











New record of the Chacoan Peccary, *Catagonus wagneri* (Rusconi, 1930) (Artiodactyla, Tayassuidae), in Santiago del Estero, Argentina

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Abstract

New records of the Endangered *Catagonus wagneri* (Rusconi, 1930) are reported in Campo Grande Community of peasants, northwestern Santiago del Estero, Argentina. The new records were obtained through camera traps as well as the finding of a skull and footprints. We conducted interviews confirmed the historical presence of the species. The records indicate the presence of *C. wagneri* in the North Biological Corridor, expanding this species' distribution in Santiago del Estero province, providing initial evidence of potential connection between northern and southern populations.

Keywords

Biological corridors, distribution, Dry Chaco, endangered species, peasant territories

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Introduction

Catagonus wagneri (Rusconi, 1930), commonly known as Chacoan Peccary or Quimilero in Spanish, is the largest species within Tayassuidae (Maffei et al. 2008). It was known only as a fossil by Rusconi (1930) until it was rediscovered as an extant species in 1975 (Wetzel et al. 1975). It is endemic to the Great South American Chaco ecoregion (Taber et al. 1994), and its known distribution is restricted to the driest portion of the ecoregion in western Paraguay, southeast Bolivia, and northern Argentina (Altrichter 2006; Gasparini et al. 2013; Altrichter et al. 2015; Torres et al. 2017). In Argentina, its presence has been documented from six provinces: Chaco, Córdoba, Formosa, La Rioja, Salta, and Santiago del Estero (Camino and Torres 2019). In the latter province, there is a record of a skull found in Tintina in 2016, which represented the southernmost locality until 2017 when a *C. wagneri* was confirmed in northern Córdoba, expanding the species' distribution 650 km south (Torres et al. 2017, 2019).

Catagonus wagneri is a territorial and diurnal (Mayer and Wetzel 1986; Taber et al. 1994). It lives in groups of 2–9 individuals, with an average of 4.5 individuals per group (Mayer and Wetzel 1986; Taber et al. 1994), but with lower number in areas with hunting pressures (Mayer and Brandt 1982; Taber et al. 1994; Altrichter and Boaglio 2004). Solitary Chacoan Peccaries are also commonly observed (Mayer and Brandt 1982). The diet of *C. wagneri* includes various species of cacti such as *Opuntia quimilo* K. Schum., from which the name Quimilero is derived. *Catagonus wagneri* is more abundant in areas with high cover of cacti species (Altrichter et al. 2016; Camino 2016). It also consumes roots, leaves, and fruits (Camino 2016; Altrichter et al. 2017).

Catagonus wagneri has been categorized as Endangered by the International Union for the Conservation of Nature (IUCN) (Altrichter et al. 2015) and by the local Sociedad Argentina para el Estudio de los Mamíferos (SAREM) (Camino and Torres 2019). There are serious concerns about the long-term persistence of this species, with declines mainly caused by habitat fragmentation and deforestation (Altrichter et al. 2015, 2016; Camino and Torres 2019). Unsustainable hunting is also affecting *C. wagneri* populations (Altrichter 2005, 2006; Camino and Torres 2019). The Chaco ecoregion currently presents one of the highest rates of deforestation anywhere in the world (Piquer-Rodríguez et al. 2015; Vallejos et al. 2015, Volante et al. 2016; Baumann et al. 2017). A large portion of this region has been transformed into intensive production systems for agriculture or livestock, which has highly fragmented habitats of *C. wagneri* (Periago et al. 2015; Altrichter et al. 2016; Volante et al. 2016). Furthermore, protected areas in the region are not sufficient to assure the subsistence and connection of *C. wagneri* populations (Matteucci

and Camino 2012; Vallejos et al. 2015; Periago et al. 2015; Nori et al. 2016).

In the Argentine Dry Chaco ecoregion, a large proportion of the natural ecosystems where *C. wagneri* persists is part of the territories of peasant and indigenous communities (Camino et al. 2018; Macchi et al. 2020). Peasants and indigenous people have private, communal, or informal land tenure systems (occupying public lands) and do not practice deforestation and intensive production of export products (Aguiar et al. 2018). They rely on the natural ecosystem, practicing subsistence hunting and gathering, small-scale agriculture, and extensive livestock farming (Camino et al. 2018). The creation of biological corridors in these areas could represent a support system for wildlife. As evidence of this, several species of special interest (endemic, emblematic, and endangered) have been recorded in territories of peasant and indigenous communities (Periago et al. 2015; Torres et al. 2019; Nanni et al. 2020).

