

## CONSERVATION REPORT

# Rediscovery and first nesting record of the Vulnerable Cheer Pheasant *Catreus wallichii* in Machiara National Park, Kashmir Himalaya, Pakistan

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## Introduction

The Cheer Pheasant *Catreus wallichii*, categorised as Vulnerable (BirdLife International 2019a), inhabits the Himalaya biogeographic region; its range covers the west Himalaya from north-east Pakistan to west-central Nepal. The species is most frequently found on steep, rocky terrain between 1,445 and 3,050 m (Johnsguard 1986, BirdLife International 2001), occasionally as low as 950 m (Bisht *et al.* 2005), and apparently as low as 600 m in Pakistan (Roberts 1991). It favours open forest and scrub, and is strongly associated with successional grasslands, resulting in a naturally fragmented population (BirdLife International 2001).

Historically the distribution of the species in Pakistan extended to the mountains of Kahaber Pakhtoon Khawa and Azad Kashmir (BirdLife International 2001) and was recorded at Qazinag on the borders of Azad Jammu and Kashmir (Baker 1921–1930), in Kishtwar and the hills of the Jhelum valley (Ward 1926, Osmaston 1927), and Neelum valley (Roberts 1991), including Salkhala Game Reserve (Mirza 1978). Mirza *et al.* (1978) reported that the species was threatened with extinction from Pakistan, although small subpopulations, which in some cases were considered on the brink of local extirpation (Chaudhry 1993), have since been documented across its range (Young *et al.* 1987, Burt 1988, Roberts 1991). However, more hopefully recent surveys have rediscovered several populations (Awan *et al.* 2004, Dar 2006, Khan *et al.* 2006, Awan 2011, 2013, Awan & Lee 2013, Awan *et al.* 2014).

Based on a report of one calling bird in 1977, Mirza (1978) reported that Machiara National Park was a potential site for the species; in January 1983 a single bird was located by Kamal Islam in the upper Machiara valley (Roberts 1991). In addition, Khawaja Younus, an 80-year old local resident in Machiara village, confirmed the presence of a significant number of Cheer Pheasants in Machiara in the 1960s. But his observations unfortunately remained unreported until after 1983, with no subsequent systematic surveys to independently

confirm the species's presence. Therefore, the survey reported here aimed to confirm the presence of Cheer Pheasant in the park, together with establishing a broad population estimate to form a suitable baseline for the future monitoring of the species there.

## Methods

### Study area

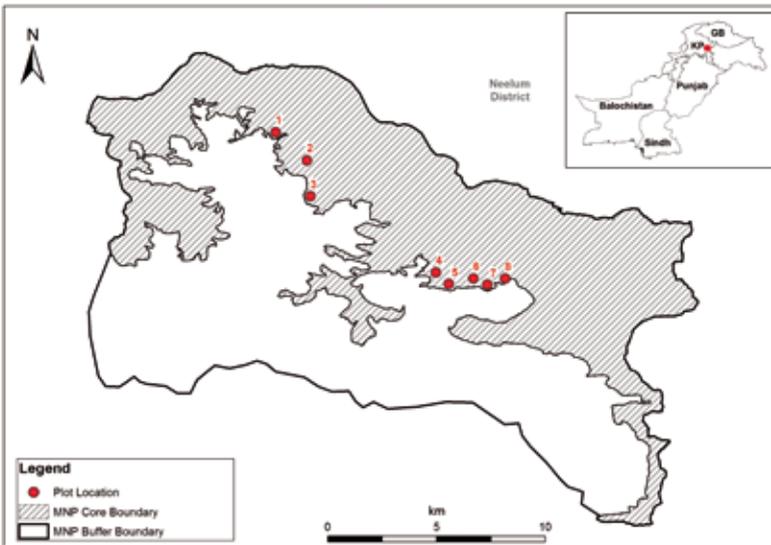
The 135 km<sup>2</sup> Machiara National Park (34.667°N 73.167°E), which is an Important Bird Area (IBA PK017), is located 35 km north of Muzaffarabad, Azad Jammu and Kashmir, north-east Pakistan. The park borders the Neelum River, with Salkhala Game Reserve to the east, Mansehra district, Khyber Pakhtoon Khawa province, to the west, the Karen forest division, Neelum Valley, to the north and Muzaffarabad to the south (BirdLife International 2019b). The forest vegetation and associated biodiversity is characteristic of the sub-tropical/temperate Himalaya mixed-forest/alpine scrub rangeland ecosystem. Together with the Vulnerable Western Tragopan *Tragopan melanocephalus* and Kashmir Flycatcher *Ficedula subrubra*, the Cheer Pheasant (based on historical evidence of its occurrence there) is one of the species that triggered the establishment of the park in 1996 (BirdLife International 2019b).

