Decline of the Cheer Pheasant *Catreus wallichii* in Dhorpatan Hunting Reserve, Nepal

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INTRODUCTION

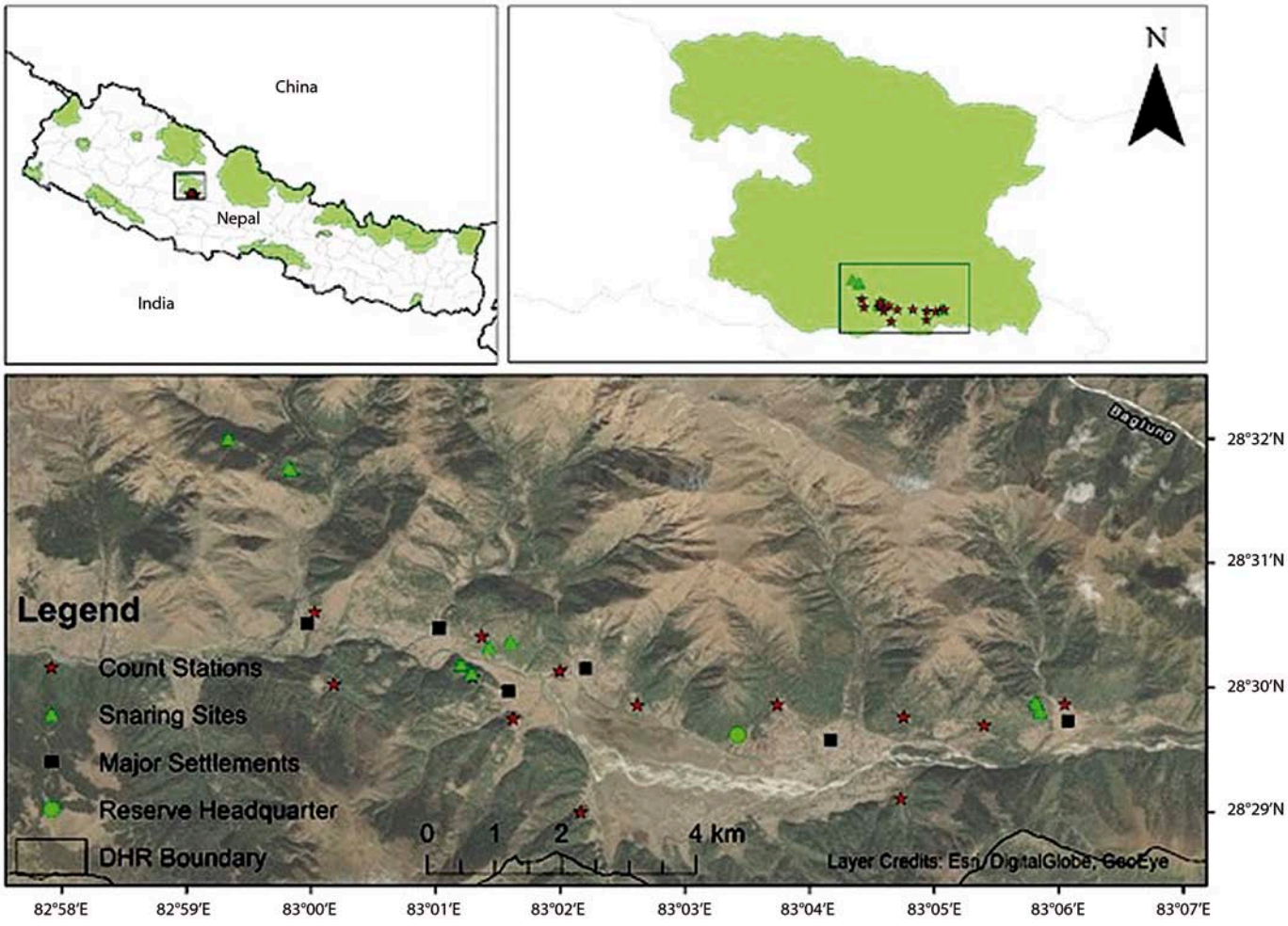
The Cheer Pheasant *Catreus wallichii* is a large pheasant restricted mainly to the western Himalaya, and is patchily distributed from northern Pakistan through India to central Nepal (Grimmett *et al*. 1998, BirdLife International 2020). It prefers successional forests, tall grassland and scrubby vegetation in rocky terrain from 1,400–3,000 m asl (Garson *et al*. 1992, Singh *et al*. 2011, BirdLife International 2020). The International Union for Conservation of Nature has classified it as Vulnerable since 1988 due to its small and declining global population that is impacted by anthropogenic pressures such as habitat fragmentation, grazing disturbance from livestock, hunting and land use change (BirdLife International 2020). Furthermore, the Cheer Pheasant is classified as Endangered in Nepal's national red list and is one of nine nationally protected birds (Inskipp *et al*. 2016).

