



Alien birds in Argentina: pathways, characteristics and ecological roles

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Abstract Currently, there is a consensus that biological invasions are one of the most important factors in global change due to their ability to modify structures and functions of many communities. The aim of this work was to provide an exhaustive assessment of the alien birds of Argentina, their routes of entry, impacts, and a synthesis of their attributes. We reviewed and compiled data from a variety of sources and databases on alien birds in Argentina and provide a summary for ten species that had been introduced. Introductions occurred in two peaks, one

at the end of the nineteenth century and the other during the 1990s. Most of species entered through the Pampas, Espinal, Bosque and Estepas Patagónica ecoregions between 34° and 50° south. Reasons for these introductions include game birds (Silver Pheasant *Lophura nycthemera*, California Quail *Callipepla californica*), domestic consumption (Mallard *Anas platyrhynchos*, Graylag Goose *Anser anser*, Rock pigeon *Columba livia*), pets (European Greenfinch *Chloris chloris*, European Goldfinch *Carduelis carduelis*, European Starling *Sturnus vulgaris*, Crested Myna *Acridotheres cristatellus*, House Sparrow *Passer domesticus*). These species occupy ecoregions similar to those of their origins, however most have experienced an expansion in the range of ecological conditions within their new habitats. These species provide opportunity for understanding the dynamics of invasions since they provide a diversity in their ecology and environmental needs.

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Introduction

The establishment and spread of alien species often result in a loss of biological diversity and can be the cause of changes in the function of ecosystems (Elton

1958; Mack et al. 2000). Scientific interest in understanding the process of alien invasions continues to grow in response to their perceived role as an economic threat and as an adverse factor affecting native species (e.g. Vitousek et al. 1997; Pimentel et al. 2005). Characterizing the pattern of spread of alien bird species, as well as predicting their potential geographic distribution, constitutes necessary steps in managing these species (Duncan et al. 2003; Blackburn et al. 2009; Martin-Albarracin et al. 2017a).

An invasion can be described as a process consisting of four stages (Duncan et al. 2003): transport, introduction, establishment, and spread. Lockwood (2017) proposed that a productive way to understand the invasion process is to view each stage as presenting a set of ecological, environmental, and stochastic barriers that must be passed before a species moves to the next stage. Through recognizing that invasions are a process rather than a single event, it becomes clear that the suite of factors that determine successful transit through a barrier can be stage-specific (Lockwood 2017).

Characteristics common to successful bird invaders include dispersal ability, high rate of population increase as a result of large clutches and having several clutches per season, competitive ability for resources and habitat, repeated introductions, and being closely associated with humans (O'Connor et al. 1986; Cassey 2002). Taxonomical patterns of the introduced families, where more of two-thirds of all species chosen for introduction belong to just seven of the 145 bird families (Blackburn and Duncan 2001), and attributes of the recipient habitat can affect the success of an introduced species in becoming established (Blackburn et al. 2009). However, studies on the role of species characteristics in successful establishments have not found consistent associations (Blackburn et al. 2009 and references therein).

Throughout the history of human assisted bird introductions in the world, two peaks in frequency of occurrence are evident, one at the end of the nineteenth century and another in the 1990s (Dyer et al. 2017). The first peak (“early” introductions) came from the actions of acclimatization societies and other groups that deliberately transported and released birds to augment local hunting opportunities or to enhance the natural aesthetics of their local avifauna (Dyer et al. 2017; Blackburn et al. 2009). The more recent peak (“recent” introductions) in bird invasions derives

almost exclusively from the accidental or intentional release of caged birds traded in the aviculture market (Dyer et al. 2017).

Most bird introductions were made in America and Australia (Kraus 2003). North and South America account for 119 and 24 introductions respectively, which represent 33.6% and 6.7% of recorded introductions (Kraus 2003). In the South American southern cone, the current status of alien birds has been well documented for Chile (Jaksic 1998; Iriarte et al. 2005). However, the issue of alien birds is poorly understood in Argentina, and comprehensive publications about the distribution and impacts of these species are scarce (Navas 2002) although some have been published focusing on particular species (e.g. Montaldo 1979; Rebolo-Ifrán and Fiorini 2010; Martin-Albarracin et al. 2017a, b). In addition, most reports have remained scattered, or have appear in local publications (e.g. “Appendix”). The aim of this paper is to provide an overall assessment of the alien birds of Argentina, with references to their pathways, attributes, ecological roles, and population status.

