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CO-CHAIR DSG
Dr. Susana González
Biodiversidad & Genética– IIBCE
Av. Italia 3318
Montevideo, 11.600
Uruguay

CO-CHAIR DSG
Dr.William J. McShea
Conservation Ecology Center National Zoological Park-Conservation and Research Center 1500 Remount Rd., Front Royal, VA 22630 -USA

DSG VICE-CHAIR Dr. José Maurício Barbanti Duarte NUPECCE – UNESP-Brazil

RED LIST AUTHORITY NEW WORLD
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RED LIST AUTHORITY OLD WORLD SPECIES
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NEWSLETTER EDITOR
Dr..Patricia Black &
Dr. Susana González

DEER SPECIALIST GROUP NEWS

Layout by:
Marcelo Giloca
Biodiversidad & Genética-IIBCE
Av. Italia 3318
Montevideo, 11.600 Uruguay

Editorial

Dear DSG members,

For the next quadrienium 2017-2020, the Species Survival Commission (SSC) leaded by **Dr. Jon Paul Rodriquez** has defined six priority areas: Increasing Diversity of SSC, Capacity Building, Bolster Work at National Level, Conservation Action, Barometer of Life, Communication and Policy. All these areas have high priority to improve and increase our activities and success in deer conservation.

Increasing Diversity of SSC concerns the expansion of regional, gender and age diversity of each group. Increasing diversity enriches perspectives and increases our efficacy in addressing global conservation.

Capacity Building involves strengthening local capacities for carrying out and using IUCN Knowledge Products, focusing on the IUCN Red List of Threatened Species™, the Red List of Ecosystems, identification of Key Biodiversity Areas, conservation planning and

Conservation Action focuses on catalyzing conservation actions that improve the status of threatened species. For example, reducing extinction risk of a group of selected species by 2020.

Barometer of Life involves work with countries to help them develop and use the information from Knowledge Products at a national scale and to strengthen links between Specialist Groups and IUCN members**.**

Communication focuses on strengthening and diversifying communication strategies and mechanisms to spread and exchange information, scientific data and knowledge products produced by Specialist Groups.

Policy addresses the participation and influence of Specialist Groups in the design and support of national, regional, and global policies to enhance effectiveness of biodiversity conservation in private and public sectors.

The Deer Specialist Group will work to contribute to these priority areas. We have been spreading the word about DSG activities through our participation in International meetings, particularly the International Mammal Congress in Perth Australia in 2017. All members should be aware of the upcoming International Deer Congress in Estes Park Colorado in August (www.deerbiologycongress.org). This will be a wonderful opportunity to network with deer biologists.

In this issue Andrew Tilker, who is leading the large antlered muntjac working group, details their goals, and invites deer biologists interested in obtaining knowledge and establishing conservation actions for muntjac species.

We have an active contribution from Latin American members. Also we are happy to introduce a funding opportunity specific for deer species "GERALD SINGER - DEER CONSERVATION RESEARCH GRANT".

We wish to acknowledge our supporting agencies: Conservation Force (www.conservationforce.org) for providing funding for Eld's deer ecology and conservation projects in Southeast Asia, and to Susana González *Comisión Sectorial de Investigación Cientifica* (CSIC-UdelaR), and the Women in Science Award of the *L'Oreal Foundation-UNESCO-MEC* in Uruguay for her research and contribution to the advancement of scientific knowledge on Neotropical deer species.

We want to acknowledge all who contribute in this edition, also we extend our thanks to all of you for being part of the DSG and we invite all to submit articles to the next issue to Dr. Patricia Black (black.patricia@gmail.com).

Our best wishes,

Susana and Bill

Susana González and Bill McShea Co-Chairs, Deer Specialist Group
sugonza9@yahoo.com
McSheaW@si.edu
DSG list server iconservacionneotropical@gmail.com

Preliminary data on movements and health condition of the first radio-collared huemul (*Hippocamelus bisulcus*) population study in Argentina

Jo Anne Smith-Flueck[1,2], Werner T. Flueck[3,4], and Miguel Escobar Ruíz[5]

[1]Laboratorio de Teriogenología "Dr. Héctor H. Morello", Facultad de Ciencias Agrarias, Universidad Nacional del Comahue, Cinco Saltos, Argentina
[2] DeerLab, c.c. 592 Bariloche, Argentina
[3]Swiss Tropical and Public Health Institute, University of Basel, Switzerland
[4]National Council of Scientific and Technological Research (CONICET), Buenos Aires
Argentine National Park Administration, Bariloche, Argentina
[5]Fundación Shoonem, Comodoro Rivadavia, Argentina

Corresponding author: j.smith@deerlab.org

Abstract

Even though less than 500 Patagonian huemul (*Hippocamelus bisulcus*) remain in Argentina, information on their population ecology and dynamics is severely lacking. For the first time in Argentine history, radio-telemetry collars were placed on a group of huemul to better understand the factors behind the population's failure to recover. Six adult huemul (3 of each gender) were captured in six days, the winter of 2017, inside Shoonem Protected Park, Chubut province. In this article, we present a description of the unique climatic conditions and characteristics of the environment that would be useful to consider in order improving the success of huemul captures, particularly in Argentina. Despite the outwardly healthy appearance of each radio-collared huemul on the last observation date (January 25, 2018), we identified clinical symptoms of disease in 5 of these 6 animals during their capture; these included lameness, affected hoof, exfoliation of 2-7 incisors, and muscular atrophy. Movement distances from the winter capture site to maximum summer distance recorded were 187% greater for females than males (n=6, p =0.05, Mann Whitney).

