HABITAT PREFERENCES OF CHUKAR PARTRIDGE IN SEWAGALI GAME RESERVE OF SWAT DISTRICT KYHBER PAKHTUNKHWA PROVINCE OF PAKISTAN

Fazal Baqi Kakakhel[1]

ABSTRACT

This paper is based on a research project carried out to study comparative ecology of Black partridge (*Francolinus francolinus)*, Grey partridge (*Francolinus pondicerianus)* and Chukar partridge (*Alectoris chukar)* in Sewegali Game reserve District Swat Khyber Pakhtunkhwa province of Pakistan**.** Animals select resources for food, cover and nest sites. If a variety of habitats are available to an animal, it selects some and avoids others. We examined habitat preferences of Chukar partridge (*Alectoris chukar)* in Sewegali Game Reserve. The main method used for collecting data was line transects. We observed 146 Chukar partridges; identified six habitat types and were mapped using GIS and field surveys. The species occurred in five out of six available habitat types; agricultural fields, shrub lands, mountain slopes, grass lands and barren rocks. Chi-square tests showed the species displayed significant habitat selection in relation to the availability. The species showed highly significant habitat and preferred mountain slopes highly significantly. The species preferred northerly aspects and foraged in the morning and evening to reduces stress heat. The findings conformed generally to other studies on the species.

INTRODUCTION

The animal makes use of its environment specifically, the kind of food it consumes and the varieties of habitats it occupies, is central to the study of animal ecology (Johnson, 1980). Resource selection by animals can occur for food, habitat, or other resources like nest sites. If an animal is faced with a variety of possible habitat types. (Krebs, 1999). Adequate quantities of usable resources are necessary to sustain animal population. Therefore biologists often identify resources used by animals and document the availability of those resources. Determining which resources are selected more than others is of particular interest because it provides fundamental information about the nature of animals and how they meet their requirements for survival. Differential resource selection is one of the principal relationships, which permit species to co-exist (Rozenzweig, 1981). It is often assumed that a species will select a resource that is best able to satisfy its life requirements and that high quality resources will be selected rather than low quality ones (Manly *et al.* 2002). We examined the ecology of Chukar partridge in Sewagali Game Reserve.

Study area

The study area is situated in the district Swat of the Khyber Pakhtunkhwa province of Pakistan. The present work is confined to Sewagali Game Reserve, located between 72°-15` East to 72°-11` west longitude and 34°-46`North to 34°-42`

[1] Divisional Forest Officer, Swat Wildlife Division, Saidu Sharif

south Latitude with an area of 1820 Hectares at the north of Khyber Pakhtunkhwa, Pakistan.

Chukar partridge (*Alectoris chukar*)

Fourteen subspecies of *Alectoris chukar* are currently recognized. The native distribution ranges across mountainous areas of the Middle East and Asia from eastern Greece and southeastern Bulgaria through Asia Minor east to Manchuria China (Del Hoyo 1994). *Alectoris chukar* is not globally threatened. In most areas, populations are stable or increasing, though habitat loss and intensive hunting may affect some local populations in their native distribution (Del Hoyo 1994; Waters et al. 1994). The Chukar is eminently a mountain partridge living on barren rocky slopes, and ravines, sparsely dotted with stunted grass and bushes. In winter it comes down to elevations of 1200-1500 m but descends with the advance of summer to 2500 m. It commonly keeps to the neighborhood of terraced wheat fields on the hillsides, and also works its way down to feed in the cultivated mountain valley. Parties of four are birds are usually met with, but coveys of up to fifty and more are not uncommon in late autumn (Roberts, 1991).

MATERIAL AND METHODS

MATERIAL

Materials used for the study include Geographical Positioning System (GPS, Stop watch, Digital camera, Topographic maps survey of Pakistan, SUPARCO satellite images, pen, pencil, rubber, drafting pad, wooden sticks, field bag and binocular.

