

**Rufford Small Grant
(for Nature Conservation)**

(RSG reference number- 05.07.08).

A camera-trapping survey of the endangered Red-billed Curassow *Crax blumenbachii* in the Atlantic rainforest, Brazil.

Technical Report

SAVE Brasil/BirdLife International

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Introduction

The Red-billed Curassow (*Crax blumebachii*) is an endemic bird of Brazil's Atlantic Forest, threatened with extinction, and included in the "Endangered" category both by the IBAMA (National Environmental Agency) (2005) and by IUCN/BirdLife International (2007). Due to illegal hunting, forest fragmentation and habitat loss it is estimated that in nature there are no more than 250 individuals distributed in only 6 locations. From the alarming situation the curassow is in, it was necessary to elaborate an official document targeting this species for conservation in the entire Brazilian territory.

In 2004, what was then called the Brazil Program of BirdLife International, together with IBAMA, performed a series of workshops in Brasilia to elaborate an Action Plan for the Conservation of the Red-billed Curassow. As a result, an Action Plan was elaborated that is divided into 32 actions that comprise 5 Theme lines, respectively: Public Policy and Legislation, Species and Habitat Protection, Research, Management of the Captive Population and Reintroduction Projects. After publication of the Action Plan, which represented an important achievement for species conservation, the next step would be its effective implementation. In August 2007, SAVE Brazil started its activities for Action Plan implementation together with other non-governmental organizations.

Among all currently known localities of the Red-billed Curassow, the region of southern Bahia was highlighted in the Action Plan as needing conservation aid, particularly through the support of its protected areas. Descobrimento National Park is a very important reserve in southern Bahia as it is one of the remaining Atlantic rainforest fragments (Bencke, et al.2006) and is thought to hold one of the largest red-billed curassow populations, even though the site suffers from hunting, fire and logging pressures. Because of this we have conducted linear transects in Descobrimento. However, we have had some difficulties because the species is very cryptic and lives at low densities. Therefore, using camera traps would be crucial in providing precise records of the curassow and obtaining its relative abundance in the Park.

Justification

This report has provided the first-ever reliable population estimate of the red-billed curassow and allowed a further understanding of this threatened species. The camera trap images will not only benefit the conservation of the curassow but also the other fauna of Descobrimento National Park by aiding the production of a Management Plan for the park. The photographs will also be used for environmental education and to develop awareness of the plight of red-billed conservation among local communities in the surrounding Prado city district. Using images for this will be very important, as it will allow the general population to see this rarely-observed and secretive bird, hopefully promoting the engagement of the local people in conservation.

Methodology

Initially, as step one in the process, a field assistant (an employee of the Descobrimento National Park) and the leader of the project were given theoretical and practical training on the use of the camera traps. At that time, the specialist in charge of conducting the training jointly with the project leader elaborated a practical handbook on programming and handling of the cameras as well as the spread sheets that would be utilized at different times during the performance of field activities. Throughout the performance of field work, the project assistant was to fill out three control sheets referring to: camera set up, monitoring and the withdrawal of said cameras. Thus, the project leader was able to successfully accompany, in detail, all the procedures adopted by the project's field assistant. In this pilot experiment, two areas within the Park and its surroundings were chosen where 10 cameras were placed in the forest at least one kilometer apart from each other. During this pilot phase, the cameras were set to operate uninterruptedly for seven days. No animal sighting was recorded during this first stage in the field.

Nevertheless, this stage fulfilled one of the proposed goals of the project, namely, the training of a field assistant who was also a member of the local community. The trained assistant engaged himself in the project in a very positive manner and today acts as a multiplier of awareness to the importance of conservation of the Descobrimento National Park and of the Red-billed Curassow.

As of the pilot project, referring to the training phase, the most appropriate programming was established for the cameras. All of the camera traps were programmed to operate from 5:00 AM to 7:00 PM. This duration was defined based on studies that investigated the period of Curassow activity in the forest, which identified the diurnal (daylight hour) habit of the species. As relates to the motion and environment sensors, the camera traps were programmed according to the directions in the manual. The cameras were placed in the park for 14 days per month and were monitored by the project assistant every seven days, at which time the number of pictures taken and the level of battery power were verified.

Experimental delineation

The “Parque Nacional do Descobrimento” has approximately 21,000 hectares and is considered that largest fragment of Atlantic Forest in Brazil’s Northeast. The size of the park, associated with the small number of photographic cameras made it difficult to establish an appropriate experimental delineation. From the information collected during the census that preceded the project (using transects) and the random sightings of curassows reported by other park rangers, we had a notion of locations where a few individuals of curassow could be found. Since the species displays low density and the number of cameras is limited, it was important to understand the efficiency of the cameras in registering the species. Thus, it was initially decided that we would test different ways of arranging the cameras in the forest at those locations where curassows were already known to occur.