Resumen

Aun cuando solo quedan menos de 500 ejemplares de huemul patagonico (*Hippocamelus bisulcus*) en Argentina, existe escasa información sobre su ecología y dinámicas poblacionales. Por primera vez en la historia de Argentina, se instalaron equipos de radio telemetría en un grupo de huemules para

entender de mejor forma los factores que no han permito la recuperación de las poblaciones. Durante el invierno del 2017, se procedió a la captura de seis ejemplares en seis días (tres de cada género), al interior del parque protegido Shoonem, provincia de Chubut. Se presenta en este artículo una descripción de las condiciones particulares del clima y las características del paisaje que serán útiles considerar para mejorar el éxito de capturas de huemules, particularmente en Argentina. Aun cuando los animales capturados presentaban un aspecto sano a primera vista, durante la última evaluación (25 enero 2018), identificamos signos clínicos de enfermedad en 5 de 6 animales capturados durante el procedimiento; incluyendo renguera, pezuñas deterioradas, perdida de 2-7 incisivos y atrofia muscular. Los desplazamientos registrados desde el sitio de captura en régimen de invernada a zonas de uso estival fueron 187% mayores en las hembras comparativamente a los machos.

Key words: capture techniques, disease, non-migratory

Introduction

An estimated 350 to 500 endangered huemul (*Hippocamelus bisulcus*) remain in Argentina. Despite these alarmingly low numbers, applying radio-tracking technology as a tool to study population ecology on the eastern side of the Andes has never been successful, mainly due to the remoteness of these approximately 50 fragmented populations, and the extremely low densities of animals inhabiting habitats of dense vegetation (0.5-1.6 huemul/km^2 in Argentina, Smith 2003, pg 106), which further hinder any opportunities for sightings, let alone captures. A first-ever population study of huemul in Argentina using radio-telemetry commenced in the winter of 2017 at Shoonem Protected Municipal Park in southern Chubut province. The capture operations successfully resulted in radio-marking 6 huemul (3 males and 3 females) over 6 days. This study also included the first male huemul to receive a radio collar in Argentine history. In this note, we describe a unique capture method, the average field time required to locate and capture the 6 individuals, the current health condition of the recently sampled population (n=7) considering a prevalent chronic bone disease affecting this population, preliminary information on seasonal home range use comparing gender, and initial observations on the influence of human activity on huemul.

Study area and methods

The study area covers the north, south and western sides of the La Plata Lake, an Andean lake at 930m elevation inside Shoonem Protected Park in southern Chubut province. The mountains surrounding the lake, on all but the eastern side, define the Chilean/Argentine border. The dominant mountains of the landscape include Dedo (2020 m) and Colorado Plata (1796 m) to the north and Condor (1996 m) and Catedral (2067 m) to the south; the mountains to the west are between 1300 and 1700 m, all with precipitous rock walls. The primary habitat is temperate woodland dominated by lenga, *Nothofagus pumilio*, situated between 930 and 1400 m.a.s.l. with a light understory predominating in shrubs: *Pernettya mucronata*, *Maytenus disticha* and *Berberis* spp. The climate is temperate and marked year round by persistent westerly winds with an average annual precipitation of 1000 mm. The warmest and driest months are December through February with an average monthly precipitation of 50 to 100 mm. Meanwhile, the average precipitation for the months of June through August is from 200 to 350 mm, principally as snow. The average temperature for the hottest month, January, is 8 to 10° C, while the coldest month, July, has average temperatures of -4 to -2° C.

Figure 1. A) Huemul at La Plata Lake were often found walking through the water at the shoreline when deep snow was present; B) Darting a huemul from a boat on La Plata Lake.

Six huemul received radio-telemetry collars at the La Plata Lake study area during 6 working days in the winter of 2017: August 3-4, August 27-28 and September 19-20. The coastline was first scanned for huemul from a boat approximately 100 meters from the shore (with 2-5 people scanning at a time using either the naked eye or 8 to 10-powered binoculars), while taking advantage of winter storms that had brought approximately one meter levels of snow at the 930m elevation on the northeastern side of La Plata Lake. Such snow levels substantially reduced mobility and forced individuals to remain near the shore in search of food, and to use the water as a potential escape route from pumas, given their known ability as excellent swimmers. Snow pack was greatly reduced on the beaches, affected by the adjacent water temperatures, as compared to snow levels at distances of 5 meters and more from the shoreline (Figure 1). This fringe allowed easier access to vegetation, both browse and forage. In addition, animals were observed on two occasions to be foraging on submerged vegetation along the shoreline. It was not unusual to see animals walking through the water instead of walking on the snow (Figure 1a), thereby possibly reducing energetic costs and risk of injury; the darting team, for instance, found the snow extremely difficult to walk over, often breaking through the crusty surface and sinking more than 20 cm into the snow depth. This commonly observed behavioral adaptation of the huemul at the study site to concentrate at the shoreline during such climatic conditions was taken into consideration in the organization of the capture operation. The team was set in motion only after adequate snow deposition had forced huemul individuals to the coastline.

Once an animal was spotted, a decision was made whether to dart this animal using the methods described in Flueck and Smith-Flueck (2017). A Daninject gun was used and the dart was shot either directly from the boat when conditions were optimal (n=2) or from land (n=4) (Figure 1b). The latter choice involved a team of three leaving the boat to follow the selected animal on land until the situation allowed for darting it. Each animal was fitted with radio-telemetry collars that included VHF radios and mortality-motion sensors. Although several collars also included GPS radios, this preliminary analysis only includes data using the VHF capabilities of the collars. Additionally, body measurements were taken, teeth were examined to estimate age, and general health condition was evaluated (i.e., general body fat, condition of teeth, presence of any bodily defects or anomalies and ectoparasites).

