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Biodiversidad &  
Genética- IIBCE  
Av. Italia 3318  
Montevideo, 11.600  
Uruguay

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### Layout by:

**Marcelo Giloca**

Biodiversidad & Genética-IIBCE  
Av. Italia 3318  
Montevideo, 11.600 Uruguay

## Introducing the "Pantano Project" to conserve the southernmost population of the marsh deer

Pereira, J.A.<sup>1,2</sup>, Ferngani, D.<sup>1,2</sup>, Fernández, V.<sup>1,2</sup>, Fracassi, N.G.<sup>3</sup>, González, V.<sup>1,2</sup>, Lartigau, B.<sup>4</sup>, Marín, V.<sup>2</sup>,  
Tellarini, J.<sup>1,2</sup>, Varela, D.<sup>5</sup>, Wolfenson, L.<sup>1,2</sup>.

<sup>1</sup> Consejo Nacional de Investigaciones Científicas y Técnicas, Argentina.

<sup>2</sup> Museo Argentino de Ciencias Naturales "Bernardino Rivadavia", Buenos Aires, Argentina.

<sup>3</sup> Estación Experimental Agropecuaria Delta del Paraná - Instituto Nacional de Tecnología Agropecuaria, Buenos Aires, Argentina.

<sup>4</sup> Asociación para la Conservación y el Estudio de la Naturaleza, Buenos Aires, Argentina.

<sup>5</sup> Instituto de Biología Subtropical, Universidad Nacional de Misiones y Centro de Investigaciones del Bosque Atlántico, Misiones, Argentina.

**Corresponding author:** javipereira@yahoo.com

### Abstract

The marsh deer (*Blastocerus dichotomus*) is the largest native cervid of South America and is categorized as Vulnerable on the IUCN Red List. The southernmost population of this deer is found in the lower Delta of the Paraná River in Argentina. Due to poaching, habitat loss, and predation by dogs, it has been proposed to upgrade the conservation status of this population to Endangered. In 2015, we implemented the "Pantano Project", an initiative aimed at studying and conserving the marsh deer population of this wetland based on research, environmental education, and public awareness. These actions are intended to reconcile marsh deer conservation with the regional forestry management and improve the conservation status of one of the most important wetlands globally.

### Resumen

El ciervo de los pantanos (*Blastocerus dichotomus*) es el cérvido nativo más grande de América del Sur y está clasificado como Vulnerable en la Lista Roja de la UICN. La población más austral de este cérvido se encuentra en el Bajo Delta del Río Paraná en Argentina. Debido a la caza furtiva, la pérdida de hábitat y la depredación por perros, se ha propuesto incrementar el estado de conservación de esta población a En Peligro. En 2015, implementamos "Proyecto Pantano", una iniciativa destinada a estudiar y conservar la población de ciervos de este humedal basada en la investigación, educación ambiental y concienciación pública. Estas acciones están destinadas a reconciliar la conservación del

ciervo con la producción forestal en la región y mejorar el estado de conservación de uno de los humedales más importantes a nivel mundial.

**Keywords:** Argentina, *Blastocerus dichotomus*, forestry, Paraná River Delta, wetland

### Introduction

The marsh deer (*Blastocerus dichotomus*) is the largest native cervid of South America and one of the most charismatic mammal species of the continent (Duarte & González 2010). Historically, the species occupied a wide range of habitats along the major river basins, but it has experienced a 65% reduction (Weber & González 2003) and is categorized as Vulnerable on the IUCN Red List (Duarte et al. 2017). The world's southernmost population of this deer is found in the lower Delta of the Paraná River in Argentina (Varela 2003), an ecosystem rich in biodiversity over which an intensive forestry activity has been carried out since the mid-nineteenth century. The commercial plantation of poplar (*Populus* spp.) and willow (*Salix* spp.) and other practices associated with this activity (e.g., water management, road development) have strongly modified the physiognomy of the Delta, generating disparate responses by wildlife. As a result, the marsh deer was on the verge of extinction in this wetland, sheltered in places of difficult access or in the heart of plantations with very little management.