We report new records of *C. wagneri* from Santiago del Estero province. The records were obtained through wildlife participatory monitoring developed in cooperation with a local association of small-scale producers, the Unión de Pequeños Productores del Salado Norte (UPPSAN) (PVU - Nuestra Tierra Nuestro Monte 2018). The area where we conducted our work has been assigned to the Santiago del Estero North Biological Corridor by the government of the province of Santiago del Estero in 2015.

Methods

Our study area is located in the Dry Chaco (Fig. 1A) of northern Santiago del Estero and is inhabited by 60 peasant communities who are members of the UPPSAN association (Fig. 1B). The territory of these communities covers around 300,000 ha and are part of the Northern Biological Corridor of Santiago, which was declared by the provincial government (Government of Santiago del Estero 2015). This corridor connects the Copo National Park with the Figueroa Multiple Use Reserve wetland (Fig. 1B).

The area presents typical Dry Chaco vegetation with thorny dense shrubby cover (Oyarzabal et al. 2018). Here, three types of habitats can be differentiated: i) a high vegetation with a mixture of shrublands and medium-tall xerophilous forests dominated by *Sarcorampus mistol* (Griseb.) Hauenschild, *Prosopis rusciifolia* Griseb., *Schinopsis lorentzii* Engl., *Aspidosperma quebracho-blanco* Schltdl., *Prosopis alba* Griseb., *Prosopis nigra* Griseb., and *Vachellia caven* (Molina) Seigler & Ebinger (Brassiole 2005; Oyarzabal et al. 2018); ii) a lower vegetation dominated by species of *Senegalia gilliesii* (Steud.) Seigler & Ebinger and *Celtis* sp. (Cannabaceae); iii) shrublands with dominance of *Salicornia ambigua* Michx., and the presence of *Prosopis rusciifolia* Griseb., *Shinopsis lorentzii* Engl., *Aspidosperma quebracho-blanco* Schltdl., and *Bromelia hieronymi*