During the following months, animals were regularly monitored to determine if their mortality sensor had been activated, with plans to immediately set a team in action to obtain the carcass in time to do a thorough necropsy. Locations were determined either by triangulation from the boats (2 directional readings taken within a 15-minute period) or by direct visual observation, after using the VHF radio signal to locate the animal. Huemul tolerated approaching them from between 5 to 100 m, enabling visual observations to be made with minimal disturbance, sometimes with as many as 7 people in the group. During the most recent field campaign in January, we were able to obtain accurate locations for all 6 study animals, either visually (n=4), or within 50 m of the animals (i.e., having a signal strong enough that the animal's radio-collar was heard "in cable", and thus audible with the cable detached from the antennae). Locations were then recorded using a Garmin GPS unit.

Results of capture operation

During a total of 9.32 hr of scans, we spotted 17 groups of deer, for a total of 37 individuals, taking an average of 93 min to sight an individual (SE ± 21, range 20-300 min). The time between spotting and successfully darting the animal averaged 46 min (n=6, SE 3.4, range 32-73 min), influenced by the type of terrain, the snow level of up to a meter, and the forest density. The average distance of shooting the tranquilizing dart to the animal was 15.7 m (n=6; SE ± 2.1, range 10-23 m). The average time between immobilization until full recovery was 45.5 min (n=6, SE ± 1.97, range 29-56 min). Comparing this with the only other huemul radio-marked so far in Argentina (2016) in Los Glacieres National Park, Santa Cruz province, by the National Park Administration, our operation in Shoonem Protected Park required 96.5% less man-days per animal.

Observed osteopathology and explanation

Physical examinations of the 6 study animals during the capture, plus a necropsy of a fresh female carcass found under a fallen tree in late-August on the southwest side of Lago La Plata showed 86% of these individuals to be diseased and all under 5 years of age (Flueck & Smith-Flueck 2017). Clinical pathophysiognomy included lameness, affected hoof, exfoliation of from 2 to 7 incisors (Figure 2), other cranial osteopathologies, and muscular atrophy. These clinical cases, particularly when considering that all animals were classified to be young adults that will most likely never come close to reaching their

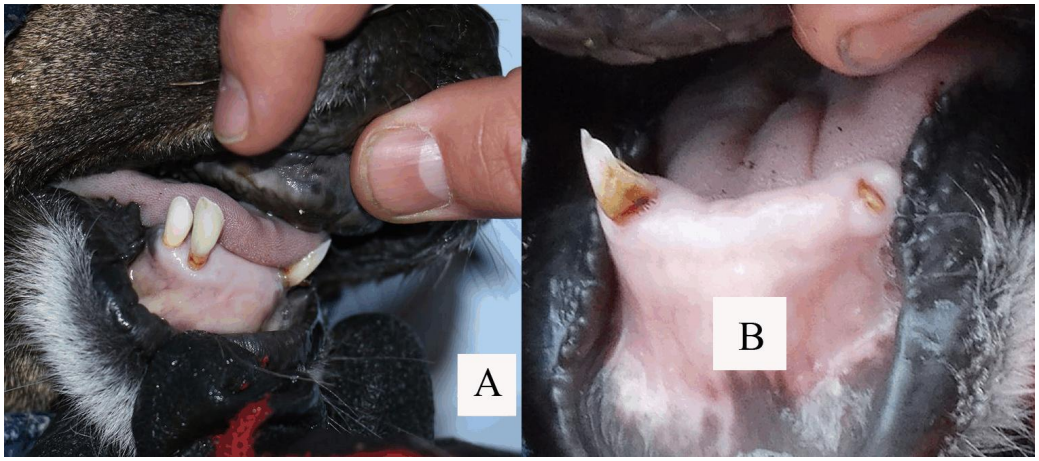

Figure 2. A) Female 3.5 years old with loss of 4 central incisors; gums, though healed over, are receded, exposing roots of remaining teeth; B) Male 4 to 5 years old: only 1 front tooth remains; the right canine is broken and only part of the root of the left canine remains at gum level**.**

potential lifespan--an estimated ≥14-year longevity for their species (Smith-Flueck 2000)-- provide an explanation for the absence of population recovery, and are congruous with the high prevalence of osteopathology evidenced in earlier carcasses collected from this same population (Flueck & Smith 2008). Skeletal remains collected between 1993 and 2007 provided data on bone disease, demonstrating its potential to contribute to morbidity: osteopathy among adults was at least 57%, with affected individuals having mandibular (63%), maxillary (100%), and appendicular lesions (78%). Furthermore, the estimated ≥14-year longevity (Smith-Flueck 2000), which was based on comparison of various deer species with known longevity, is low. Instead, when basing an estimate by the body weight (Speakman 2005), we can expect longevity of 26-years for huemul (assuming 100 kg), when using the formula:

log(e) age=0.851 + 0.209xlog(e) body weight in grams

Selenium (Se), a limiting trace mineral for all mammal species, could be responsible for the high prevalence of bone disease in this population. Although traditional wintering grounds are rich in Se, soil Se levels in areas currently used by huemul measured 0.19 ppm, which is at the low end of the deficiency range along this trace mineral's spectrum (Flueck & Smith-Flueck 2014a). This is

corroborated by overt selenium deficiency reported in local livestock and plants (Contreras et al. 2005) and in a Chilean huemul population (Flueck & Smith-Flueck 2014b). The Andean region is well recognized for its primary iodine deficiency, a mineral whose absorption is further aggravated by selenium deficiency. The nexus to nutritional ecology of huemul in such a population can be explained by the lack of presence of huemul today in fertile lowlands and traditional winter ranges due to elimination of migratory traditions and concomitant elimination of source populations. Essentially, most remaining huemul populations are restrained to marginal if not sink areas, or ecological traps.