Methodology

We conducted an exhaustive literature review using a diversity of sources including general standard books (Long 1981; Blackburn et al. 2009), scientific and non-scientific (grey literature) articles, reliable internet databases: GBIF (Global Biodiversity Information Facility, 2019), GISD (Global Invasive Species Database, IUCN/SSC, 2019), and eBird (2019). We classified each species as part of either the “early” or “recent” introduction peaks (Dyer et al. 2017). We compared the occurrence of exotic birds recorded in Argentina, to their presence in neighboring countries (Uruguay, Brazil, Paraguay, Bolivia and Chile) using the records of Remsen et al. (2020) and GBIF (2019) database.

From the GBIF (2019) database we generated a vector point distribution of alien birds in Argentina. Base table data comprised the following attributes for each observation: coordinates, species, year, month, date, source and number of individuals. For observations reporting only that individuals were present, we assigned the value of 1. Heatmaps (visualization of a point density interpolation) were created for every species, using a triponderate function for a kernel

density estimation with a 100 km radius and weighted by the number on individuals recorded in each observation point (Deboer 2015). The resulting grids presented pixels of 500 m and the information was mapped at 1:750,000 using the software QGIS (QGIS Development Team 2018). The status of each species was defined as the stage in the invasion process, either transport, introduction, establishment or spread (Duncan et al. 2003).

Results

The ten alien bird species in Argentina belong to the families Anatidae, Phasianidae, Odonthoporidae, Columbidae, Fringillidae, Passeridae, and Sturnidae. Argentina shares five of these species with Uruguay, four with Brazil, three with Chile, and two with both Bolivia and Paraguay (Table 1). These species represent about 1% of Argentina’s avifauna (Remsen et al. 2020). Most of these introduced species have their original distributions in Eurasia and had been introduced into temperate ecosystems, located between 35°

and 50° S that match their original habitat preferences. Six species (Mallard *Anas platyrhynchos*, Graylag Goose *Anser anser*, Silver Pheasant *Lophura nycthemera*, California Quail *Callipepla californica*, Rock Pigeon *Columba livia*, and House Sparrow *Passer domesticus*) comprise those species introduced “early”; the other four species (European Greenfinch *Chloris chloris*, Golden Goldfinch *Carduelis carduelis*, European Starling *Sturnus vulgaris*, and Crested Myna *Acridotheres cristatellus*) had been introduced more “recently”. The complete bibliography consulted for each species is detailed in “Appendix”.

Dates and introduction pathways

Mallards, native to the Holarctic, were released on the Malvinas Islands (Soledad Island) in the 1930s and now breed there in very small numbers (Varnham 2006). Graylag Goose introductions in the Malvinas Islands date back to the year 1765 (Varnham 2006) but between 1935 and 1944, domesticated pairs were taken to West Point Island, in the northwest of the West Malvinas, and have reproduced freely (Navas

Table 1 Introduced species in countries of the southern cone of South America (extracted from Remsen et al. 2020) and place of origin

Species	ARG	URU	BRA	CHI	PAR	BOL	Origin
Mallard <i>Anas platyrhynchos</i>	*						EU, AS
Graylag Goose <i>Anser anser</i>	*						EU, AS
Silver Pheasant <i>Lophura nycthemera</i>	*						EU, AS
Ring-necked Pheasant <i>Phasianus colchicus</i>				*			EU, AS
California Quail <i>Callipepla californica</i>	*			*			SA, NA
Rock Pigeon <i>Columba livia</i>	*	*	*	*	*	*	EU, AS
Monk Parakeet <i>Myiopsitta monachus</i>				IN			SA
Nanday Parakeet <i>Aratinga nenday</i>		IN					SA
Mitred Parakeet <i>Psittacara mitratus</i>		IN					SA
Common Waxbill <i>Estrilda astrild</i>		H	*				AF
House Sparrow <i>Passer domesticus</i>	*	*	*	*	*	*	EU, AS
European Greenfinch <i>Chloris chloris</i>	*	*	H				EU, AS
European Goldfinch <i>Carduelis carduelis</i>	*	*	*				EU, AS
European Starling <i>Sturnus vulgaris</i>	*	*	*				EU, AS, NA
Crested Myna <i>Acridotheres cristatellus</i>	*						AS
	10	7	5	5	2	2	