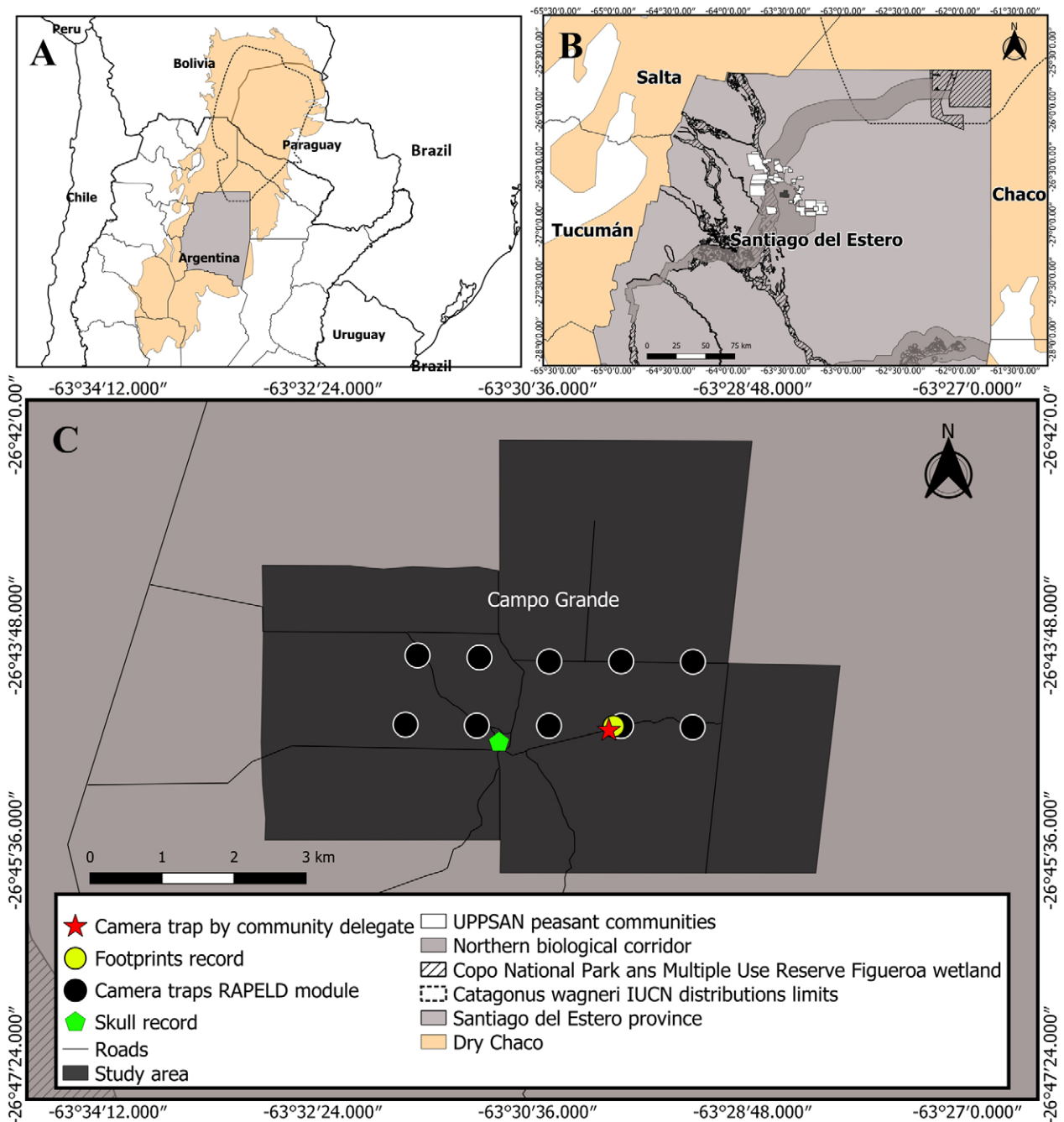


Figure 1. Study area in Santiago del Estero, Argentina. **A.** Location of the Dry Chaco, distribution polygon of *Catagonus wagneri* according to IUCN (Altrichter 2015). **B.** Portion of the map with the location of the communities that make up UPPSAN and the North Biological Corridor that runs from Copo National Park to the Figueroa Multiple Use Reserve wetland. **C.** Campo Grande community, location camera traps in the RAPELD module, location of camera trap that recorded the species (red star), location skull record and footprints record.

Mez. (Brassiolo 2005; Kunst et al. 2006; Oyarzabal et al. 2018). The three vegetation types have Cactaceae varying densities and include species such as *Opuntia quimilo*, *Cleistocactus baumannii* (Lem.) Lem., *Harrisa pamanensis* (F.A.C. Weber ex K. Schum.), *Cereus forbesii* Otto ex C.F. Först., and *Stetsonia coryne* (Salm-Dyck) Britton & Rose (Zuloaga et al. 2019).

We follow the RAPELD methodology (RAP: rapid assessments; PELD: by Long-term Research) proposed by the Biodiversity Research Program (PPBio). PPBio proposes a collaborative work logic that allows maximizing benefits and making the most of efforts in ecological studies of biodiversity (Rossa et al. 2021). A RAPELD

module was installed in the Campo Grande community (Magnusson et al. 2005, 2013; Neme 2019) (Fig. 1C). The RAPELD methodology consists of a standardized system of transects and permanent plots (Magnusson et al. 2005). The sampling unit used was a module consisting of two 5-km long parallel trails, 1 km apart, and with 10 regularly spaced plots (Magnusson et al. 2013; Paredes et al. 2017). The Campo Grande community is composed of seven peasant families who practice traditional methods of livestock grazing, small-scale agriculture, and forest-harvesting activities.

In the context of the Volunteer University Project Participatory Monitoring of Biodiversity in peasant

communities of the North Salado River (PVU - UNSE 2018), a participative inventory of wildlife was developed in cooperation with Campo Grande Community. Ten camera traps were installed in a RAPELD module for the monitoring of medium-sized and large mammals (>0.5 kg) during October and November 2018. Additional monitoring was done to search for signs and bone remains in RAPELD parcels, trails, and roads within the community's territory. We also conducted semi-structured interviews with eight members of the community, including women, men, youth, and children (<12 years), and we placed one of the camera traps at a site suggested by the community delegate (Fig. 1C).