### Population surveys

We made call counts of Cheer Pheasant using a dawn call count technique (Gaston 1980) that has been widely used in surveys of Himalayan pheasants (e.g. Awan *et al.* 2004, 2014, Singh *et al.* 2011) in May–June 2017 as both male and female give loud calls in the early morning and evening during these months (Young *et al.* 1987). Eight point count locations were positioned in potential habitat within the species's altitudinal range (Table 1, Figure 1). The selection of the survey locations was based on discussions with Wildlife Department field staff, hunters and the local communities. The count locations were in different side valleys of the park, to minimise double

**Table 1.** Summary of the results of the call count survey for Cheer Pheasant *Catreus wallichii* in the Machiara National Park, Pakistan, May–June 2017.

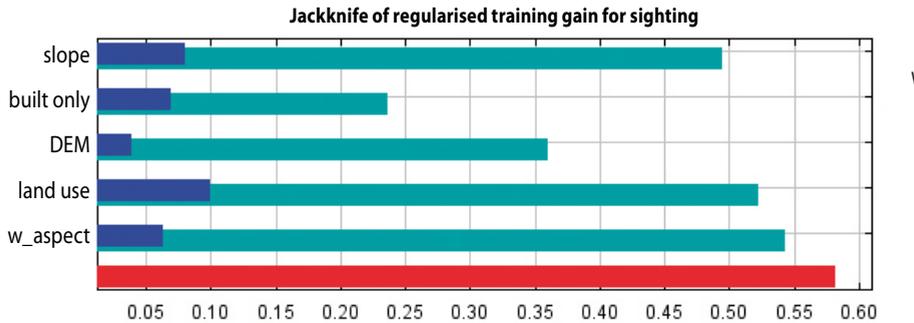
Plot number (locality)	Date (2017)	Altitude (m)	Aspect	No. of calling birds	No. of nests	Clutch size	Unhatched eggs after four weeks	Hatching success (%)
1 (Kundi)	26 May	2,329	SW	4				
2 (Charian)	27 May	2,692	S	5	1	9	2	77.8
3 (Kayan)	28 May	2,290	SW	0				
4 (Kunda)	29 May	2,395	SW	7	1	3	2	33.3
5 (Magra)	30 May	2,403	S	6				
6 (Kharash Wali Nali)	31 May	2,765	SE	2				
7 (Chitee Parea)	1 June	2,610	SW	4	2	7	4	42.9
						9	4	55.5
8 (Kharash)	2 June	2,710	SE	6	1		3	50.0

**Figure 1.** Survey plots established for the call count counting of Cheer Pheasant in Machiara National Park.

counting individual birds and to maximise the area surveyed. Before starting the surveys, a preliminary visit was made to finalise survey locations and identify call counting sites. Additionally, a capacity building workshop was organised to help train the field team in call counting and data collection. Himalayan pheasants are best surveyed in May and June when they are breeding and tend to be most vocal (Gaston 1980). Observers arrived at the survey locations the night before and counts started before dawn (04h30) and lasted for 60 minutes (Awan *et al.* 2004, 2014).

To minimise double counting, only data collected in the first 15 minutes after the first bird was heard calling was analysed (Fuller & Langslow 1984, Reynolds *et al.* 1980, Scott & Ramsey 1981, Singh *et al.* 2011, Awan *et al.* 2014). This is because Cheer Pheasants, like other pheasants, are known

to call from their roosting trees at dawn, from where they start foraging on the ground soon after. Hence, there is a risk of overestimating numbers, due to the movement of calling birds during the survey period (Granholt 1983). The direction and distance of each calling bird was estimated within a maximum of 300 m around each survey point. Each point was surveyed once, and all survey points were identified by GPS to be used as reference for future monitoring. Following Awan *et al.* (2014), a fixed radius approach was used to estimate Cheer Pheasant density wherein the number of calling birds heard at each point was then used to calculate encounter rates and densities for the whole park area, based on the assumption that the number of calling birds detected within the 300 m survey radius (0.28 km<sup>2</sup>) represented the minimum number of birds actually present.

**Figure 2.** Results of Jackknife test for evaluating the relative importance of predictor variables for Cheer Pheasant habitat suitability.

### Nest search and data collection

After each survey, MNA, assisted by wildlife staff, systematically searched for Cheer Pheasant nests within a 300 m radius of each survey point, following the technique used by Awan & Lee (2013). All areas were searched for three hours for evidence of nesting. The number of eggs, broken eggs or hatched eggs was recorded for each nest found, and their location marked using GPS. To record nesting success and survival rate, each complete nest was revisited weekly for four weeks. All hatched and unhatched eggs were recorded to assess the success rate.