References: ARG: Argentina, URU: Uruguay; BRA: Brazil, CHI: Chile, PAR: Paraguay, BOL: Bolivia. Origin (AF = Africa, AS = Asia, EU = Europe, NA = North America, SA = South America). H: Hypothetical (no tangible evidence). IN: introduced from Argentina

2002). The Silver Pheasant was introduced at Victoria Island, Nahuel Huapi Lake (Neuquen province) between 1902 and 1911, along with other phasianids (Golden Pheasant *Chrysolophus pictus*, Lady Amherst's Pheasant *Chrysolophus amherstiae* and Kalij Pheasant *Lophura melanota*) (Navas 2002). Only the Silver Pheasant became established on Victoria Island (Martin-Albarracin et al. 2017b); the other pheasant species have not been seen in the last 40 years. The first introductions of California Quail, native of western North America, was of feral individuals from Chile which had become established from a successful introduction in 1864 of feral individuals from San Francisco, USA (Jaksic 1998). Between 1920 and 1922 was introduced in Las Heras, Mendoza province, however, the species did not become established (Navas 2002). In 1943, a new introduction of California Quail was made freeing 10 pairs, again from Chile, near the Traful River south of the Neuquen province and the species finally became successfully established. The Rock Pigeon's origin in Argentina was from escaped or released individuals of this domesticated species brought from Mediterranean region of Europe during the colonization of America (Hudson 1920). The House Sparrow was introduced in 1872 into Buenos Aires city, where ten pairs brought from Europe were released by an immigrant citizen.

There is no definite information about the appearance of the European Greenfinch in Argentina (Montaldo 1979), but the species' presence was probably a result of an expansion of populations from the neighboring Republic of Uruguay where it had been introduced at the beginning of the twentieth century (Tremoleras 1934). Since the early 1980's, European Goldfinches have been recorded near Buenos Aires City, and in isolated counties on the coast of the Río de la Plata and the Atlantic coast (Narosky and Di Giacomo 1993). The European Starling were imported from the USA and sold in bird markets in the city of Buenos Aires and neighboring towns (Peris et al. 2005). In the mid 1980's some individuals escaped and established breeding populations in the surrounding areas. The Crested Myna is a species of Asian origin that was brought to Argentina for commercialization as a pet (Navas 2002). In the mid 1980's some individuals escaped and established two breeding populations in urban and rural areas in the northern and southeastern portions of the province of Buenos Aires (Narosky and Di Giacomo 1993).

Attributes, ecological roles and impacts

A summarized account of species and their attributes are shown in Table 2. Mallard and Graylag Goose may a possible compete with sheldgeese *Chloephaga* sp. (Varnham 2006), and the Graylag Goose may have an introgression with sheldgeese (Varnham 2006). The Silver Pheasant is a seed disperser that may contribute to the spread of some invasive fleshy-fruited plants (e.g. *Rubus ulmifolius* and *Rosa rubiginosa*) in the Patagonian ecosystems (Martin-Albarracin et al. 2018). California Quail have found a vacant ecological niche in the region (see Navas 2002) and it has become a new food item for native predators (Jimenez and Jaksic 1993), including man. In addition, California Quail contributes to the dispersal of some native fleshy-fruited plants (e.g. *Berberis buxifolia*). The House Sparrow is an herbivorous and granivorous species that also consumes food waste produced by man.

The European Greenfinch eats mainly seeds, although it also eats insects and other small arthropods, and even tender shoots of plants. The European Greenfinch has had no conflict with the native flora or fauna, nor with man since this species mainly uses plantations of exotic trees (Narosky and Di Giacomo 1993). The European Starling is a hole-nesting bird that can displace native species such as the Rufous Hornero (*Furnarius rufus*), Green-barred Woodpecker (*Colaptes melanochloros*) and Campo Flicker (*C. campestris*) (Rebolo-Ifrán and Fiorini 2010; Ibañez et al. 2017). Starlings have had some impact to fruit trees for which the species was declared harmful and detrimental to productive activities by National Resolution 974/98. The Crested Myna has an omnivorous diet that includes some crops of economic value for which it was declared harmful and detrimental to productive activities.

