Proyect Corzuela: preliminary results

Density estimates of grey brocket deer (*Mazama gouazoubira*): validation of a sampling technique in Chancaní Reserve, Córdoba, Argentina.

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Management problem

The purpose of this study is to validate a sampling technique used for the estimation of population density of grey brocket deer (*Mazama gouazoubira*) in Chancaní Reserve, Córdoba Province, Argentina.

To evaluate brocket deer populations it is important to use a standardized method that can be used in successive years for periodic controls. The Reserve under study is the only conservation unit that protects the arid Chaco ecosystem, its flora and fauna, in Argentina. Although not in a vulnerable state, the grey brocket deer is highly affected by the increasing hunting pressure by locals who exploit its coat and meat. The results of this study will be an important contribution to the status of the species, the status of the Chaco ecosystem, and the role of the Reserve in the conservation of both.

Previous studies

There are currently no studies in Argentina that provide information as to the density or abundance of the species. Estimates in Bolivia indicate a density of 6.33 ind/km^2 in the rainy season and 33.24 ind/km^2 in the dry season, being the only study available (Rivero et al 2004). Although in Argentina both the red and the grey brocket deer are considered as not threatened (Low risk minor preoccupation category), neighboring countries maintain a more conservative criteria about its status, as that suggested by Juliá and Richard (1999). In Bolivia, the grey brocket deer has been categorized as "Insufficiently known" and "Commercially threatened" by IUCN (1990) and as "Data Insufficient" by IUCN (1994), and the Argentine subspecies has been considered as vulnerable. At present there are no management strategies or appropriate measures to protect brockets, given the lack of an effective hunting control (Richard & Juliá 2001). More recently, in 2006, the IUCN elevated the grey brocket deer to "Data Deficient", which calls for base studies of the species.

The population under study is found in the arid Chaco ecoregion in central Argentina. This ecoregion is highly degraded due to overgrazing, deforestation and invasion of exotic grasses. Sustainable hunting is also a constant threat to the species. Without an initial count and further research it is not possible to know the effects, if any, of these factors on the population.

Main Objective

- To validate a sampling technique with the aim of estimating the density of the grey brocket deer in wild areas of the arid Chaco.

Specific Objectives

- To determine the variables taken in account in population density evaluation: maximum days of persistence of the pellets on the ground and number of daily defecations per individual of the species in the Chaco.
- To estimate the population density of grey brocket deer in Chancaní Reserve.

Methods and work plan

Population density estimation of the grey brocket deer in Chancaní was based on group pellet counts in accumulation plots. The pellet counts per unit area were conducted in February and March of 2006. Five camera traps were set up throughout the Reserve to monitor individual use of latrines and to obtain behavioral records. Thereafter, visits to the Reserve were performed every 15 days to conduct the rest of the activities. Further planned activities include a second campaign in the dry season and a comparison of habitat use in both seasons.

Persistence time of the pellets on the ground

Fresh pellets from different grey brockets in the Reserve were collected and placed along a straight line at 10-m intervals in a homogeneous area of mature forest in the Reserve. The number of pellets was counted in each group. The groups were checked every 15 days in order to estimate the maximum number of days of persistence, until less than 10% of the pellets were recognizable. The general criteria for this experiment followed Harestad & Bunnell (1987).

Daily defecation rates

Grey brockets were studied in Córdoba Zoo and daily defecations were recorded for 15 days in February 2006. The individual pens were cleaned and counts were performed daily. The groups were counted and recorded.

Population density estimates

Seventy 600-m^2 plots were distributed randomly throughout the Reserve. Plot assignation was determined using a 150m^2 cell grid on top of an aerial image of the region. The number of plots fixed was determined through an estimate of the minimum number of samples (Sutherland 1996), calculated with values obtained by an initial sampling conducted in November 2005. The plots were marked and their satellite position was established using a GPS. Two persons walked each plot identifying and recording the number of pellets observed at each point.

The density estimate of the grey brockets in Chancaní Reserve was determined using the following equation:

$$Density = \frac{Pellet\ groups\ per\ unit\ area}{defecation\ rate \times pellet\ persistence\ time}$$

Assuming that pellet abundance is proportional to the number of individuals present in an area and the daily defecation rate, this equation divides the number of pellets/area by the daily defecation rate to obtain an estimate of use (days x animal)/area. The population density (animals/area) is obtained by dividing the resulting value by the days the pellets persist on the ground (Ojasti & Dallmeier 2000).

Preliminary Results

Pellets were found in 32 (46%) of the 70 plots that were searched throughout the Reserve. A total of 241 groups were found in gregarious form. Fresh and old groups were observed; they were easily differentiated by color, decomposition state and size. 78 records of individuals were also obtained with the camera traps.

Pellet persistence time

The maximum number of days that pellets persisted on the ground was estimated as 100, considering that in this period, none of the pellet groups had more than 10% of the original pellets. This value in days is considered in this project as the maximum persistence time on the ground in this area.