One male at capture (September 19th) had only one full incisive tooth remaining out of the eight in the mandible (Figure 2b), and was in an emaciated condition. We did not expect him to survive the winter, which was one of the harshest over the past 20 years. Visual observations and photos of this male on January 20, 2018 suggest his health condition to be fine, as he exhibited a healthy looking summer coat and good-sized, well-formed antlers. However, we must be cautious with this interpretation as there are other cases where animals have appeared well but instead were in critical condition. One recent reported case was of an adult male huemul in Cerro Castillo National Reserve in southern Chile with serious abscesses. Although he was captured and treated on February 15, 2018 by park rangers and veterinarians of the Chilean government agency CONAF, and his coat and antlers gave the impression of a healthy animal, he was reported to be in serious physical condition; although not emaciated, he lacked a fat accumulation expected for this time of year, and exhibited a loss of incisors and abnormalities with the remaining teeth. Therefore, even though we observed all 6 radio-collared animals to be in good condition during the January monitoring period, including improvement in the gait of the male with a bad limp at capture (Figure 3A), we must not assume their overall health condition to be optimal, particularly when considering the poor state of their teeth. A mineral deficiency at the subclinical level can easily give us a false interpretation of the animal's situation. With this in mind, regular monitoring of their radios -each equipped with mortality sensors -is crucial.

Survival and seasonal habitat use (spatial distribution)

As of January 25, 2018 -"the southern summer"-all 6 radio-marked animals were still alive and with no observed clinical symptoms. Survival time since capture dates would thus be from 4 months, 6 days to 5 months, 23 days (= 151.83 days, SE ± 8.58). Summer locations identified showed that the movement distances from the winter capture site to maximum summer distance recorded were 187% greater for females than males with 1.82 to 3.85 km and 1.39 to 1.5 km distances moved, respectively (n=6, p =0.05, Mann Whitney). Thus, males and females behaved differently in terms of the distance moved between the winter capture site and the summer location of furthest distance. These initial observations of movement patterns suggest that all 6 individuals are resident − not migratory − deer, in that year round they use the same habitat sector that we would label as the "winter zone". Similarly, Gill et al. (2010) found that radio-collared huemul in the Aysen region of Chile undertook a modest seasonal migration or none at all. The mean distance between mean summer and winter positions was 552 m (range 44–1219 m), less than the median distance moved in 24 h (706 m). They reasoned that the study animals remained at summer range elevations year round given that lower elevations didn't provide suitable habitat due to grazing and other human activities' being commonplace. It is additionally important to consider, however, that given the seasonal climatic conditions of that region, which are similar to that of the Lago La Plata study area, it is possible that huemul in the Aysén region of Chilean Patagonia also migrated down to winter ranges in the historic past, up until some chain of events led to the extinction of that behavioral pattern.

Other biological observations

The first captured male huemul, judged to be approximately 2.5 years old based on antler size, had short nubs for antlers when captured on August 3 (Figure 3a). Twenty-six days later his antlers had grown 10 cm, but exhibited asymmetrical growth, which is a typical condition in the presence of injuries. Before his capture, we noted him to be limping with an antalgic gait favoring the right front leg.

The three marked adult males were identified to have hard antlers by 17 to 22 January 2018, as well as two other adult males observed in another group. In contrast, a yearling male spotted down on the

lake's coastline (930 m) on January 18th had short nubs still in velvet.

Figure 3. A) 2.5 years old male had short nubs in velvet when captured on August 3, 2017 in Shoonem Protected Park. Before capture, this male had a strong limp, and favored his right front leg; B) A female darted in Shoonem Protected Park with a young by her side.

The first female captured on August 4th had a fawn that remained close by her during the immobilization period. This female was found to be lactating and upon complete recovery after the reversal drug, she called to the fawn, which then ran to her and immediately began nursing. Considering data on other huemul fawns (Smith-Flueck 2003, pg 293), the date of birth was shown to be between late October and early January, with most births occurring between mid-November and mid-December. If we apply a fairly late birth date, that of early January, to the fawn of this radio-marked female, then this fawn would be estimated to be 7 months of age or more, and yet still nursing. According to observations at Torres del Paine National Park and Huilo Huilo Biological Reserve, fawns nurse up to 5 month of age (Guineo et al. 2008, pg 52, Vidal 2010, pg 25). In *Odocoileus virginianus*, a North American deer of similar stature, weaning occurs at approximately the 4th month (Brady et al. 1978).

Potential influence of recreational activity

Initial observations indicate human activity might influence huemul distribution. Accurate locations of all animals were obtained during a recent monitoring operation (15-26 January 2018). In one of the bays, where three of the animals had been captured, all three individuals were close to the coast and less than 1.5 km from their capture sites upon our arrival. At that time, this bay was quiet and void of

human activity. Then, on the evening of January 19th, we observed a large group of people arriving in two 4x4 vehicles to camp at the main beach. For three days these people remained, and were observed fishing from their boats or wading and fly fishing along the shoreline. A day after their arrival, one of the three marked animals in this bay had already moved out. Two days after their arrival, the other two marked individuals had also moved further into the forest to higher elevations; the male had gone a distance of 1400 m, while the two females had moved 3850 and 1550 m. These coinciding observations demonstrate the importance to evaluate further the potential impact of human activity on this population. Drouilly (1983) found some huemul individuals in Chile to move as much as 3 km in a 7-hr time period in response to human disturbance. Our management recommendations would be to heed the precautionary principal and avoid any potential negative affects by closing off road access to this particularly sensitive area.