Present distribution and population status

Mallards are reported to be local and rare and recorded in two 10 km² sites and are associated with fresh water on the Malvinas islands (Varnham 2006, Fig. 1b). In addition, there are other isolated records in some cities of Argentina (e.g. Buenos Aires City; Fig. 1b). Despite these recent records, the population status of the Mallard is unknown. Graylag Goose is a wide-spread species but scarce and has been recorded in

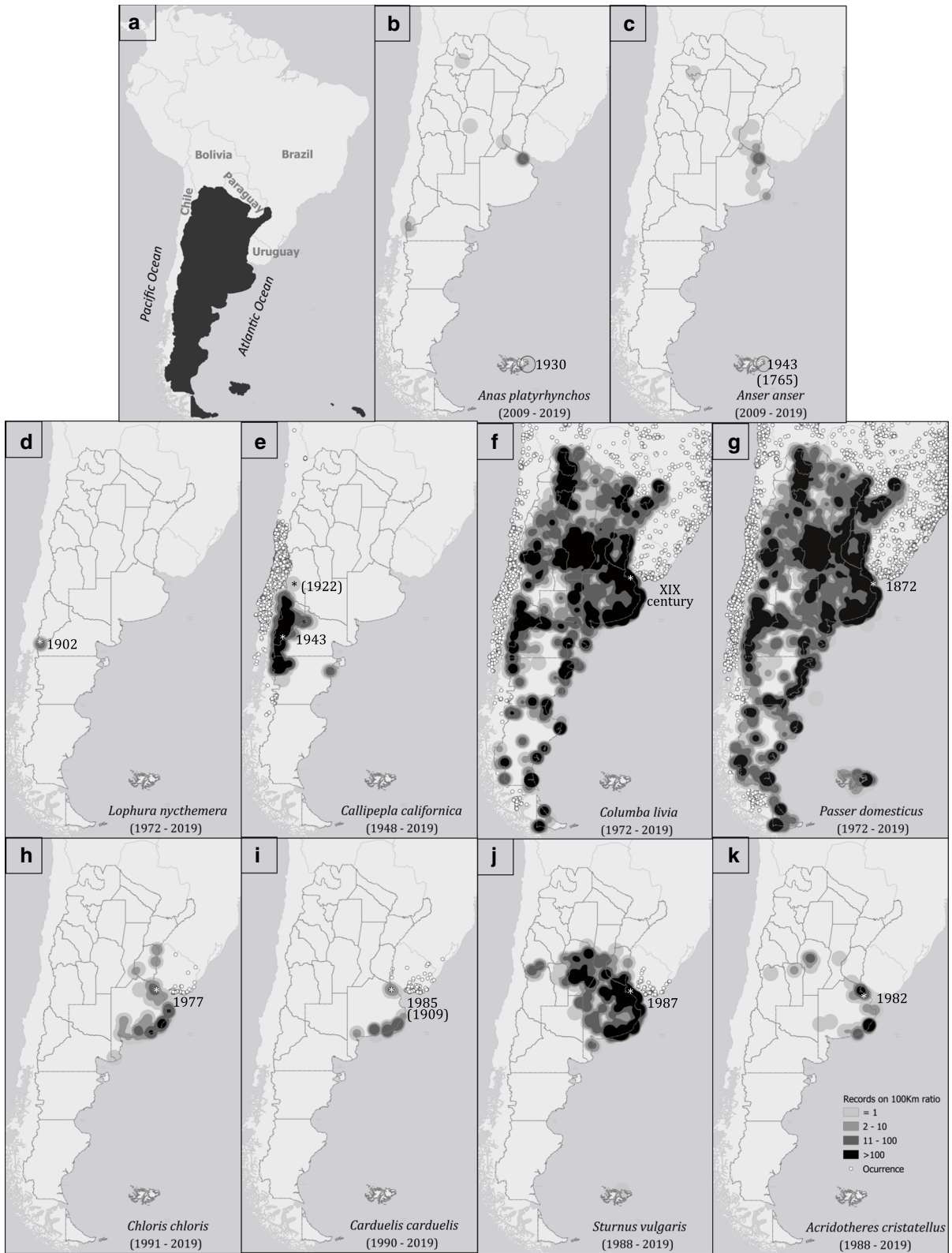
Table 2 Characteristics common to successful of bird introductions with explanations and examples