On the whole, four months of tests were conducted regarding the placement of cameras in the forest with a different arrangement of cameras being adopted every month (see below). In addition, tests were also performed utilizing bait (fruit – bananas and papaya) as a means of attracting the curassows. Below are the different phases with their respective explanations:

- **Phase 1:** (September 2009): The cameras were arranged along two parallel lines which were positioned one kilometer from each other. In each line, there were 5 (five) cameras placed 100 meters apart from each other. As regards the lines, one was situated near the road and the other was in the interior of the forest with 3 (three) of the cameras in that line (among the 5) baited. All of the cameras remained in the field for 14 days, as described above in ‘Methodology’.
- **Phase 2:** (October 2009): The cameras were arranged along two parallel lines which were positioned one kilometer from each other. In each line, there were 5 (five) cameras placed 100 meters apart from each other. As regards the lines, one was situated near the road and the other was in the interior of the forest with all of the cameras in that line baited. All of the cameras remained in the field for 14 days, as described above in ‘Methodology’.
- **Phase 3:** (November 2009): The cameras were arranged along a single line near the road and without bait. The cameras were placed 100 meters apart from each other for 14 days, as described above in ‘Methodology’.
- **Phase 4:** (December 2009): The cameras were arranged along a single line precisely along the edge of the road to record the movement of any animals that might use the road. The cameras were placed 100 meters apart from each other for 14 days, as described above in ‘Methodology’.

In the experimental delineation referring to Phase 4, the first sighting of curassows was obtained by the camera traps. Thus, a suspicion was established that they prefer to occupy wider, open areas (clearings) and the road acted as a lure for the species. In fact, the use of fruit as bait to attract curassows proved to be unsatisfactory (ineffective) since no sighting of the species was made.

As of the definition of the delineation and methodology, in the subsequent months referring to the period from January 2010 to April 2010 (three stages of sampling), the camera traps were placed at other points in the park so as to address the other objectives of the project. The placement of the cameras in the park throughout the delineation tests and in the subsequent months can be seen in Figure 1.

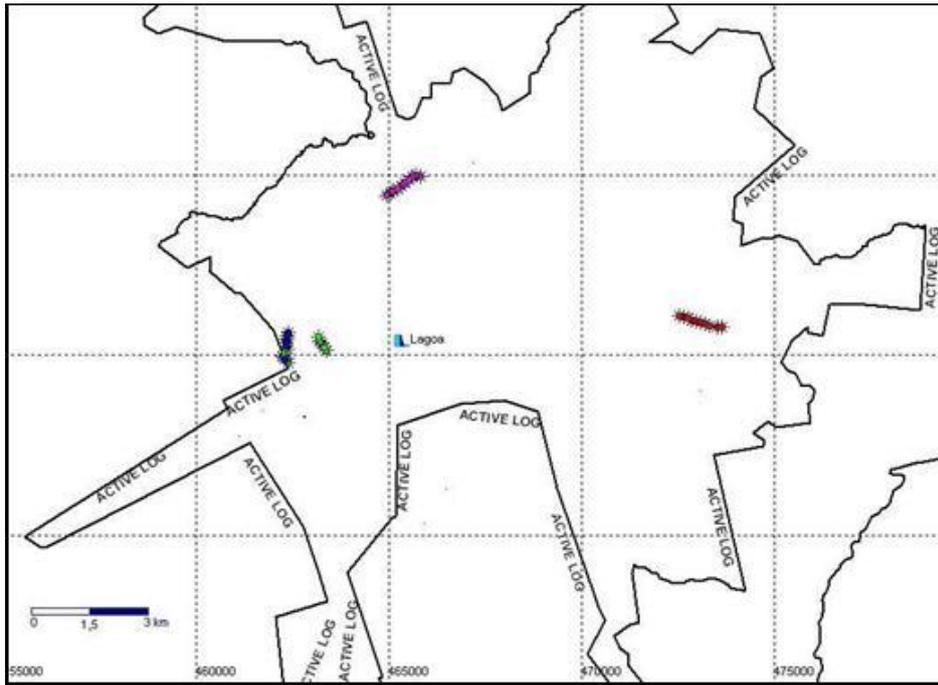


Figure 1: Map of the Descobrimento National Park showing the points where the camera traps were placed throughout the project. A) Blue and green represent points that refer to the phase of delineation tests and recording of curassows. B) Red and Pink represent the points where cameras were placed after the definition of the delineation.

Results and Discussion

On the whole, considering all the phases of work, including pilot work, the cameras were installed and remained in the park for 133 days and successfully recorded a total of 372 photos of 17 different species of wildlife among birds, reptiles and mammals (Table 1). The Red-billed Curassow was recorded in 38 photos in which male and female individuals were identified (Figure 2).