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References

BRADY, P.S., L.J. BRADY, P.A. WHETTER, D.E. ULLREY & L.D. FAY. 1978. The effect of dietary selenium and vitamin E on biochemical parameters and survival of young among hite-tailed Deer (*Odocoileus virginianus*). Journal of Nutrition 108:1439-1448

CONTRERAS P.A., E. PAREDES, F. WITTMER & S. CARRILLO. 2005. Clinical case: outbreak of white muscle disease or nutritional muscular dystrophy in calves. Revista Científica, FCV-LUZ. 15:401–405.

DROUILLY P. 1983. Recopilación de antecedentes biológicos y ecológicos del huemul Chileno y consideraciones sobre su manejo. Corporación Nacional Forestal, Gerencia Técnica. Chile. Boletin Técnico No. 5:57.

FLUECK W.T. & J.M. SMITH- FLUECK. 2017. Troubling disease syndrome in endangered live Patagonian

huemul deer (*Hippocamelus bisulcus*) from the Protected Park Shoonem: unusually high prevalence of osteopathology. BMC Research Notes10:739.

FLUECK, W.T., J.M. SMITH- FLUECK, B. J. MINCHER & L.H.E.WINKEL. 2014a. Soil selenium levels corroborate direct evidence of selenium deficiency in endangered Patagonian huemul deer (*Hippocamelus bisulcus*). Pp. 52-53. In: Proceedings of the 8th International Deer Biology Congress (Ma J., M. Zhang, R. Halbrook, B. Liu, W. Zhang, editors). Northeast Forestry University, Harbin, China.

FLUECK, W.T., J.M. SMITH- FLUECK, B. J. MINCHER & L.H.E.WINKEL. 2014b. An alternative interpretation of plasma selenium data from endangered Patagonian huemul deer (*Hippocamelus bisulcus*). Journal of Wildlife Diseases 50:1003-1004.

FLUECK, W.T., J.M. SMITH- FLUECK, J. MIONCZYNSKI, B. J. MINCHER. 2012. The implications of selenium deficiency for wild herbivore conservation: A review. European Journal of Wildlife Research 58(5): 761-780.

FLUECK W.T. & J.M. SMITH- FLUECK. 2008. Age-independent osteopathology in skeletons of a south American cervid, the Patagonian huemul (*Hippocamelus bisulcus*). Journal of Wildlife Diseases, 44(3):636–648.

GILL R., C. D. SAUCEDO GALVEZ, D. ALDRIDGE, G. MORGAN. 2010. Ranging behaviour of huemul in relation to habitat and landscape. J. Zoology London. 274:254-260.

GUINEO O., R. GUINEO GARAY & G. GARAY. 2008. Conociendo al huemul de Torres del Paine. La Prensa Austral. Punta Arenas, Chile. 98 pp.

SMITH-FLUECK J.M. 2003. La ecología del huemul (*Hippocamelus bisulcus*) en la Patagonia Andina de Argentina y consideraciones sobre su conservación, Tésis de doctorado. Universidad Nacional del Comahue, Bariloche, Argentina. 361 pp.

SMITH- FLUECK J. 2000. The current situation of the Patagonian huemul. Pp. 67-149. In: The Patagonian Huemul: A Mysterious Deer on the Brink of Extinction (Dias N.I. & J.M. Flueck-Smith, eds.) L.O.L.A. Buenos Aires, Argentina. 149 pp.

SPEAKMAN J.R. 2005. Review: Body size, energy metabolism and lifespan. The Journal of Experimental Biology 208:1717-1730.

VIDAL, F. 2010. El Huemul, un futuro posible. Fundación Huilo-Huilo. Servicio Agricola y Ganadero, Santiago, Chile. 89 pp.

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

Pereira, J.A.[1,2], Fergnani, D.[1,2], Fernández, V.[1,2], Fracassi, N.G.[3], González, V.[1,2], Lartigau, B.[4], Marín, V.[2], Tellarini, J.[1,2], Varela, D.[5], Wolfenson, L.[1,2].

[1] Consejo Nacional de Investigaciones Científicas y Técnicas, Argentina.

[2] Museo Argentino de Ciencias Naturales "Bernardino Rivadavia", Buenos Aires, Argentina.

[3] Estación Experimental Agropecuaria Delta del Paraná - Instituto Nacional de Tecnología Agropecuaria, Buenos Aires, Argentina.

[4] Asociación para la Conservación y el Estudio de la Naturaleza, Buenos Aires, Argentina.

[5] 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^2), 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.