Characteristics	Explanation	Species
Dispersal ability	Advantage to colonize new environments	<i>C. californica</i> , <i>C. livia</i> , <i>P. domesticus</i> , <i>S. vulgaris</i>
Broad diet	Able to feed on different items	<i>P. domesticus</i> , <i>S. vulgaris</i> , <i>A. cristatellus</i>
Habitat breadth	Type of habitat may not be a limiting factor	<i>C. livia</i> , <i>P. domesticus</i> , <i>S. vulgaris</i> , <i>A. cristatellus</i>
Associated with humans	Human assist some species deliberately or unintentionally	<i>C. livia</i> , <i>C. chloris</i> , <i>C. carduelis</i> , <i>P. domesticus</i> , <i>S. vulgaris</i> , <i>A. cristatellus</i>
High rate of population increase	Advantage to fast population increase and colonization	<i>C. livia</i> , <i>P. domesticus</i> , <i>S. vulgaris</i>
High ability to compete for resources and habitat with native species	Advantages for competition	<i>C. livia</i> , <i>P. domesticus</i> , <i>S. vulgaris</i>
No ecological counterpart	Theory of vacant niche	<i>C. californica</i>
Old data introductions	More time for acclimatization	<i>C. livia</i> , <i>P. domesticus</i>
Climate matching	Sets of species seem to be limited by climate.	<i>C. livia</i> , <i>P. domesticus</i> , <i>S. vulgaris</i>
Much genetic variability	Increases the likelihood of rapid expansion into the new habitat	No data for invasive species in Argentina

1710 km² in association with coasts and fresh water (Varnham 2006), particularly in the north of Soledad Island (Fig. 1c). In addition, there are other isolated records in some cities of Argentina (Fig. 1c). Its present status is established locally (Varnham 2006). Silver Pheasant distribution only includes Victoria Island (Fig. 1d), over an area of 31 km², and in higher densities than have been found in its native distribution (Martin-Albarracin et al. 2017b). The Silver Pheasant is established locally. California Quail distribution include a large area of Neuquen province and a southwestern portion of the Río Negro province (Navas 2002) with its distribution currently expanding and has been commonly reported in the northwest of the Chubut province (Fig. 1e). An additional introduction of California Quail was made east of the province of Chubut in early 1990s, but the origins and numbers of these birds is unknown (Fig. 1e). The California Quail is an invasive species and is still expanding in the Patagonian region of central Argentina. The Rock Pigeon has expanded its distribution in conjunction with human settlements (Fig. 1f). The Rock Pigeon is abundant in cities, towns, country houses, and croplands areas (Zufiaurre et al. 2019) and is an invasive species distributed throughout Argentina. The distribution of House Sparrow includes the whole country, reaching greater

abundances in the major cities (such as Rosario, Cordoba, Buenos Aires; Fig. 1g). House Sparrow reached the Malvinas Islands in 1919 by means of “assisted passages” on different steamers from Montevideo. The House Sparrow is an invasive species distributed in urban and suburban areas throughout Argentina.

The European Greenfinch is an uncommon resident in coniferous and eucalyptus plantations of the River Plate and Atlantic coasts of the Buenos Aires province (Narosky and Di Giacomo 1993; Fig. 1h). Greenfinchs are established and are expanding their distribution in the Pampas of central Argentina (Fig. 1h). The European Goldfinch is an uncommon species recently found primarily in plantations of exotic trees (Fig. 1i). Despite these recent records, the population status of the European Goldfinch is unknown. The distribution of European Starling is expanding through crop lands areas into Buenos Aires (Zufiaurre et al. 2016) and some central provinces (Fig. 1j) into areas where, until 2010, the species had not been observed (Codesido et al. 2015). The European Starling is an invasive species that is still expanding its distribution into the Pampas, and Espinal ecoregions of Argentina. The Crested Myna is an invasive species that is also expanding its distribution into the Pampas of central Argentina (Fig. 1k).