Table 1: List of animals recorded by the photographic cameras and respective number of photos.

	Number of photos
1. Red-billed Curassow	38
2. White-lipped peccaries	41
3. Red brocket deer	21
4. Agouti	162
5. Black and White Tegu	57
6. Opossum	2

7. Coati	19
8. Margay	2
9. Rusty-margined Guan	17
10. Dove	2
11. Jaguarundi	1
12. Tinamou	1
13. Armadillo	2
14. Paca	1
15. Pauraque	1
16. Birds	1
17. Domestic dog	4
TOTAL	372

It is important to stress that the number of photographs does not necessarily correspond to the number of individual curassows. During monitoring of the camera traps, it was found that the cameras did not perform well as regards the time of day in which the sightings were recorded. In a few cases, due to technical problems, all of the sightings were identified as having occurred at the same time throughout the day. Thus we cannot affirm that they refer to distinct individuals. Therefore, the data were considered merely qualitative (i.e. attesting either presence or absence).



Figure 2: Photographic records of species in the Descobrimento National Park, Bahia, Brazil. Photos: 1) male curassow; 2) female curassow; 3) pack of white-lipped peccaries; 4) coati; 5) deer; 6) Guan

Even without individual identification of curassows, due to a repetition of sightings recorded at the same locations considering the different sampling methods (census/linear transect, sporadic sightings and camera traps), it was possible to determine different territories in the park (Figure 3) which contributed to estimating their population. Considering the different methods, besides having confirmed the previously acknowledged reports, the camera traps also enabled the recording of curassows in areas that had never been sampled with the use of any methodology whatsoever, such as the area in the northern part of the park (line in pink in Figure 1).

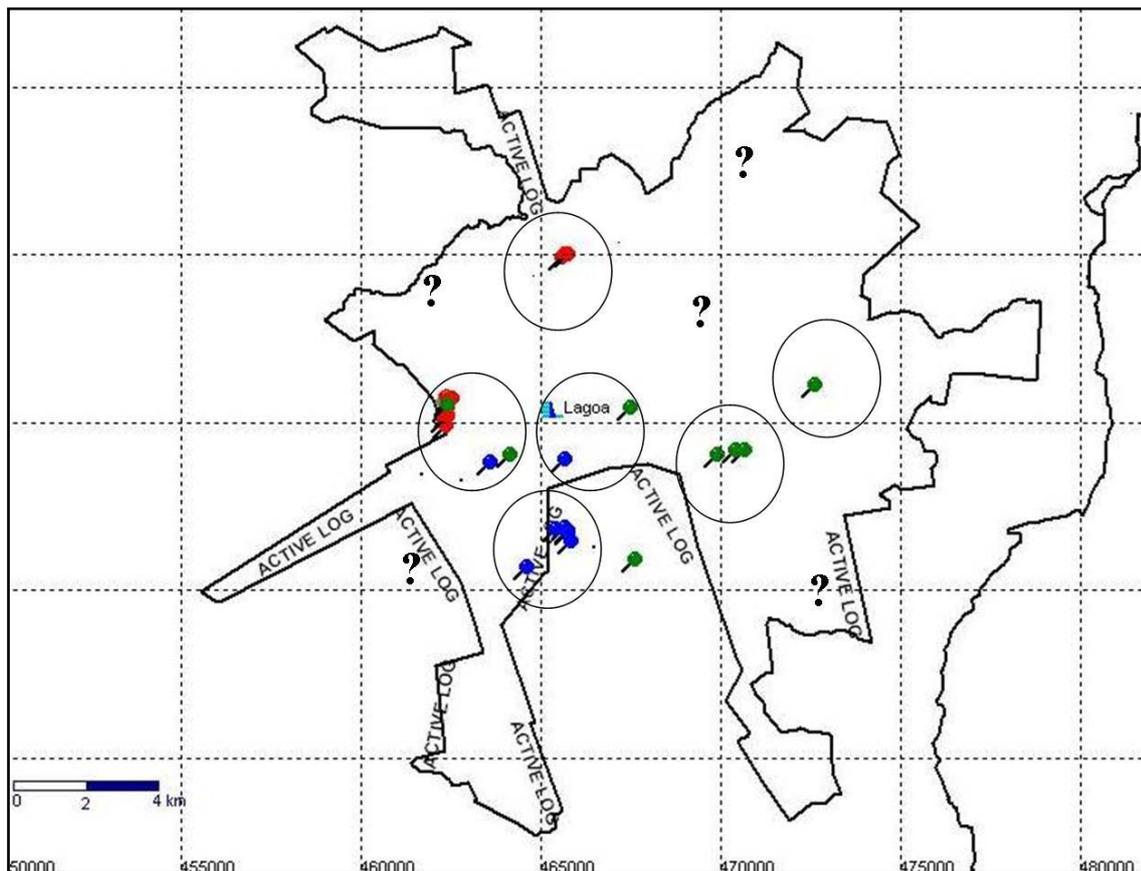


Figure 3: Sightings of curassows in the region of the Descobrimento National Park, Bahia, Brazil. A) Marks in red refer to the sightings recorded by camera traps. B) Marks in blue refer to records obtained via linear transect. C) Marks in green refer to random reports. D) The circles indicate the potential curassow territories in the park. E) Question marks indicate territories where curassows are likely to occur.