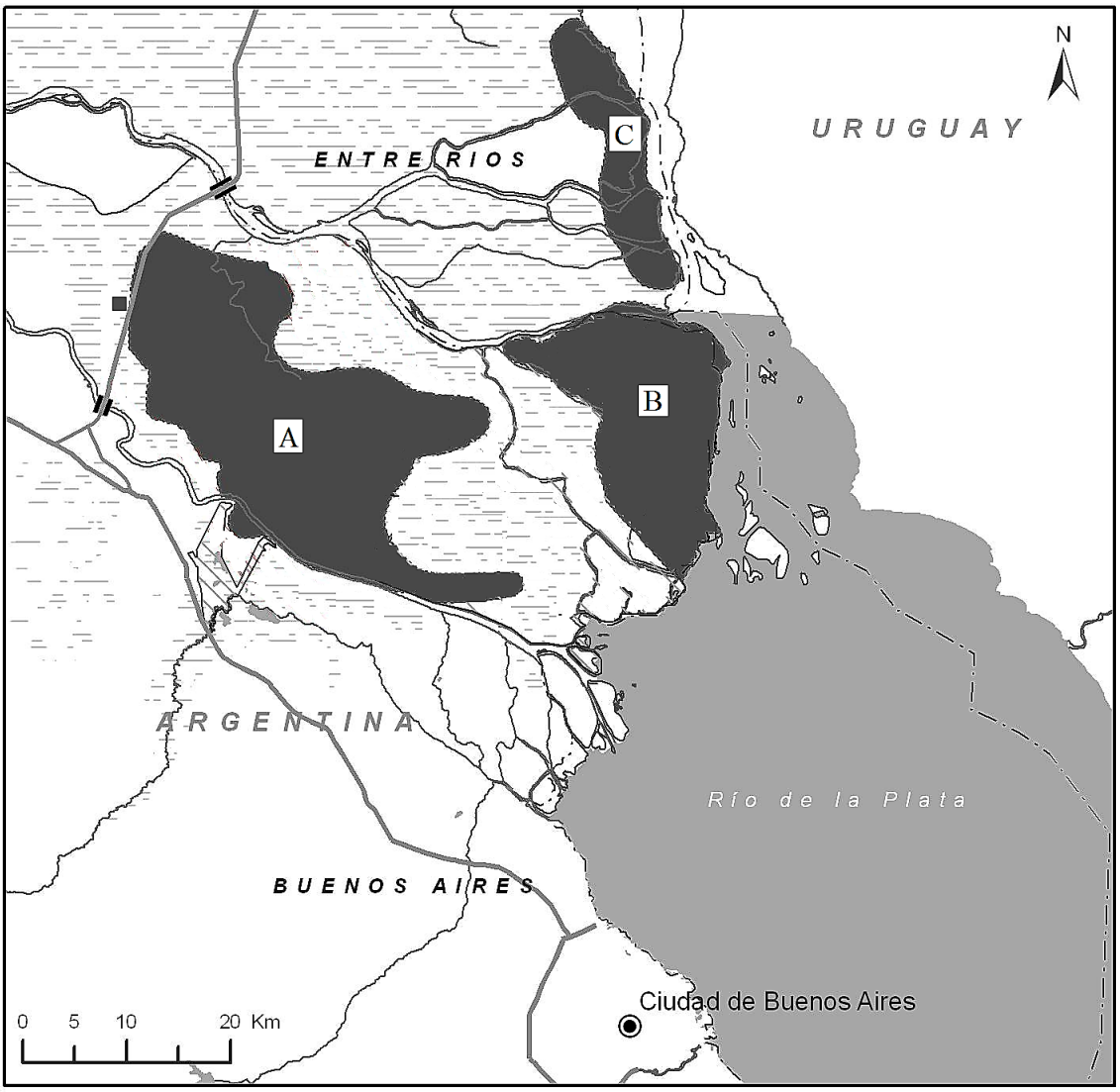

Figure 2. Marsh deer (Blastocerus dichotomus) distribution in the lower Delta of the Paraná River. Letters A, B and C represent the three different nuclei proposed for the species in this wetland (D'Alessio et al. 2006). Source: ACEN - Proyecto Ciervo de los Pantanos

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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Reference List

APRILE, G., S. D'ALESSIO, B. LARTIGAU & P. HERRERA. 2006. Avances en la conservación del ciervo de los pantanos en el bajo Delta del Paraná. Pp. 155 – 157. In: Situación ambiental argentina 2005 (Brown, A., U. Martínez Ortiz, M. Acerbi & J. Corcuera, eds.). Fundación Vida Silvestre Argentina. Buenos Aires, 587 pp.

D'ALESSIO, S., B. LARTIGAU, G. APRILE, P. HERRERA & D.M. VARELA. 2006. Distribución, abundancia relativa y acciones para la conservación del ciervo de los pantanos en el bajo Delta del río Paraná. Pp. 129-153. In: Humedales Fluviales de América del Sur. Hacia un manejo sustentable (Peteán, J. & J. Cappato, eds.). Proteger Ediciones, Santa Fé, Argentina, 570 pp.

DUARTE, J.M.B. & S. GONZÁLEZ. 2010. Neotropical Cervidology: Biology and Medicine of Latin American Deer. Funep/IUCN, Jaboticabal, Brazil, 394 pp.

DUARTE, J.M.B, D. VARELA, U. PIOVEZAN, M.D. BECCACECI & J.E. GARCIA. 2016. Blastocerus dichotomus. The IUCN Red List of Threatened Species 2016. Downloaded on 20 October 2017.

FRACASSI, N.G., P.A. MOREYRA, B. LARTIGAU, P. TETA, R. LANDÓ & J.A. PEREIRA. 2010. Nuevas especies de mamíferos para el Bajo Delta del Paraná y Bajíos Ribereños adyacentes, Buenos Aires, Argentina. Mastozoología Neotropical 17:367-374.

LARTIGAU, B., C. DE ANGELO, S. D'ALESSIO, I. JIMÉNEZ PÉREZ, G. APRILE, M.B. AUED, N.G. FRACASSI & D. VARELA. 2012. *Blastocerus dichotomus*. Pp. 121-124. In: Libro Rojo de los Mamíferos Amenazados de la Argentina (Ojeda, R., V. Chillo & G.B. Díaz Isenrath). Sociedad Argentina para el Estudio de los Mamíferos, Mendoza, Argentina, 257 pp.

MÁRQUEZ, A., J.E. MALDONADO, S. GONZÁLEZ, M.D. BECCACECI, J.E. GARCÍA & J.M.B. DUARTE. 2006. Phylogeography and Pleistocene demographic history of the endangered marsh deer (*Blastocerus dichotomus*) from the Río de la Plata Basin. Conservation Genetics 7:563-575.