In Nepal, the Cheer Pheasant is distributed both within and outside of protected areas (Inskipp *et al*. 2016, Basnet & Poudyal 2017). Of these protected areas, Dhorpatan Hunting Reserve (DHR) has by far the largest known population and is considered a stronghold of the species in Nepal and across its entire range (Garson & Baral 2007). Two decades after Lelliott (1981), who first initiated a detailed study of the Cheer Pheasant in the reserve, PS studied its population status in 2003 and found the population to be stable over the period from 1981 to 2003 (Subedi 2003). However, follow-up work was lacking for a decade in spite of the increasing anthropogenic activities that have led to further habitat loss and fragmentation in the park (Panthi *et al*. 2017, Sharma *et al*. 2019). This has consequently affected the Cheer Pheasant population as it is a species known to be highly sensitive to human disturbance (Jolli *et al*. 2011). In our study, we re-surveyed the population of the Cheer Pheasant in the reserve to evaluate changes in counts over time between 2003 and 2013, and to determine the existing threats to the species in DHR.

STUDY AREA

We conducted our study in the Fagune (28.4929°N 83.0546°E) and Surtibang (28.4901°N 83.0363°E) blocks in the Dhorpatan valley in DHR (Figure 1). DHR is the only hunting reserve in Nepal, and is known for its regulated trophy hunting of the Blue Sheep *Pseudois nayaur* and Himalayan Tahr *Hemitragus jemlahicus* in Nepal

Figure 1. Map showing count stations, major settlements, the reserve headquarter and hidden trap (snaring) sites in the Dhorpatan valley in Dhorpatan Hunting Reserve.



(Aryal *et al.* 2015). The vegetation in the valley is characterised by *Abies spectabilis*, *Rhododendron* spp., *Toona* spp., *Picea* spp., *Quercus* spp., *Acer* spp. and *Cupressus* spp. (Lelliott 1981, Singh *et al.* 2011). DHR has been identified as an Important Bird and Biodiversity Area in Nepal (Baral & Inskipp 2005). Besides the Cheer Pheasant, five other pheasant species also occur in this landscape, namely Blood Pheasant *Ithaginis cruentus*, Satyr Tragopan *Tragopan satyra,* Koklass Pheasant *Pucrasia macrolopha*, Himalayan Monal *Lophophorus impejanus* and Kalij Pheasant *Lophura leucomelanos* (Inskipp *et al.* 2016).

METHODS

We monitored the abundance of the Cheer Pheasant at 13 count stations (Chhentung, Bhartan Chaur, Lamakhoriya, Gadi Khola, Pakhathar, Sayalpakhe, Uttar Ganga, Lamathan, Nabithumko, Kandedanda, Bhuji, Kanga and Lumbakharka) in 2013; these stations were earlier established by PS in 2003. We used the dawn call count technique, applied over May and June to count Cheer Pheasants, as both male and female pheasants tend to be very vocal in the early morning and evening during the breeding season (Gaston 1980, Young *et al.* 1987, Singh *et al.* 2011, Awan & Buner 2019). Count stations were spaced at a minimum of 800 m apart to minimise double-counting. At each count station, we established circular plots of 300 m radius to sample calling Cheer Pheasants. Call counts were conducted at 04h30 and lasted for one hour at each count station. We spent five and three consecutive days at each count station in 2003 and 2013 respectively, therefore totaling 104 man-days in both surveys. We also informally interviewed local people and collected opportunistic observations to document existing threats to the Cheer Pheasant.

We compared the total counts of Cheer Pheasants at the 13 count stations to estimate the mean counts of the species for 2003 and 2013. The encounter rate for the pheasant at each count station was calculated by dividing the total count of Cheer Pheasants at each station by the total number of survey days. We then fitted a generalised linear model to our Cheer Pheasant count data using a Poisson error structure with year as the predictor variable. Due to over-dispersion in our data, we eventually refitted our data using the quasi-Poisson family. We estimated the coefficients, robust standard errors, p-values and 95% confidence intervals for the model coefficients. We compared the expected counts of Cheer Pheasant in 2003 and 2013 to assess the change in the abundance of the Cheer Pheasant over the study period. The analysis was carried out in R (R Core Team 2017).

RESULTS

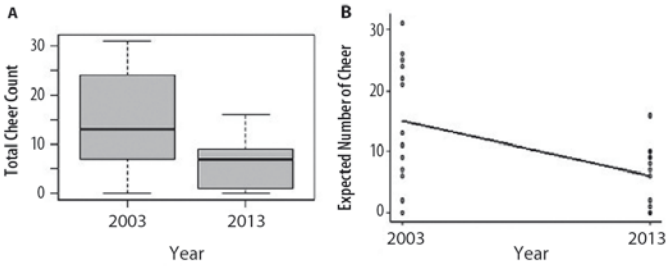
Of 13 count stations, we recorded the Cheer Pheasant at 12 stations in 2003 and 10 stations in 2013. No pheasants were recorded in Gadikhola station in either year. The species was found to be absent from both Kandedanda and Lumbakharkha stations in 2013, while the highest number of calling birds was recorded in Pakhathar station in both years. Overall, the mean count was 15.15 ± 10.16 individuals in 2003 and 6.00 ± 5.03 individuals in 2013, while the encounter rate was estimated at 1.87 individuals/day in 2013 and 2.12 individuals/day in 2003. We found a significant difference between counts in 2003 and 2013 (Table 1, Figure 2). The expected difference in log count between 2003 and 2013 was -9.154.