METHODS

The main method for collecting data for the target species was line transects. Line transects were selected randomly and duration of the survey was from 06h00-20h00 each survey day in 60 days. A total of 12 transects were selected, varying from 2.02 to 5.43 km in length and thus the whole study area was covered. In order to maximize the detection of the target specie assistants possessing pointer dogs were used for flushing of birds. Each transect was 200 meters wide, as suggested by Bibby *et al.* (1992) and it was assumed that all birds had the same chance of being sighted within the 200 m wide transect strip. For each sighting, a series of habitat parameters were recorded. These were: habitat type, elevation, aspect, and distance to nearest water source (springs or rain fed pool). The study area was divided into six major habitat types based on physical features and vegetation characteristics: agricultural fields, woody ravines, mountain slopes, shrub land, barren rocks, and grasslands. The mapping of the study area was based on Topographic maps Survey of Pakistan, G. I. Sheet No 43 B/1, 43 B/2, 43 B/5 and 43 B/6 having scale 1:50 k published by survey of Pakistan 2001.the layers have been extracted from the raster images using MapInfo Vs 8.1 with the help of Geographical information Technology.

Maps were updated from SUPARCO satellite images and habitat boundaries were mapped on layers using the satellite data and ground-truthing by field survey using Geographical Positioning System (GPS).

Statistical analysis

Chi square test was used for statistical analysis of the data at the value to alpha set at 0.05 (the level of significance) was used. The test statistic used is:

$$\chi^2 = \sum_{i=1}^{r}\sum_{j=1}^{c}\frac{(O_{ij}-E_{ij})^2}{E_{ij}}$$

Where O_{ij} is the observed number of observations and E_{ij} is the expected number of observations and can be calculated as:

$$E_{ij} = \frac{A_i.B_j}{N}$$

n addition Standard Deviation of various parameters was calculated as:

$$\overline{X} = \frac{\sum X_i}{n} \quad \text{And s.d} = \sqrt{\frac{\sum(X_i-\overline{X})^2}{n-1}}$$

RESULTS

Transects and area

Table 1 shows that a total of 12 transact were navigated, totaling 44.8km. Mean transect length was 3.73 km (SD = 1.063). The average area covered in a single day was 0.74 sq km.

Table 1. Number of transacts traversed and area covered in Sewegali Game Reserve

Transect Number	Transect length (km)	Number of days	Area calculated (ha)
1	5.43	1	109
2	4.36	1	87.2
3	4.74	1	94.8
4	3.1	1	61
5	4.89	1	97.8
6	3.07	1	61.4
7	3.65	1	73
8	2.02	1	40.4
9	3.99	1	79.8
10	4.12	1	82.4
11	3.32	1	66.4
12	2.11	1	42.2
Total	44.8	12	895.4

Chukar partridges observed

A total of 146 Chukar partridge were observed, due to the same colors male and female were not differentiated. The group's size was from 2 to 13 birds, 114 out of a total of 146 birds were in coveys of 6 or more.

Species and aspects

Northerly aspects (representing 37.5% of the available habitats) were preferred by Chukar partridge (71%) and 13% were recorded on southerly aspects.

Table 2. Chukar partridge recorded on different aspects in Sewagali Game Reserve

Aspect	Chukar Partridge (*n*=146)	
	Observed	%
North	31	21
North East	32	22
North West	40	28
South	00	00
South East	13	9
South West	06	4
East	15	10
West	09	6

Species and habitat utilization

Table 3 shows, the use of the six habitats by Chukar partridge in relation to their availability. It was observed in five out of the six habitats: these were agricultural fields, and shrub lands, mountain slopes, grass lands and barren rocks. Chukar partridge showed a strong preference for mountain slopes (44% of birds in 27% of the study area).

