and veterinary medicine to better understand and manage IIMs in Argentina. It concludes by providing updated information on Argentina's IIM assemblage, which includes 23 species.

**Alejandro E. J. Valenzuela, Christopher B. Anderson, Sebastián A. Ballari
and Ricardo A. Ojeda, EDITORS**



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