PIOVEZAN, U., L.M. TIEPOLO, W.M. TOMAS, J.M.B. DUARTE, D. VARELA & J.S. MARINHO-FILHO. 2010. Marsh deer *Blastocerus dichotomus* (Illiger, 1815). Pp. 66-76. In: Neotropical Cervidology: Biology and medicine of Latin American deer (Duarte, J.M.B. & S. González, eds.). Jaboticabal, Funep/IUCN, 394 pp.

VARELA, D. 2003. Distribución, Abundancia y Conservación del Ciervo de los Pantanos (Blastocerus dichotomus) en el bajo Delta del Río Paraná, Provincia de Buenos Aires, Argentina. BSc thesis. Universidad de Buenos Aires, Buenos Aires, Argentina.

WEBER, M. & S. GONZÁLEZ. 2003. Latin American deer diversity and conservation: a review of status and distribution. Ecoscience 10:443-454.

Formation of a large-antlered muntjac working group and muntjac partnership

Andrew Tilker

Leibniz Institute for Zoo and Wildlife Research

atilker@gmail.com

In May 2017 a Large-antlered Muntjac Working Group was formed under the Deer Specialist Group. The group will be led by Andrew Tilker, doctoral student at the Leibniz Institute for Zoo and Wildlife Research and Associate Conservation Scientist at Global Wildlife Conservation. The purpose of the new working group is to bring together leading experts to form a foundation for conservation measures for the large-antlered muntjac (*Muntiacus vuquangensis*).

Figure 1. Large-antlered muntjac (*Muntiacus vuquangensis*).credit Project Anoulak

The large-antlered muntjac is the rarest and most threatened muntjac known to biologists. The species was described by science in 1997 and is found only in the Annamite Mountains that border Vietnam and Laos. Unfortunately, widespread poaching, primarily accomplished by the setting of wire snares, has decimated populations across its range, and it is now on the verge of extinction. In 2016, the large-antlered muntjac was uplisted to Critically Endangered status on the IUCN Red List of Threatened Species. To prevent the imminent extinction of the species, the Large-antlered Muntjac Working Group has two primary goals:

- protect remaining populations *in situ*
- establish an *ex situ* insurance population

To accomplish these goals, we will take a collaborative approach, and work across multiple disciplines. The role of the working group is to advise conservation stakeholders—including practitioners not associated with the DSG, such as protected area managers—in large-antlered muntjac conservation. Overall, we seek to use cutting-edge research to inform best-practice conservation measures that will save the large antlered muntjac.

To complement the new working group, we will also form a Muntjac Partnership separate from the Deer Specialist Group. The goal of this volunteer organization will be to bring together a diverse group of conservation stakeholders to facilitate collaborative work across all muntjac species (it is not restricted to large-antlered muntjac) and across Asia. The Muntjac Partnership is open to anyone interested in muntjac research and conservation—from biologists to government protected area staff. We seek to provide an open and flexible forum to address muntjac-related topics.

Both ventures will be fiscally sponsored by Global Wildlife Conservation. For more information please contact Andrew Tilker at atilker@gmail.com

A new pampas deer (*Ozotoceros bezoarticus leucogaster*) translocation into Iberá Park (Province of Corrientes, Argentina)

Gustavo Solís, Jorge Peña, Sebastián Di Martino, Ana Carolina Rosas, Emanuel Galetto, Juan Pablo Vallejos, Alicia Delgado, Magalí Longo, Leandro Vásquez and Talía Zamboni
taliazamboni_87@hotmail.com
THE CONSERVATION LAND TRUST ARGENTINA

During November 2017, a new pampas deer translocation into Iberá Park was carried out, for the purpose of reinforcing a second population nucleus which had already been established there. The Iberá Park covers 1,729,737 acres of public lands combining Iberá Provincial and National Parks, which are managed by the Province of Corrientes and the National Parks Administration. The lands that constitute the National Park were donated by The Conservation Land Trust (CLT), which is also carrying out the reintroduction of six species of mammals and birds which became extinct in this huge wetland. One of these species, the pampas deer, is among the most endangered in Argentina, with only four remaining populations, isolated from each other, with 2000 individuals in total.

Figure 1. The animals are darted and moved to a pen located in the capture area (right). After 10 days they are moved to the Iberá Park in a helicopter (left).

Since 2009 CLT started a pampas deer reintroduction project in Iberá Park, 22 individuals were reintroduced in less than four years in a portion of the reserve known as “San Alonso”, founding a new population which currently contains more than 100 deer. The success of this experience encouraged us to start a second nucleus in Iberá, this time in a sector known as “Rincón del Socorro”. This initial population was composed of 10 adults, reintroduced in 2016

and 2017, which have already given birth to four fawns. In December 2017, a third group of five individuals was also translocated there to reinforce the population.

These pampas deer were captured from an original population inhabiting an area formerly dominated by natural grasslands and currently transformed to forestry *Pomera Maderas*. The forestry that owns these lands has been collaborating with the project for many years, allowing us to capture animals from the source population living in their fields. Five individuals were darted with an injection rifle from a vehicle and later released together into a pen built in the same area. They were anesthetized ten days later for the purpose of moving them to the reserve, with the help of a helicopter. All animals were chemically immobilized in the pen and intubated to administer inhalational anesthesia during the helicopter movement, thereby increasing safety.

Once in the reserve, the animals were released into a 1 ha pre-release pen, consisting of Olympic fencing with 2 rows of electric wiring on the bottom. They were allowed to habituate to this environment, with the presence of humans and the electric wiring, for around a month. After this period the animals were moved to a 30 ha pen with an electric perimeter consisting only of eight wires, six of which were electrified. The deer remain in this pen because they have learned to respect the electrical fencing. They will be left inside this pen for around a year in a soft release program in order to prevent their dispersing, which occurs frequently when pampas deer are directly released into the wild.