### Habitat suitability

Using a Geographical Information System (GIS)-based habitat suitability analysis of key habitat variables, we calculated the area of potentially suitable habitat for Cheer Pheasant in the park. The variables which were ranked as the most important, based on a Jackknife test (Figure 2), were: altitude (derived from ASTER Global Digital Elevation Model of 30 m spatial resolution); slope; aspect (derived from the Digital Elevation Model); and land cover (derived from Landsat OLI 8 satellite data with 30 m spatial resolution). Object-based satellite image classification was used to extract different parameters of land-use: built-up area, forest cover, shrubs/grass, cultivated area and soil type. Different spatial software programmes were used in this study, including Entropy Modelling (Maxent 3.4.1), Arcmap (V.10.5) and eCognition (V. 9). A digital elevation model (DEM) was used to establish slope and aspect within the study area. The distance from each settlement or road was calculated using a density analysis tool in ArcMap (V.10.5). Raster maps were created using Erdas (V.9.1) and eCognition (V. 9). All variables used in the habitat suitability model were converted into Ascii format using ArcMap.

The Jackknife test was run for variable importance in Maxent to estimate the comparative

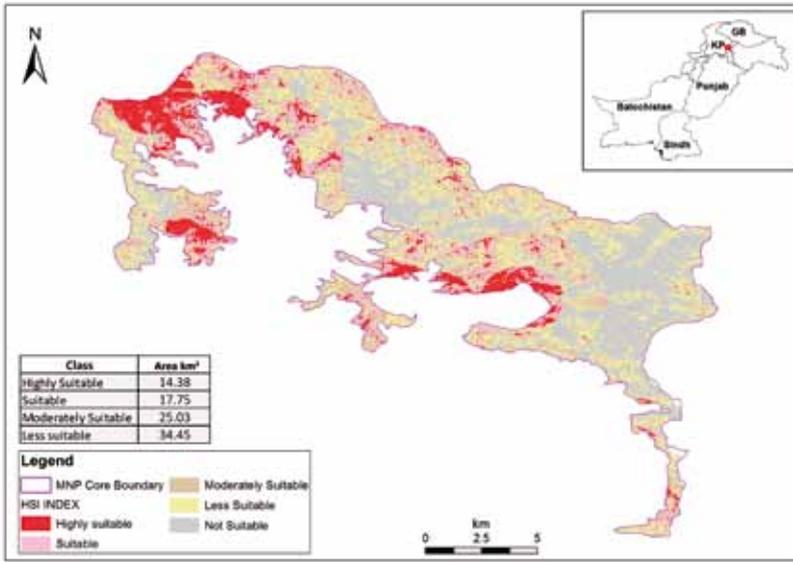
strength of forecaster variables. The variable with the lowest decrease in the average training gain was removed and the remaining variables were used to build and run the next model. Continuous distribution probability values of the model produced by Maxent were then converted into suitable or unsuitable values using a modified minimum training presence threshold (Pearson *et al.* 2007). The suitable or unsuitable values were then used to build a distribution map of the Cheer in the park area (Figure 3).

### Results

The Cheer Pheasant was detected at seven of the eight survey locations (Table 1). In total, 34 individuals were recorded calling and two of them were seen. On average, a minimum of  $4.9 \pm 0.6$  SE birds were present per occupied survey plot and the estimated number of Cheer Pheasant in suitable habitat at Machiara National Park is a minimum of 17.3 birds per km<sup>2</sup>. How many of these were male or female, or in fact pairs, remains unknown. This is because in Cheer Pheasants, both male and female call with no detectable differences in their calls. We found five Cheer Pheasant nests in four survey plots, hence confirming breeding. Clutch size ranged from 3–9 eggs per nest, with a mean of 6.8 eggs per clutch (Table 1, Plates 1 & 2).

The Cheer Pheasant habitat suitability analysis classified 14.38 km<sup>2</sup> (10.6%) of the park as highly suitable, 17.75 km<sup>2</sup> (13.1%) as suitable and 25.03 km<sup>2</sup> (18.5%) as moderately suitable (Figure 3). Consequently, considering only the highly suitable habitat for the species, the minimum number of Cheer Pheasants in Machiara National Park is estimated to be about 250 individuals.

There was one human settlement with an average of 25 households in each survey plot. Most households consisted of one human (mainly female) with an average of 17 animals each. Therefore, each survey plot contained at least 25 humans and 425 animals. The number and size of human settlements within the study area appears



**Figure 3.** Distribution and habitat suitability map of Cheer Pheasant in Machiara National Park.

**Plates 1 & 2.** One of the Cheer Pheasant *Catreus wallichii* nests with eggs and the location (circled) where the nest was found, Machiara National Park, Pakistan, 9 July 2017.



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to be increasing, with previously uninhabited areas being developed for farming and grazing and existing ones expanded, resulting in an overall decrease in suitable habitat and an increase in disturbance for breeding Cheer Pheasants.