Analyzing Figure 3, one can see that there are at least six groups of curassows in the park. Considering that in most of the records regardless of the method used, most of the sightings were of a single individual or a male-female couple, it is possible to infer that there are at least 12 (twelve) individuals in the park. However, during census taking activities, via linear transect, the recording of a female accompanied by her offspring was observed. Thus, one can deduce that each couple can potentially have, at least, one chick, thus increasing the number from 12 to 18 individuals.

However, by examining the map (Figure 3) it is possible to note that there are many areas of preserved forest in the park that were not sampled in the research; such areas being potential locations of curassow occurrence. Considering the confirmed distribution of curassows in the park along with these areas of potential occurrence, we have identified another five groups of territories where occurrence of the species is probable (indicated by the question marks in Figure 3). Taking these locations into

account, the estimate of the curassow population would grow from 18 to 33 individuals since in each of the five potential areas we would find one more couple with one chick.

The eastern and northeastern regions of the park alone were disregarded in this analysis of potential occurrence of the species in view of the presence of four indigenous tribes that frequently hunt within the park. Consequently, we believe that the density of the fauna in this segment of the park is strictly diminished. In fact, during the field activities, two camera traps were damaged by gunshots and battering (Figure 4). One of the vandalized cameras recorded photos of dogs, indicating the presence of hunters within the park.

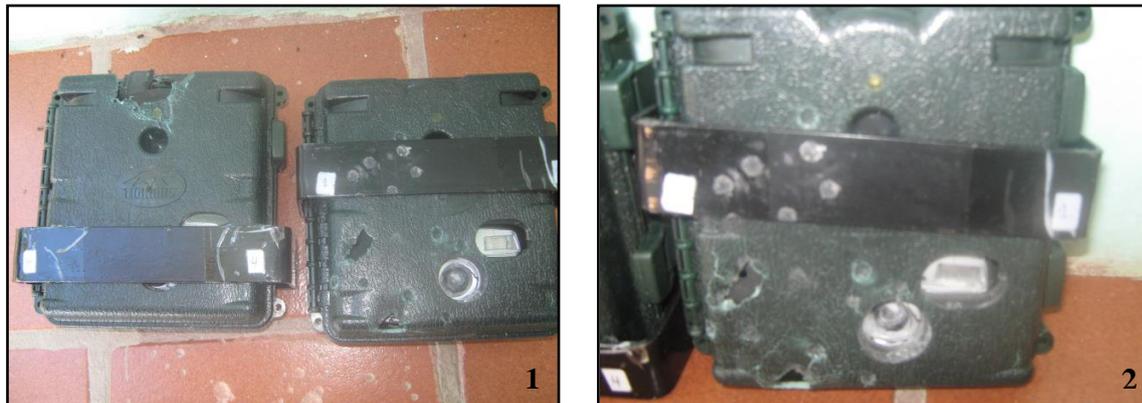


Figure 4: Camera traps damaged by hunters in the Descobrimento National Park. 1) The two traps broken by gunshots and battering. 2) Detail of gunshot marks on the camera traps.

According to the Action Plan for the species (Silveira et al. 2005), the estimated population of curassows in the Descobrimento National Park is 35-40 individuals, but there is no specification as to how this number was calculated. Nevertheless, the estimate presented in this report is very similar to the estimate presented in the action plan, indicating that both estimates are likely to be realistic.

Contrary to other methods engaged in counting curassows, the work with the use of cameras can easily be replicated and does not depend on the skill of an observer. In addition, the sampling effort is easily controllable thus enabling good comparisons. This first initiative in the park can be used as a basis for long-term monitoring programs for the species. With the finalization of the Management Plan, it is expected that patrolling and monitoring activities will be more effective so that there will be a reduction of hunting within the park. The use of photographic cameras following delineation and a sampling effort equal to what was employed in performing this work may serve as a good way of assessing fluctuations in the population of curassows in the park, which reflects directly on the existing pressure from hunting.

Finally, there is interest among park employees in continuing to use camera traps to record the park's fauna. Should park employees continue to do so, SAVE Brasil will provide guidance in the installation of cameras in areas that are yet unsampled so as to complement the gaps in sampling in the present paper.

Bibliography

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