The pampas deer translocations into Iberá Park have allowed us to establish a fifth population of the species in Argentina with around 130 individuals, representing the largest one living inside a National Park in the country.

More pampas deer located in La Pampa province, Argentina

John Jackson

The last Deer News mentioned that one small group of the southernmost subspecies of the pampas deer (*Ozotoceros bezoarticus celer*)--a Red List member-- had been reported from La Pampa on what is the southwestern limit of its original distribution across the vast pampas grasslands. Further surveys have now turned up a further, few populations in other remote estancias in this semi-arid region. So although in a precarious state, the "venado de las pampas" has not disappeared there completely after all! This case does highlight the importance of initial, thorough ground work to check a species true conservation status.

GPS Tracking of Reindeer Herds Saves Animals from Predators and Accidents

Patricia Black

Reindeer herding is an activity with over a thousand years of history in Lapland in Scandinavia carried out by the indigenous peoples of the area. Semi-domestic reindeer (*Rangifer tarandus*) are followed over traditional summer and winter migratory routes and are periodically harvested for meat, hides, antlers and other parts. Today it is a big business with 300,000 animals being managed each year for a value of $25 million. However, reindeer can fall prey to lynxes, wolverines, wolves and golden eagles and they can be killed in accidents such as road kill. These incidents generate significant losses for herders. Modern technology is coming to the rescue with the use of GPS collars linked to the herders'smartphones. The collars are placed at the biannual roundup, and herders have discovered that the best animals for the collars are the alpha females, to facilitate locating the whole herd. Next year there are plans to collar the predators.

http://www.bbc.com/news/technology-42454875

Funding Opportunity

GERALD SINGER - DEER CONSERVATION RESEARCH GRANT

SAINTE CROIX BIODIVERSITÉ is a non-profit organisation founded by the French Wild Animal Park "Sainte-Croix"" to fund conservation programs for wild animals.

In 2017 SAINTE CROIX BIODIVERSITÉ initiated the *Gerald Singer - Deer Conservation Research Grant*, in memory of the founder of Sainte-Croix Wild Animal Park. Deer played an important role in the life of Gerald Singer, and with this grant we hope to honour his legacy by supporting research that can benefice the conservation of deer worldwide.

We will give priority to studies that involve, in their natural habitat, little known and (probable) endangered species. We give priority to studies conducted by citizens from the country in which the deer are found. The intent is to provide support for research that can be used to formulate and to implement conservation plans for the species studied.

Eligibility

SAINTE CROIX BIODIVERSITÉ will grant to any organisation that studies rare and endangered deer and their conservation in their natural habitat.

Each year one grant of € 5,000 or two grants of € 2,500 will be available.

With this grant we do not intend to support conferences, travel to scientific meetings or work for sanctuaries.

Selection criteria

Proposals are evaluated on a competitive basis. Applications are screened by the board of SAINTE CROIX BIODIVERSITÉ, if necessary with the help of outside reviewers.

Closing dates and notification

Deadlines for all grant applications are May 1st. Results will be given June 1st.

Application procedure

Grant applicants should complete the application materials that can be requested from: jan.vermeer@parcsaintecroix.com

Training Workshop
Conservation Biology of Neotropical deer
Subárea Genética- PEDECIBA-BIOLOGIA

PEDECIBA

The main goal is to train students in the biology and medicine of the conservation of neotropical deer.

We will be analyzing methodologies applied as well as the demographic, genetic and ecological trends in biology and medicine .

Coordinator: Dr. Susana González
Mariana Cosse, Leticia Bidegaray & José Carlos Guerrero
Invited Professor : Dr. José Mauricio Barbanti Duarte UNESP-Brasil
Dra. Federica Moreno & Dra. Claudia Elizondo
Msc. Natalia Mannise & Msc. Nadia Bou
Dr. Hugo Arellano & Dr. Matías Loureiro

Topics

Origen and Evolution of Neotropical deer.
Systematic and taxonomy.
Morphometry as a tool in Archaeology and taxonomy.
Conservation Biology
Biogeography. Filogeography
Molecular Markers
Genomics
Conservation Medicine.
Workshop. Capture Methods Sampling collections, Radio telemetry, captive management, husbandry.

Theoretical Sections in Montevideo IIBCE salón Sáez, de 18 a 21 horas
Practical Sections ***Estación de Cría Fauna Autóctona Pan de Azúcar***-Piriapolis-Uruguay

The Languages will be Spanish and Portuguese

Registration (Uruguayan students)
April 16 de April - May 4 *Bedelía Facultad de Ciencias*
bedelia@fcien.edu.uy
Students from other countries contact:
iconservacionneotropical@gmail.com
Subject Curso Cervidos Neotropicales

Start
May 22 2018
Quota: 20
.Total 40 horas

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SAVE THE DATE

9th International Deer Biology Congress

David Hewitt

The 9th International Deer Biology Congress (IDBC) is taking place August 5–10, 2018 in Estes Park, Colorado, USA. The IDBC is held every 4 years and provides a venue for researchers and managers to discuss deer ecology and management. The 9th IDBC will be held in the scenic town of Estes Park, nestled in the Rocky Mountains adjacent to Rocky Mountain National Park. Participants will be able to view elk, mule deer, and moose while learning about research and management of deer species from around the world. Please go to http://www.deerbiologycongress.org/ for more information. Abstracts will be accepted extended deadline and meeting registration is now open.

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