### Discussion

The results of this survey, together with anecdotal local knowledge, indicate that the Cheer Pheasant is widely distributed in the park, probably because 14.38 km<sup>2</sup> (10.6%) of the habitat appear highly suitable for the species, with another 17.75 km<sup>2</sup> (13.1%) being suitable (Figure 3).

This study detected an average of  $4.9 \pm 0.6$  SE calling birds per survey plot, compared with  $6.6 \pm 3.7$  SE in Jhelum Valley, Azad Kashmir (Awan *et al.* 2014). Comparison with surveys elsewhere in the species's range is somewhat difficult, as our estimates are based on birds/km<sup>2</sup>, whereas others estimated numbers in pairs/km<sup>2</sup> (Gaston & Singh 1980, Lelliott 1981, Garson 1983, Subedi 2003, Singh *et al.* 2011). These authors estimated density based on the assumption that all vocal Cheer Pheasants detected were paired, an assumption that we argue is highly unrealistic. Their numbers consequently ranged between 5 and 12.4 pairs/

km<sup>2</sup>, with those of Subedi (2003) from India as high as 24 pairs/km<sup>2</sup>. Based on our survey, the density at Machiara is 17.3 birds/km<sup>2</sup>. Given that both sexes call during the survey period and that their calls are indistinguishable, it seems likely that the densities reported from across the range have led to an overestimation of numbers. In contrast, our approach provides a solid baseline for future monitoring of the Cheer Pheasant population across its range. Our population estimate of Cheer Pheasant from Machiara, together with populations estimated from other parts of Pakistan (Awan *et al.* 2014), could lead to a reassessment of the threat status of the species.

In Machiara the clutch size was between 3–9 eggs per nest, with a mean of 6.8 eggs (Table 1), and Awan & Lee (2013) recorded a clutch size of 6–12 eggs per nest (mean 8.3) from the Jhelum valley, Kashmir, whereas Roberts (1991) reported that the normal clutch size was between 9–14 eggs (and additionally reported that they were incubated only by female, for 26 days). Why the clutch sizes recorded during our surveys in Kashmir are lower than those reported by Roberts (1991) remains unknown.

In common with other parts of its range (BirdLife International 2019a), in Machiara the species is facing anthropogenic pressures. Although the potentially suitable habitat in the park is reported to have markedly increased between 2004–2010 (Cochard & Dar 2014) because of conversion of parkland into grasslands for sheep and goats (often using marginal pastures inside the park), buffalo (mostly stall-fed) and equines (for transport), the overall outlook for the species appears less positive. It seems likely that the number of settlements and the number of animals per household has increased over the same period, potentially leading to increased disturbance of breeding birds. Anthropogenic pressure from housing, roads and agriculture is relentlessly increasing in and around the park due to a shortage of land for the needs of the growing population; this ultimately damages the already fragmented habitat of the Cheer Pheasant. Similar pressure has already been reported for other pheasant species in the nearby Salkhala Game Reserve (Awan & Buner 2014).

Unsustainable development poses a serious conservation challenge for this species, especially in the context of the current lack of government support to improve the livelihoods of the local communities in and around Machiara. Cochard & Dar (2014) have reported annual human population growth of more than 2.3% among more than 55,000 farmers who traditionally used the park for grazing livestock and extracting forest products before the

national park was established in 1996. Current fuel wood consumption per household was estimated to be above sustainable levels for most Himalayan forest types and is therefore likely to severely affect forest rejuvenation, putting more pressures on natural resources as well as pheasant habitat in the park.

To mitigate the potential impact of these problems, two approaches may help: 1) identifying and declaring a number of safe breeding zones for the species which should be owned by the park management and local communities in a collaborative management approach, and 2) launching a strong conservation awareness and education programme for the local inhabitants to help improve their knowledge of the Cheer Pheasant and its global importance within the park. However, this needs to go hand-in-hand with improving the socio-economic condition of the local communities to make them less reliant on natural resources within the park, especially by focusing on community enterprise development for women, as already suggested by Awan *et al.* (2014). To monitor the impacts of any implemented conservation action, regular monitoring surveys will be of great value and will go a long way towards determining the future of the Cheer Pheasant within Machiara National Park.

### Acknowledgements

We thank the World Pheasant Association for financial support and extend our gratitude to Mukhtar Ahmad, President WPA Pakistan, for his support and encouragement of Galliformes research and conservation work in Pakistan. We also thank Matthew Grainger, Galliformes Specialist Group, for his valuable comments on a draft manuscript. Thanks go to the Wildlife and Fisheries department, government of Azad Jammu and Kashmir, the Machiara National Park authorities for permission to carry out this work and, last but not least, we thank all field staff of the park and the Himalayan Nature Conservation Foundation for their help and support during the field work.

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