RHINO NOTES

Camera trapping as a method for monitoring rhino populations within the Waterberg Plateau Park, Namibia

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Abstract

For species with unique markings, camera trapping has been used as a non-invasive method for generating population estimates and monitoring the fate of particular individuals. Rhinos—both black (*Diceros bicornis*) and white (*Ceratotherium simum*)—have unique horn sizes, shapes and scarring, making camera trapping a monitoring technique that could be useful. Over a 7-week period during 2006 in the Waterberg Plateau Park (WPP) in Namibia, we obtained 125 photos of rhinos from 11 camera stations during 545 camera nights, about half of which were useful in identifying 18 individual black rhinos and 13 white rhinos. Additional coverage of the Park could lead to more complete counts that would complement ongoing monitoring efforts.

Key words: camera trapping, monitoring, black rhino, white rhino, Namibia

Résumé

Pour des espèces ayant des marques uniques, le piégeage photographique a été utilisé comme une méthode non envahissante pour produire des évaluations des populations et surveiller la situation des individus particuliers. Les rhinocéros noirs (*Diceros bicornis*) et blancs (*Ceratotherium simum*) ont la taille des cornes, des formes et des marques uniques, rendant le piégeage photographique une technique de surveillance qui pourrait être utile. En 2006, sur une période de sept semaines nous avons obtenu 125 photos de rhinocéros de 11 stations photographiques pendant 545 nuits de photographie au Parc du plateau de Waterberg en Namibie, dont environ la moitié servait à identifier 18 différents rhinocéros noirs et 13 rhinocéros blancs. Une couverture supplémentaire du parc pourrait mener à des comptages plus complets qui compléteraient les efforts de surveillance en cours.

Introduction

Developing cost-effective techniques for conducting surveys of endangered species is a conservation priority. Several techniques have been developed for non-invasively monitoring populations of uniquely identified individuals through camera trapping and genetics (Woods et al. 1999, Karanth and Nichols 2002, Trolle et al. 2008). Since both black (*Diceros bicornis*) and white rhinos (*Ceratotherium simum*) are species of concern (Linklater 2003)—and can be identified individually through horn size, shape and scarring (Berger and Cunningham 1998)—camera trapping surveys may be useful for monitoring individuals over time and assessing the effectiveness of ongoing anti-poaching activities (Jackson et al. 2006).

In this analysis, we focus on the rhino populations within the Waterberg Plateau Park (WPP) in north-central Namibia. These populations have been monitored since their release through anti-poaching patrols and annual 48-hour waterhole counts. As part of this monitoring effort, rhinos have been ear notched, but this practice was terminated in recent years as the result of a lack of funds. Since the WPP is a closed population where long-term monitoring efforts are ongoing, it is a logical location in which to assess camera trapping as a technique for rhino monitoring. Although we discuss the utility of this method for estimating populations, we do not report estimates here due to the sensitive nature of rhino conservation in the region.

Study area

The WPP, located in north-central Namibia (S20.46133, E17.20812), is a 470 km^2 area that was established in the 1970s for the protection of large herbivore species, including black and white rhinos (Schneider 1998). The plateau is characterized by 200–m high sandstone cliffs with deep sands on top. Average annual rainfall is between 400 and 500 mm (Mendelsohn et al. 2002), with most ground water seeping into underground springs that feed groundwater wells on the farms along the base of the escarpment. To the north-east, the plateau levels off with surrounding farmland. There are four different vegetation zones within the WPP: fountain plant communities, rocky outcrop communities, bush savannah and mixed tree and shrub woodland (Jankowitz 1983, Schneider 1998).

Figure 1. The camera trap station locations within the Waterberg Plateau Park.

Methods

The study area was divided into two parts—the southwestern and northeastern portions of the WPP. Eleven stations were constructed for two 7–week (52–day) study sessions during June–July and September–October 2006 (Fig. 1). The initial objective of this study was to estimate leopard abundance and therefore, camera trap stations were set to photograph them (Karanth and Nichols 2002). Each camera trap consisted of two Deercam™ film cameras (Nontypical Inc. Park Falls, WI) that took photographs when passive beam motion and heat sensors were triggered. Cameras were set, facing the trail and offset by 1 m, on opposite sides of commonly used game trails or roads. Cameras were either set level at 0.7 m or, in cases where moving vegetation could cause false trips, 1.7 m and angled down onto the path where the area was cleared of grass and branches. A scent lure was placed between the two camera traps to attract animals to the site. It is unclear whether these lures deterred rhinos though rhinos were photographed smelling the lure.

The stations were visited every two to three days to record the number of photos taken, to determine the presence of tracks, to collect hair samples and to change film and batteries when necessary. For all camera traps, hair snare stations were set within 30 m of each other, but for six others the distance between them was set to 30–60 m. Photos of rhinos were

Figure 2. Photographs of white rhinos taken within the Waterberg Plateau Park using motion-sensor camera traps between June and October of 2006. Note the marked difference in horn size and shape between individuals.

examined and separated based on horn size, shape and unique scratches and markings. When released in the WPP, individual rhinos were ear notched and these were used when possible. The analysis was conducted by one individual unless there was confusion about particular individuals when colleagues were asked to independently review the photos for consensus.

Results

A total of 72 black rhinos and 53 white rhinos were photographed. There were 18 individual black rhinos identified including 4 recaptured individuals and 13 individual white rhinos with 4 recaptured. For black and white rhinos, only 51% and 50% of the total photographs, respectively, were used for identification. Photographs were omitted from the analysis if they had been taken within five minutes of clearer pictures or if the camera angle prohibited an adequate visual of the horn.

Discussion

Both black and white rhinos, being protected species, require active management, which includes intensive population monitoring. Techniques such as 48-hour waterhole counts and tracking give managers of the WPP select information that has guided management practices in the past. Our current study suggests that camera trapping could be another useful, non-invasive tool for monitoring the survivorship and health of particular individuals over time. When monitoring populations of heavily persecuted species, data on the survivorship of particular individuals could provide valuable information (Jackson et al. 2006). Camera trapping is relatively easy to learn, and after the initial investment of the camera traps (USD 100–200 per trap), the costs are reduced to that of batteries, personnel for monitoring and transport expenses such as vehicles or horses. Further, camera trapping or footprints can be used to generate population estimates using a mark-recapture model and extrapolating the estimates using home range estimates, Mean Maximum Distance Moved and Bayesian techniques depending on a priori information (McCarthy et al. 2008; Royle et al. 2009).

Although this technique has potential for use in rhino monitoring programmes, there are several limitations that could impact the effectiveness of this technique. First, camera trapping could be useful in calculating rhino population estimates in habitats where commonly used rhino trails are known. The thick vegetation of the WPP causes rhinos and other species to use roads and game pathways that are conducive to camera trapping. In other regions of Namibia, such as the Kunene or Etosha National Park, vegetation is sparse and rhino movements are not as predictable, therefore this technique may not be applicable. Second, since our survey was designed to target leopards, the rhino estimates that we calculated were below the expected numbers based on previous surveys. In future, surveys would be more effective targeting particular pathways that rhinos frequent.

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