In addition, we documented national distribution records of *C. wagneri* obtained through bibliographical research. The records were categorized according to land use by peasants and protected areas.

Results

Catagonus wagneri (Rusconi, 1930)

Figure 2

After 134 camera-days we obtained two records of *C. wagneri*. The records were obtained at the site selected by the community delegate in a zone characterized for

a dense shrubby vegetation, crossed by a livestock trail, and near a water course. We also collected the cranium of an adult *C. wagneri* hunted by a local family and we recorded footprints of this species in a transect.

New records. ARGENTINA – **Santiago del Estero province** • Alberdi department, Campo Grande community; 26°44'35"S, 0063°30'00"W; 3.XI.2018 at 13:53 h and 6.XI.2018 at 11:55 h; records by camera traps; 1 adult, sex undetermined • same community; 26°44'46"S, 0063°30'00"W; 14.X.2018; Lucas Palomo leg; 1 skull, CBUNSE 001 • same community; 26°44'34"S, 0063°29'58"W; 11.X.2018; Andrea Neme obs; footprints.

Identification. We identified the photographed animals as *C. wagneri* (Fig. 2A, B) by their external characteristics: long dorsal pelage, light colored shoulders and semi-collar, proportionally larger head and longer ears, tail, and legs. We cannot determine if the photographs show the same or different individuals. The skull specimen lacks the lower jaw, but compared to other species of the family, it has a very well-developed rostrum and nasals that present a typical curved-vaulted shape, and a relatively small braincase. Teeth are markedly wider and larger than those of two other, smaller, sympatric species of Tayassuidae (Fig. 2C–E). The collected material has been temporarily placed in Santiago del Estero National