The marsh deer population there is unique for several reasons. Although the typical habitats of this deer are flooded grasslands, vegetated lagoons and swamps with floating marshes (Piovezan et al. 2010), its current presence in this wetland is mostly linked to landscapes under forestry production. Of all the existing marsh deer populations, this is probably the one that faced the most drastic change in the habitat physiognomy and still survives. Also, this population is genetically different from other known populations of the species (Márquez et al. 2006), which suggests that it should be considered a distinctive management unit. Finally, the presence of this charismatic mammal so close (c. 40 km) to the Buenos Aires metropolitan area (around 14 million people or 31% of the national population) has become a valuable conservation tool for raising awareness about the natural and cultural heritage of the Delta among forestry producers, islanders and urban people. Despite its uniqueness, this deer population suffers from threats such as retaliatory killing, poaching, habitat loss, and predation by dogs, so it has been proposed to upgrade its conservation status to Endangered (Lartigau et al. 2012). Surveys carried out in the lower Delta of the Paraná River in the late-1990s showed that the marsh deer population appears to be fragmented into three unconnected nuclei (Figure 1); the most important, in the portion of the delta adjacent to the De la Plata River, the second, within the "forestry

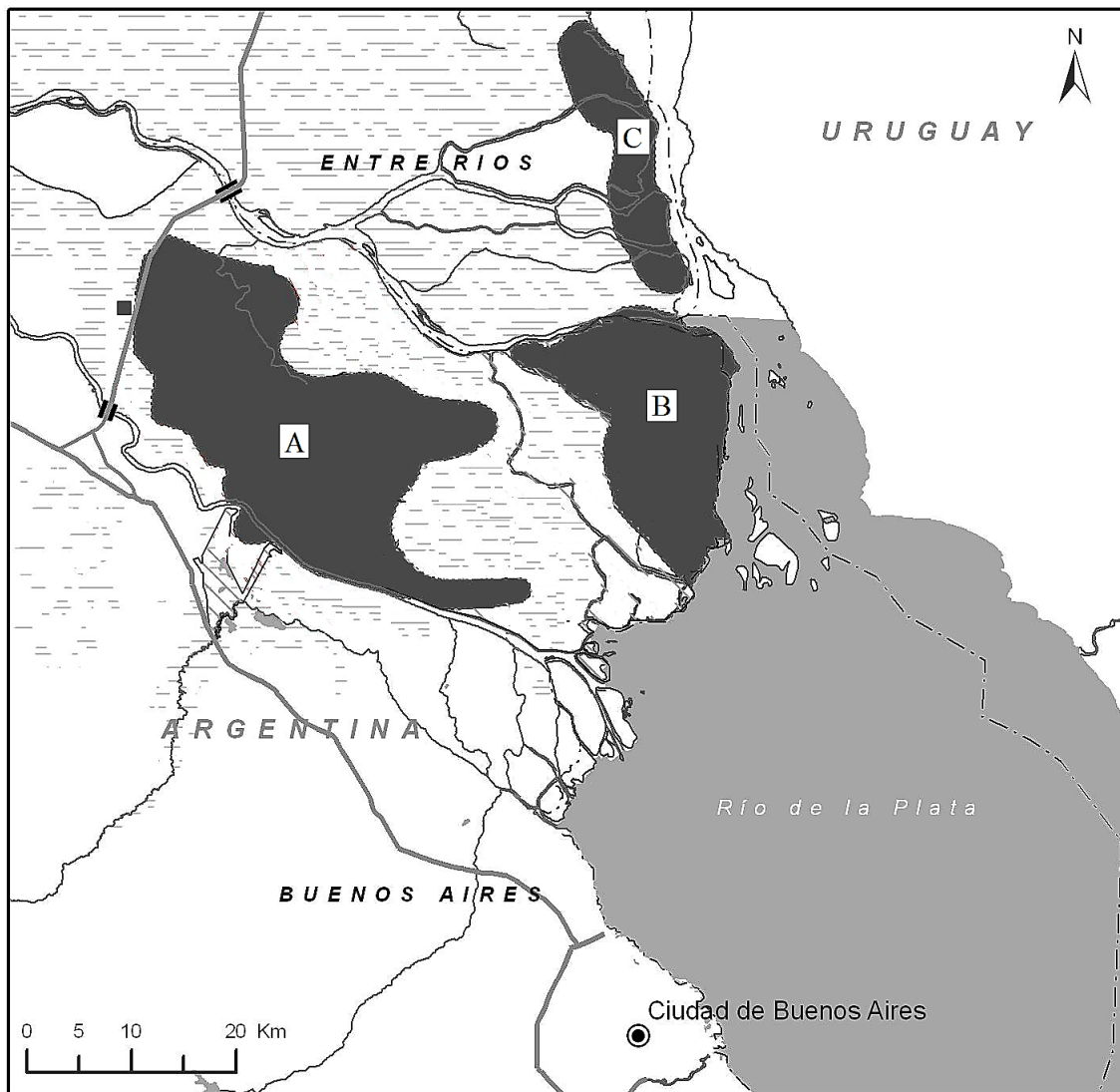
core" (with almost all individuals within forestry properties) and the third on a strip of islands near the Uruguay River, in Entre Ríos province (Varela 2003; D'Alessio et al. 2006). Under this scenario, initiatives, including the creation of protected areas (i.e., the MAB-UNESCO Delta del Paraná Biosphere Reserve, with c. 900 km<sup>2</sup>), dissemination and awareness activities among islanders, and control to reduce poaching, were taken to conserve the deer in the region (Aprile et al. 2006, D'Alessio et al. 2006). These actions were designed opportunistically and their real impact on marsh deer conservation was not evaluated due to the lack of reference data about this population.