Daily defecation rate

From the daily observations of grey brocket deer in the Córdoba Zoo, an average of 6 pellet groups/day was recorded. However, in our opinion and as stated by our Bolivian colleagues in their study of the species in a similar area, defecation rates of animals *ex*

situ can be misleading because of stress, diet and movement constraint involved in their handling. Therefore, we decided to use the recommended number of 13 daily defecations stated by Neff (1968) for small forest cervids, such as our species.

Brocket deer density estimation

The population of grey brocket deer in Chancaní Reserve is estimated in an average of 4.41 ± 6.86 individuals /km^2 (average$\pm$SD). This density value was estimated through pellet group counts distributed in five vegetation zones in the Reserve (Figure 1). The terms used in the equation for this calculation, with respect to the points developed before, were:

- Maximum persistence days of the pellets on the ground: 100,
- Number of daily defecation per individual: 13 (recommended number, Neff 1968).

After the study was started, we realized that the Reserve had distinct vegetation zones resulting in a heterogeneous environment. Following the description of Cabido & Pacha (2002), we divided the area in five general sub environments and recalculated the density estimates with the pellet counts in each region. The densities estimated per vegetation zone, using the equation above and integrating the established coefficients, varied between 0.96 ± 0.76 and 8.97 ± 2.62 individuals/km^2 (average$\pm$SE).
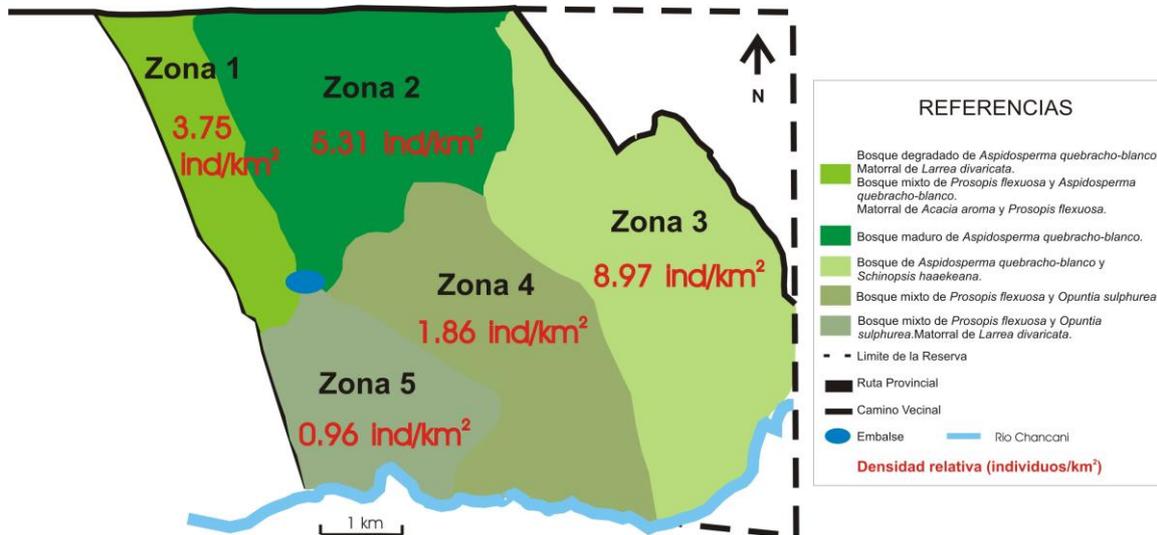

Figure 1. Grey brocket density estimates in each vegetation zone in Chancaní Reserve.

Conclusions

- The method used (group pellet count) with accumulation plots is highly recommended, for it is of rapid application and low cost.
- We estimate that the population of grey brocket deer is of 4.4 individuals per km^2 in Chancaní Reserve, the last well preserved forest in the arid Chaco,
- However, since the pellet count technique showed that animal distribution in the Reserve is not homogeneous, the estimated density of the grey brocket deer (*Mazama gouazoubira*) in the Reserve ranges between 0.96 and 8.97 individuals/km^2, depending on the vegetation zone.
- The terms used in the density estimation equation are based on two factors for this region: 100 days as the persistence time of the pellets on the ground and 13 as the daily defecations per individual.

Activities performed

- Presentation of preliminary results at the XXI Congreso Nacional de Ecologia. August 2006. Abstract accepted and poster presented. "Estimación de la densidad poblacional de la corzuela parda (*Mazama gouazoubira*) en la Reserva Chancaní, Córdoba, Argentina"
- Presentation of a written report with preliminary results to the Agencia Córdoba Ambiente (regulating entity of Chancaní Reserve).

Future Activities

- Presentation of results at the II Congreso Nacional de Conservación de la Biodiversidad. November 2006. "Estimación de la densidad de M*azama gouazoubira*: validación de una técnica de muestreo en el chaco árido argentino" and "Variaciones estacionales en el uso de hábitat de M*azama gouazoubira* en la Reserva Chancaní, Córdoba, Argentina."
- Thesis dissertation entitled "Estimación de la densidad de M*azama gouazoubira*: validación de una técnica de muestreo en el chaco árido argentino."

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