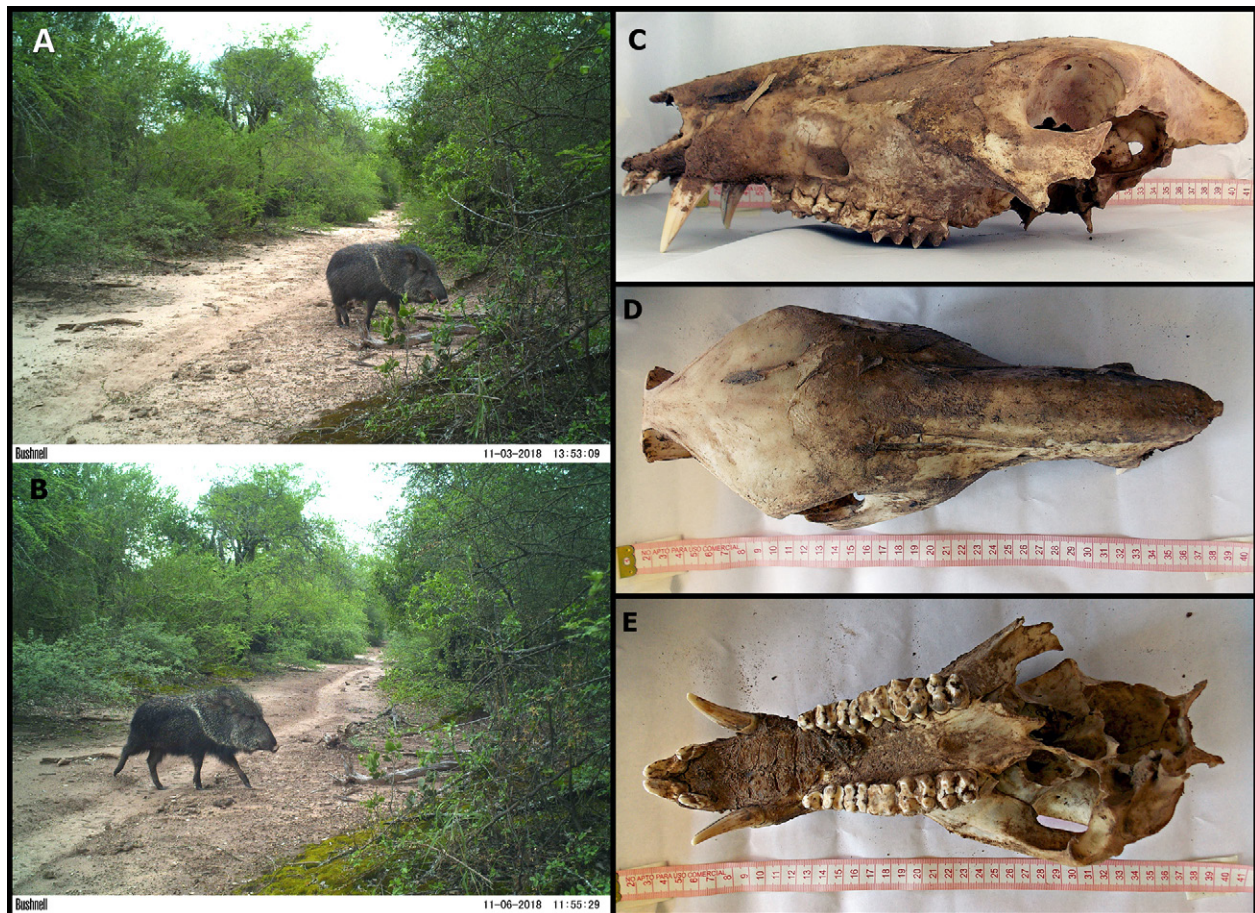


Figure 2. *Catagonus wagneri*. **A, B.** Camera trap images from the trap placed by the community delegate. **C–E.** Skull collected (CBUNSE 001): **(C)** lateral view—note the elongated nostrils, long, domed face; **(D)** dorsal view, showing the relatively small cranial case; **(E)** ventral view, showing wide and long teeth; in this specimen M2 = 18 mm and M3 = 17mm long).

University, Facultad de Ciencias Forestales, UNSE (CBUNSE 001), and will later be deposited in the local Natural and Social Sciences Museum, in the UPPSAN peasants protected reserve. The footprints were identified according to their characteristics: two deep hoof marks with the fingers not so wide. The tips do not meet in the center.

Results of the interviews indicate that community members clearly distinguish *C. wagneri* and that this species historically inhabited the territory. They described it as a solitary or small-herd species that is larger than Collared Peccary, *Dicotyles tajacu* (Linnaeus, 1758). Also, they confirmed that *C. wagneri* is a supplementary source of protein in times of food shortage.

Based on the literature review, we found 47 localities where the species has been found to occur (Table 1); 78% of the records are in unprotected areas and 22% are in protected areas. The occurrences within the limits of the Dry Chaco ecoregion are shown in Figure 3.

Discussion

Our new records of *Catagonus wagneri* provide evidence of one population of this species in the area between the distribution according to Quiroga (2006), Altrichter et al.

(2015), and Camino (2016) and more recent records from northern Cordoba (Torres et al. 2019). Torres et al. (2019) detected the species in southern Santiago del Estero, but the presence of this species was present in northern areas of the province was unknown. We add evidence of that this species does occur in central Santiago del Estero, which supports previous studies of Camino and Torres (2019) and Torres et al. (2019).

Our study also shows the importance of the Northern Biological Corridor of Santiago as a reservoir of biodiversity and as an important corridor connecting protected areas in the Dry Chaco of Santiago del Estero (Gobierno de Santiago del Estero 2015). Protected areas, such as the Copo National Park, have higher number of records of *C. wagneri* (Fig. 3). However, the presence of this emblematic species within the biological corridor is key and proves that *C. wagneri* is using the territory. Thus, the corridor is serving its main objective.

New questions about wildlife arise from our results, especially in the context of ecosystems with extremely high land-use transformation rates (Volante 2014; Vallejos et al. 2015; Piquer-Rodríguez et al. 2015; Basualdo et al. 2019). *Catagonus wagneri* is negatively associated with human presence (Altrichter and Boaglio 2004; Altrichter 2006; Altrichter et al. 2015, 2016; Camino et al. 2020), mostly due to habitat destruction (Camino 2016), but it is likely that peasant communities can coexist with emblematic species in fragmented territories that resist large-scale transformations. Therefore, peasant production systems might be compatible with conservation along with *C. wagneri* as a food source for local peasant communities. Finally, the value of biocultural diversity (Guzmán et al. 2012; Rueda et al. 2013; Abt Giubergia 2015; Cotroneo 2017) and the connection between UPPSAN communities and their native environment is highlighted, as it has been pointed out elsewhere (Escalada 2019; Neme 2019).