◀ **Fig. 1** Distribution of alien species in Argentina (big circles) and occurrence in neighboring countries (white dots). Circles represent number of records over a radius of 100 km from periods of time considered for each species. (*) Indicates the place and year of entry, and also, in brackets, the year of a failure entry

Discussion

This is, to the best of our knowledge, the first quantitative assessment of the distribution and ecological characteristics of the birds that have been introduced in Argentina, which, together with earlier studies (Jaksic 1998; Navas 2002; Iriarte et al. 2005), broadens our understanding of the process of alien invasions in the southern cone of South America. Currently, Argentina shares much similarity in exotic bird species with Uruguay and Brazil due to the greater proximity of their urban centers where introductions originated, either accidentally or deliberately.

The families representing the alien species present in Argentina generally match the taxonomical pattern of those families that have been introduced worldwide (Blackburn and Duncan 2001), except that the Argentinian list includes no species of Psittacidae but does include a species of Odontoporidae. The over-representation of species in these families almost certainly reflects two of the major motivations behind introducing birds. Species in the families Anatidae, Columbidae and Phasianidae were associated to the introduction peak of end nineteenth century, when species were intentionally introduced for different purposes (e.g. economic exploitation, game bird hunting, alternative resources; Dyer et al. 2017). The same pattern was reported for the introduction of Ring-necked Pheasant (*Phasianus colchicus*, Phasianidae) in Chile around 1886 (Jaksic 1998). Species in the families Fringillidae and Sturnidae are frequently kept as cage birds and were associated to the recent peak in bird invasions (e.g. released or accidentally escaped from the pet trade; see Dyer et al. 2017; Lockwood et al. 2019). The same pattern was reported for the introduction of these species in Uruguay and Brasil. Species in the family Psittacidae are also frequently kept as cage bird, and the introduction of species with a native range in South America (i.e., Monk Parakeet *Myiopsitta monachus* in Chile [Jaksic 1998], Nanday Parakeet *Aratinga nenday* and Mitred Parakeet

Psittacara mitratus in Uruguay) were of feral individuals from Argentina.

Ecological characteristics of introduced species, in addition to ecological characteristics of the recipient habitat were considered by several authors as potential predictors of successful invasions (O'Connor et al. 1986; Cassey 2002; Blackburn et al. 2009). Most of the alien birds present in Argentina exhibit some of these characteristics (Table 2). The species encompassing most of these traits are Rock Pigeon, House Sparrow, and European Starling. The first two species are distributed throughout the entire country and are highly associated with urban areas and moderately so with agroecosystems (Codesido et al. 2012; Zufiurre et al. 2019). The European Starling is associated with urban areas and agroecosystems in the central region of Argentina and currently is in a process of spread and population increase (Zufiurre et al. 2016). The European Starling is among the 100 “worst” species of the world (Lowe et al. 2000).

Most of alien birds display good climatic matching (i.e. occupy ecoregions similar to their native ranges), and some species have made a range expansion into new habitat types (e.g. California Quail, European Starling). The European Starling is a broad niche species, with most of the attributes of a successful invader. The invaded ecoregions in Argentina not only match its native Eurasian distribution, but some of its populations expand their ranges to novel habitats, as for example its recent colonization into the temperate central Espinal ecoregion. Exceptions to this range expansion correspond to presence of geographic barriers such as the Nahuel Huapi Lake separating Victoria islands from the continent (e.g. Silver Pheasant) or the Atlantic Ocean isolating the Malvinas Islands (e.g. Mallard, Graylag Goose). Moreover, some introduced species (e.g. European Goldfinch, European Greenfinch, Crested Myna) still remain as small populations with limited distributions principally in isolated counties on the coast of the Río de la Plata and the Atlantic coast. Some of these restricted ranges might be due to other biological or ecosystem constraints but it is difficult to assure with the limited data available.

On the other hand, biological invasion are particularly important in disturbed areas, where they are considered to be primarily consequences of disturbance rather than components of change in their own right (Vitousek et al. 1997). The widespread success of

certain introduced birds, such as the European Starling, House Sparrow and Rock Pigeon (Long 1981), suggests that some species may simply be good at establishing themselves in disturbed environments. Whether species differ inherently in their probability of establishing, and if so, what characteristics regulate this difference, are two questions that have long interested ecologists (Duncan et al. 2003).