**Figure 1.** Marsh deer (*Blastocerus dichotomus*) credit to "Proyecto Pantano/Roberto Cinti."

Nowadays, there is consensus that any strategy aimed at protecting marsh deer in this Delta must necessarily include its interaction with forestry, since most of the individuals are immersed in the forestry matrix. To meet this challenge, biologists, veterinarians, forestry producers, park rangers,

communicators, and educators from governmental organizations (i.e., the Research Council of Argentina, the National Institute of Agricultural Technology), environmental NGOs (i.e., ACEN - Association for the Conservation and Study of Nature) and forestry companies, implemented an ambitious initiative ("Pantano Project") aimed at diagnosing the conservation status of the species in this wetland and identifying which forestry or silvopastoral practices (i.e., plantation management, water use strategies, cattle density) are most compatible with the deer's continued existence.



**Figure 2.** Marsh deer (*Blastocerus dichotomus*) distribution in the lower Delta of the Paraná River. Letters A, B and C represent the three different nuclei proposed for the species in this wetland (D'Alessio et al. 2006). Source: ACEN - Proyecto Ciervo de los Pantanos

The six main research lines include:

- completing an updated regional distribution map incorporating relative abundance indices and modeling landscape and human variables that affect these attributes;
- getting insight--for the first time--into the spatial ecology (i.e., home-range size, habitat selection at a fine scale, movement patterns, dispersal routes) of the species in the region, focusing on plantation types used or avoided;
- evaluating the genetic status of the marsh deer through population and landscape genetics approaches (i.e., degree of isolation among the three proposed nuclei, possible barriers to gene flow, inbreeding);
- analyzing the nutritional ecology of deer in this population (i.e., seasonal diet, forage selection, the role of commercial plants as food items and their frequency of use);
- assessing the effects of cattle management practices on deer presence and abundance; and
- evaluating the interaction between the marsh deer and the invasive axis deer (*Axis axis*), recently established and expanding in the lower Delta of the Paraná River (Fracassi et al. 2010).

In addition to these research lines, environmental education activities at kinder and primary schools are carried out, mostly focused on children living in or around this wetland. Finally, a communication project to increase public awareness of biodiversity conservation is being developed, with the marsh deer as a flagship species, emphasizing the natural and social value of biodiversity and the ecosystem services provided by well-conserved wetlands.

The information obtained by the "Pantano Project" is intended to reconcile marsh deer conservation with forestry management by improving production protocols (e.g., by using this species as a 'high conservation value' to be included as a monitoring attribute in those forestry operations FSC certified), contribute to the landscape use planning process under development, defining dispersion corridors for wildlife, guide vegetation restoration activities, provide a reference basis for marsh deer population monitoring, and improve the conservation status of one of the most important wetlands globally. The significance of this project has been positively valued by the World Bank, which has supported the early stages (years 2015-2016) of this conservation initiative with an important grant. Further grants from

the Ministry of Environment and Sustainable Development of Argentina and the National Geographic Society keep this project running. With the main activities underway and steadily moving ahead, we expect to obtain key inputs to help achieving the environmental sustainability of the regional forestry activity, improving the economy and competitiveness of producers in this wetland. In that way, efforts to save the southernmost population of the iconic marsh deer will also benefit the lower Delta of the Paraná River as a whole, a place of irreplaceable species of flora, fauna and the islanders' culture.

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