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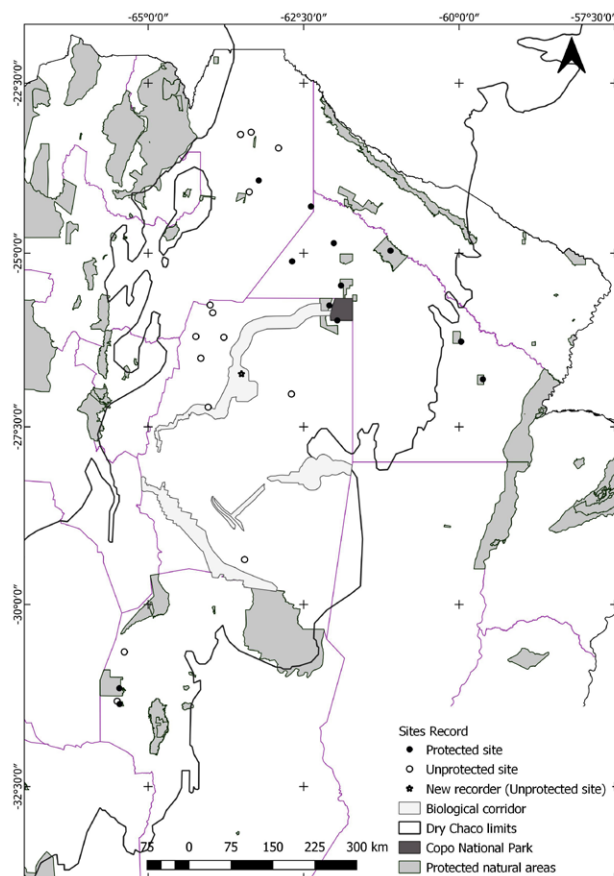


Figure 3. Distribution of records of *Catagonus wagneri* classified by category of protected area. Records in protected sites (black circle) and in unprotected sites in the Argentine Dry Chaco ecoregion. The location of the Northern Biological Corridor in Santiago del Estero province and the Copo National Park in the National System of Protected Areas (IGN 2019) are shown.

Table 1. Records of *Catagonus wagneri* in Argentina indicating the province, locality and references.