Table 3. Percent use of Chukar partridge in various habitat types of Sewagali Game reserve

Habitats Type	Area (Hectares)	% area	Chukar partridge	
			No. of birds	% Birds
Agric: field	450	17	25	17
Woody ravines	405	15	00	00
Shrub lands	395	15	21	14
Mountain slopes	715	27	64	44
Grass lands	360	14	19	13
Barren rocks	320	12	17	12

The data show that Chukar partridge select some habitats and avoid others. The Chi- square test shows the use of the six habitats by each species in relation to their availability that in each case, the species highly significantly prefer the habitats. The habitats preference showed by Chukar partridge ($\chi^2 = 37.41$, $p = <0.001$) were highly significant. The Chukar partridge ($\chi^2 = 15.32$, $p = <0.001$) showed highly significant preference for mountain slopes habitat.

Proximity of species to water sources

The proximity of Chukar partridge to nearest water source (springs or rain-fed pool) was calculated. These distances were classified into five distance classes and 69% of birds observed occurred above 100 meters of water (Table 4).

Table 4. Chukar partridge to water sources

Distance (meters)	Chukar partridge (n=146)	
	Number	%
0-25	00	00
25-50	00	00
50-75	25	17
75-100	21	14
>100	100	69

Species and time

Table 5, show the time of day in two-hour periods when the target species were observed. The species was observed throughout the day but most were recorded in the morning between 06h00 and 12h00: The highest percentage was observed in the morning (52%); however the percentage was 29% in the afternoon and 11% in the evening.

Table 5. Chukar partridge observed through the day in Sewagali Game Reserve

Sighting time of birds	Chukar partridge *(n = 146)*	
	Observed	%
06h00-08h00	41	29
08h00-10h00	24	16
10h00-12h00	10	7
12h00-14h00	16	11
14h00-16h00	8	5
16h00-18h00	35	24
18h00-20h00	12	8

DISCUSSION

Habitats

The Chukar partridge showed habitat selection for agricultural land, shrub land, barren rocks and grass lands but the species displayed a significant degree of habitat selection for mountain slopes. Moreover proximity of the bird to water sources was 69 % birds above 100m distance. These findings on habitat are in general agreement with those reported by Ali and Ripley 1969, Roberts 1991, Khan 1999, Madge et al. 2002, Graaf *et al*., 1991, Johnsgard 1973, Leopold *et al*.,1981, Sibley et al 1990, Walter, 2000.

Aspects

Northern aspects were preferred by the species (71%) in summer. This can be explained by several factors: reduced solar radiation results in cooler conditions, reduced heat stress in summer; increased moisture on northerly slopes promotes better vegetation growth and foraging conditions; The birds will seek to minimize the effects of heat stress by foraging early morning.

Time

The highest population of Chukar partridges was sighted foraging in the morning, however showed a slight drag towards afternoon than evening. The maximum temperature of the study area registered during the field work was 35ºc in the mid-afternoon so this behavior is also clearly connected with the need to reduce heat stress. Moreover the maximum number of Chukar partridge was recorded in groups of 2-13. These findings conform broadly to those of Christensen (1996), Campbell and Lack, 1985; Delacour Amadon, 1973; Johnsgard, 1999; Jones, Dekker, Weigand 1980; Roselaar, 1995; Madge and McGowan, 2002 that Some Galliformes are solitary while others spend some part of the year in mated pairs or in flocks.

CONCLUSION

Chukar partridge showed habitat selection and significantly prefer mountain slopes. This could attract natural resource managers to plan conservation interventions for the study species in the preferred habitats.

- Chukar partridge prefer dry habitat. This can contribute to species habitat improvement practices.

- The Chukar partridge prefer northerly aspects in summer and foraging in the morning and evening to reduce heat stress in summer, further studies are needed to investigate aspects preferences and foraging time of the study

species in winter so that management interventions could be planned accordingly.

- Chukar partridge forage in large group of two to thirteen .This can encourage species behavioral studies.

- The results of this study can contribute to studies on population dynamics of the study species; modeling and projecting the impact of habitat change on species population.

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