During our surveys, we recorded hidden snares (>50) in the ridges of Kanga, Chhentung, Bartan Chaur and Bhuji areas (Figure 1), providing evidence of poaching as a threat. We also documented other threats to the Cheer Pheasant, such as the collection of eggs, excessive livestock grazing and high human disturbance in DHR.

Table 1. Summary statistics for Cheer Pheasant counts (2003 and 2013) in Dhorpatan Hunting Reserve using a generalised linear model.

Year	Estimate	Robust SE	Pr(>|z|)	Lower limit	Upper limit
2003	15.154	2.706	0.000	9.850	20.458
2013	-9.154	3.020	0.002	-15.074	-3.234

Figure 2. Comparison of Cheer Pheasant counts for the years 2003 and 2013: A) boxplot showing the total count of Cheer Pheasant, and B) decline in expected number of Cheer Pheasant within a decade in Dhorpatan Hunting Reserve.



DISCUSSION

We found a significant decline in Cheer Pheasant counts in Dhorpatan Valley between 2003 and 2013. In addition, the Cheer Pheasant is also widely in decline across its distribution (BirdLife International 2020). In Nepal, a decline of more than 50% has been observed in Kaligandaki valley from 2004 to 2009 (Subedi 2013). Declines are also documented from Rara National Park from 2005 to 2008 (Budhathapa 2007, Singh 2009). The species has since disappeared from Neelum valley, Salkhala Game Reserve, Khyber Pakhtunkhwa and Margalla National Park in Pakistan (Awan *et al.* 2012, 2014) and it is now confined mostly to Himachal Pradesh and Uttarakhand in India (BirdLife International 2020) outside of Nepal.

In DHR, we failed to detect Cheer Pheasants at Kandedanda station, which in 2003 was one of the stations with the highest counts, and noted a marked decline at Lamathan and Nabithumko calling stations in our 2013 survey. In contrast, counts of the Cheer Pheasant did not change much at areas which have steep terrain, are difficult to access and are near to the reserve headquarters, such as Pakhathar and Syalpakhe. Based on our observations, the important direct threats that may be contributing to the decline of the Cheer Pheasant include poaching, trapping/snaring and the collection of eggs, as also reported by Singh *et al.* (2011) and Panthi & Thagunna (2013). Additionally, intense human pressure arising from the collection of firewood, medicinal plants and herbs in the species' habitat as local communities migrate from lower villages to Dhorpatan valley for agriculture and livestock herding may also have contributed to the declines of the species.

We acknowledge that there are some limitations in our study methodology which may have affected our results. By assuming Cheer Pheasants to be highly vocal in the early morning during the breeding season (Gaston 1980, Young *et al.* 1987), we used calls as a proxy for their abundance at each count station. However, we acknowledge that our counts based on detecting calls may be affected by inaccurate distance estimation between observers and calling pheasants, given the complex topography of the survey area and the differences in the survey effort over our two surveys. We have tried to reduce the impact of these factors on our surveys by ensuring proper training of our field assistants before commencing our surveys but we recognise that systematic sampling problems cannot be easily addressed. Another important limitation of our study is that replicates of counts were conducted at count stations over five days in 2003 but only three days in 2013, due to logistical problems and time constraint. However, the mean count rate differed by more than 50% between the two surveys. Such a large

difference is unlikely to have arisen solely as a result of the difference in number of visits (i.e. sampling intensity), and is probably best explained by a lowered abundance due to genuine declines at the local scale.

We conclude that the Cheer Pheasant is in decline at DHR and has apparently disappeared from some of the stations where it was fairly common in the past. In spite of DHR being a protected area, human activities within the reserve and a lack of awareness among the local people continue to pose challenges to conserving the species. We recommend the implementation of strengthened and more regularly organised patrols by park rangers, more awareness campaigns to engage the local people, and regular monitoring of the Cheer Pheasant population and habitat to better conserve the species in DHR.

ACKNOWLEDGEMENTS

We thank the EMEM Aves Award–Swedish University of Agricultural Sciences for financial support, and the Department of National Parks and Wildlife Conservation for permission to carry out this study. We will never forget Rishi Baral, Somnath Sharma and Kamal K.C. for their help in the field. We are also grateful to Carol Inskipp and Peter J. Garson for reviewing the draft manuscript and Mr Prakash Chandra Aryal for helping in the analysis. We thank the anonymous reviewers for their comments which have improved the quality of our manuscript.

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