Province	Site	Latitude (S)	Longitude (W)	Elevation (m)	Reference
Chaco	Chaco National Park*	25°46'21.70"	062°05'03.40"	184	Altrichter and Boaglio 2004
	El Impenetrable National Park*	24°59'54.02"	061°00'19.08"	143	Nigro et al. 2020
	Loro Hablador Provincial Reserve*	25°25'26.4"	061°47'20.4"	174	Altrichter and Boaglio 2004; Altrichter 2005
	Pampa del Indio Provincial Reserve*	26°16'32.30"	059°57'54.17"	96	Altrichter and Boaglio 2004; Altrichter 2006
	Intermediate locations between Frías, Taco Pozo, las Hacheras, Pompeya	24°33'40.98"	062°14'19.70"	182	Altrichter and Boaglio 2004; Altrichter 2005; Camino 2016
		25°36'57.17"	063°16'04.64"	260	
		25°23'12.75"	060°59'23.55"	135	
		24°55'47.07"	061°29'11.75"	156	
	Aborígen Reserve *	24°85'04.31"	062°01'43.53"	85	Quiroga 2006
	Estancia San Miguel	26°96'00"	059°03'00"	200	Torres and Jayat 2010
	General. Güemes	27°11'60.00"	061°10'48.00"	156	Chebez 1999; 2008; Gasparini et al. 2013; Camino 2016
	San Alfonso Port	27°17'25.78"	058°56'20.93"	56	Gasparini et al. 2013
	Alte. Brown	25°50'41.13"	061°30'48.97"	153	Chebez 2008
Fuerte Esperanza Provincial Park*	25°11'69.47"	061°83'59.45"	172	Altrichter et al. 2016; 2017; Camino 2016	
Córdoba	Serrezuela	31°09'36.00"	065°35'60.00"	282	Torres et al. 2019
	Pinas Stay*	31°09'30.08"	065°27'47.91"	296	Torres et al. 2017
	Chancaní Provincial Park*	31°19'58.85"	065°27'02.94"	384	www.ecoregistros.org 2020
Formosa	General Mosconi	23°12'59.62"	062°17'59.59"	211	Camino 2016
	Ingeniero Juarez	23°53'22.88"	061°51'01.52"	183	Camino 2016
	Las Lomitas	24°42'04.23"	060°35'33.48"	133	Gasparini et al. 2013
	Formosa National Reserve*	24°19'00.00"	061°43'00.00"	176	Altrichter 2006
La Rioja	Area of influence of Traslasierra National Park	31°09'47.08"	066°00'45.57"	368	Camino and Torres 2019
Salta	Palma Chueca, Bañados del Quirquincho	24°10'37.19"	063°37'44.14"	220	Torres and Jayat 2010
	Morillo	23°45'81.36"	062°90'41.4"	222	Torres and Jayat 2010
	Dragones	23°22'36.55"	063°33'77.96"	244	Torres and Jayat 2010; Gasparini et al. 2013
	Agua Linda	23°25'84.21"	063°51'31.6"	479	Torres and Jayat 2010; Gasparini et al. 2013
	Rivadavia	24°11'10.65"	062°55'03.39"	209	Chebez 1999; 2008; Camino 2016
	Los Blancos	23°36'34.50"	062°35'37.90"	210	Camino 2016
	Santa Victoria Este	22°16'21.58"	062°42'45.45"	266	Camino 2016
	Los Palmares	24°51'08.05"	065°23'51.35"	1172	Altrichter 2006
	Gral. José de San Martín	22°47'11.18"	063°46'10.34"	359	Chebez 1999; 2008
	Anta Department	24°54'04.54"	063°46'10.34"	323	Núñez-Regueiro et al. 2015
Santiago Del Estero	Sumampa	29°22'49.76"	063°28'21.61"	250	Torres et al. 2019
	Agua Azul	26°51'74.44"	064°15'25.81"	250	Torres et al. 2019
	Santo Domingo	26°21'66.66"	063°78'33.33"	238	Torres et al. 2019
	Department Pellegrini	26°01'41.38"	064°08'52.17"	335	Chebez 1999; 2008
	Nueva Esperanza	26°19'41.06"	064°23'41.25"	322	Olrog et al. 1976; Torres et al. 2019
	Copo National Park and Provincial Reserve*	25°55'00.00"	062°05'00.00"	160	Chebez 1999; 2008; Altrichter and Boaglio 2004; Altrichter 2005; Perovic et al. 2008; Torres and Jayat 2010; Decarre 2015; Altrichter et al. 2016
		25°46'21.70"	062°05'03.40"	184	
	Locations in between Pampa de los Guanacos, Monte Quemado, and border with Chaco	25°48'10.8"	062°52'08.4"	160	Altrichter and Boaglio 2004; Altrichter 2005
	Tulip-Loman, near de Icaño	28°40'41.11"	062°53'00.76"	104	Gasparini et al. 2013
	Llajta Mauca	28°00'00.0"	063°00'00.0"	124	Mayer and Wetzel 1986
	Tintina	27°01'48.0"	062°41'24.0"	166	Torres et al. 2019
	Algarrobal Viejo	25°42'58.53"	064°01'59.82"	309	Juliá and Abdala 2006
	Ahí veremos	25°52'09.23"	063°56'58.45"	291	Juliá and Abdala 2006
	Los Pirpintos	26°07'56.49"	062°03'37.46"	175	Torres et al. 2019
	La Golondrina	27°57'15.24"	064°10'29.36"	169	Torres et al. 2019
	Departments Avellaneda & Matará	28°25'12.84"	063°29'01.95"	122	Chebez 1999; 2008
		28°06'26.50"	063°11'39.55"	125	
Figueroa Multiple Use Reserve wetland*	27°21'59.60"	063°36'59.06"	161	Contreras 2015	

* Protected area.

Authors' Contributions

Conceptualization: CVR, ACO, AMN, MPR. Data curation: LP, MGL, CE, OBQ, RGCS, MFS, PMA, SEM, CG, NY, CP, EF, FL. Formal analysis: CVR, MPR, MGL,

OBQ, ACO, AMN. Resources: MPR, AMN. Visualization: CVR, MPR, ACO, MGL, AMN. Writing – original draft: CVR, ACO, MPR, PO, PA, MI, AMN. Writing – review and editing: OBQ, CE, MGL, RGCS, MFE, MA, SEM, CG.

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