In conclusion, the alien birds of Argentina represents a diversity of ecological groups which offer an enormous opportunity for research. Our synthesis pinpoints several interesting topic to be explored, such as their role as seed dispersal and seed predation (e.g. Silver Pheasant, California Quail), the coexistence and interactions among potential ecological counterparts (e.g. Passeriformes), rates of dispersal of recent invaders (e.g. Sturnidae), among others. As long as we approach their study with appropriate scientific methodologies our contribution to the understanding and management of invasive species will be enormously beneficial.

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Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Appendix: Local publications for alien birds from Argentina and their neighboring countries

Mallard (*Anas platyrhynchos*, Anatidae)

1. Navas J (1987) Los vertebrados exóticos introducidos en la Argentina. Revista del MACN "Bernardino Rivadavia", XIV, Argentina.

Graylag Goose (*Anser anser*, Anatidae)

2. Woods KW, Woods A (1997) Atlas of breeding birds of the Falkland Islands. Anthony Nelson, England.

California Quail (*Callipepla californica*, Odontophoridae)

3. Reed CS (1921) Las aves de caza de la provincia de Mendoza. Rev Chil Hist Nat 25:203–230
4. Reed CS (1934) Las aves exóticas que viven aclimatadas en estado silvestre en algunas regiones de Chile. Jardín Zoológico Nacional, Santiago, Publicación Oficial N°10
5. Sainz-Trápaga S (2014) Presencia de la Codorniz Californiana (*Callipepla californica*) y la Paloma Araucana (*Patagioenas araucana*) al este de la provincia de Chubut, Argentina. EcoRegistros Revista 4:32–36

Silver Pheasant (*Lophura nycthemera*, Phasianidae)

6. Daciuk J (1978) Aclimatación de aves y mamíferos en el parque nacional Nahuel Huapi (Prov. de Neuquén y Río Negro, Argentina), con especial referencia de los faisánidos. An Parq Nac 14:96–104

Ring-necked Pheasant (*Phasianus colchicus*, Phasianidae)

7. Barros R (2015) Algunos Comentarios a la Lista de las Aves de Chile. La Chiricoca 20:57–77

Common Waxbill (*Estrilda astrild*, Estrildidae)

8. Cardoso Da Silva JM, Oren DC (1990) Introduced and invading birds in Belem, Brazil. Wilson Bull 102:309–313.

House Sparrow (*Passer domesticus*, Passeridae)

9. Bennet AG (1926) A list of the birds of the Falkland Islands and dependencies. Ibis 68:306–333
10. Berg C (1901) Omithologisches. Comunicaciones del Museo Nacional de Buenos Aires 1:283–287
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12. Pereyra JH (1923) Las aves de la región ribereña de la provincia de Buenos Aires. Hornero 3:159–174
13. Zotta AR (1940) Lista sistemática de las aves argentinas. Hornero 7:447–472

European Greenfinch (*Chloris chloris*, Fringillidae)

14. ECOREGISTROS (2019). Registros ecológicos de la comunidad: *Chloris chloris*. <http://www.ecoregistros.org>. Accessed 15 October 2019
15. Mazulla J (2013) Registro de Verderón (*Carduelis chloris*) en Salto. Achará 4:37

European Goldfinch (*Carduelis carduelis*, Fringillidae)

16. Colombo MA, González E, Segura LN (2016) Cardelino (*Carduelis carduelis*) en Cariló, provincia de Buenos Aires. Nuestras Aves 61:28
17. Delius JD (1986). Pequeña bandada de Jilgueros Europeos avistada en las afueras de Buenos Aires. Nuestras Aves 4: 6–8
18. Fiameni MA (2005) El Boyerito (*Icterus cayanensis*) y Cardelino (*Carduelis carduelis*) en Necochea, provincia de Buenos Aires, Argentina. Nuestras Aves 50:36
19. Hartert E, Venturi S (1909) Notes sur les oiseaux de la République Argentine. Novitates Zoologicae 16:159–267

European Starling (*Sturnus vulgaris*, Sturnidae)

20. Ibañez LM, Andreucci F, Montalti D (2016) Primer registro de daño a cultivo de frutales por el estornino pinto (*Sturnus vulgaris*) (Passeriformes: Sturnidae) en Argentina. Acta Zoológica Lilloana 60:177–180
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Crested Mya (*Acridotheres cristatellus*, Sturnidae)

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