HABITAT SELECTION OF GREY FRANCOLIN IN SWEAGALI GAME RESERVE OF SWAT DISTRICT KYHBER PAKHTUNKHWA PROVINCE OF PAKISTAN

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ABSTRACT

This paper is based on a research project carried out to study comparative ecology of Black francolin, Grey francolin and Chukar partridge in Swegali Game reserve District Swat Khyber Pakhtunkhwa province of Pakistan. Animals select habitats for cover, food, water and breeding. We examined habitat selection of Grey francolin (*Francolinus pondicerianus)* in Sewagali Game Reserve. The main method used for collection of data was line transects. We observed 58 Grey francolins; identified six habitat types and were mapped using GIS and field surveys. The species was observed in three of the available six habitat types including woody ravines, shrub land and agricultural fields. Chi-square tests showed the species displayed significant habitat selection in relation to the availability. The species showed highly significant habitat selection for woody ravines, preferred northerly aspects and foraged in the morning and evening. The findings conformed generally to other studies on the species.

INTRODUCTION

The animal use its environment for food and habitats it occupies and is central to the study of animal ecology (Johnson, 1980). The animal selects resource for food, habitat, and other resources like water and nest sites. If a variety of possible habitat types are provided to an animal, it makes use of some and avoids others (Krebs, 1999, Rozenzweig 1981, Manly *et al*., 1993, Petrides, 1975).To achieve a better understanding of the habitat selection we examined the ecology of Grey francolin in Sewagali Game Reserve.

Key research question

To examined habitat selection of Grey francolin (*Francolinus pondicerianus)* in Sewagali Game Reserve.

MATERIALS AND METHODS

Study area

The study area is situated in the district Swat of the Khyer Pakhtunkhwa province of Pakistan. The present work is confined to Sewagali Game Reserve Swat, located at the north of Khyber Pakhtunkhwa, Pakistan. The area is located

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from 34° – 42' to 34° – 46' Northern latitudes and 72° – 11' to 72° – 15' Eastern longitudes' with an area of 1820 Hectares.

Grey francolin (*Francolinus francolinus*)

The species belong to the Kingdom Animalia; *Phylum* Chordata; *Class* Aves; *Order* Galliformes; *Family* Phasianidae; *Species Francolinus pondicerianus; Common Name* Grey francolin. It inhabits Dry to semi-deserts grasslands and scrub to fairly well watered pastures and cultivation. Grey francolin occupies the widest range of dry habitats. Absent in bare treeless or shrub less deserts, swampy grounds, dense forests steep terrain and humid tracts. Common from sea level up to 600 m, occasionally to 1400 m. Topographically Grey francolin occurs in flat to rolling habitat with hilly country avoided. Soil varies from sandy deserts, reddish prairie or black gray of wet-dry subtropics to sandy alluvial (Roberts 1991). Moreover the species is evaluated as Least Concern (Bird Life International 2004).

METHODS

The study was conducted after breeding season of the bird during June, as the species brred in rains from March to April and mature birds are available in June (Bibby *et al*., 1992). 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 0600 to 2000 each survey day. Line transacts passed from different habitat types thus type of habitat and the number of birds observed in each type was recorded. Consequently 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. A total of 12 transects were selected randomly, 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 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 System. Maps were updated from SUPARCO satellite images and habitat boundaries were mapped on layers using the satellite data and field survey using Geographical Positioning System (GPS).

Statistical analysis

Chi square test was used for statistical analysis of the data at the value 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:

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

In 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 transacts 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 Swegali 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

Grey francolins observed

A total of 58 Grey francolins in pairs and family groups were observed, the number of males was 27 and female were 31. The group size was 2-6 birds.

Species and aspects

Northerly aspects (representing 37.5% of the available habitats) were preferred by Grey francolin (91%).

Table 2. Grey francolins recorded on different aspects in Sewagali Game Reserve

Aspect	Grey francolin (*n* = 58)	
	Observed	%
North	19	32
North East	16	28
North West	18	31
South	00	00
South East	00	00
South West	00	00
East	00	00
West	5	9

Species and habitat utilization

Table 3 shows, the use of the six habitats by Grey francolin in relation to their availability. It was observed in only three out of the six habitats: these were agricultural fields, woody ravines, and shrub lands. Grey francolin showed a strong preference for woody ravines (46% of birds in 15% of the study area).

Table 3. Percent use of Grey francolins in habitats of Sewagali Game reserve

Habitats Type	Area (Hectares)	% area	Grey francolin	
			No. of birds	% Birds
Agric: field	450	17	16	28
Woody ravines	405	15	27	46
Shrub lands	395	15	15	26
Mountain slopes	715	27	00	00
Grass lands	360	14	00	00
Barren rocks	320	12	00	00

The data show that Grey francolin select some habitats and avoid others. The Chi- square test shows the use of the six habitats by each species. The habitats preference showed by Grey francolin (χ^2= 74.45, *p*=<0.001) were highly significant. The Grey francolin (χ^2= 38.49, p= <0.001) showed highly significant preferences for woody ravines.

Proximity of species to water sources

The proximity of Grey francolin to nearest water source (springs or rain-fed pool) was calculated. These distances were classified into five distance classes and 55% of birds observed occurred within 75-100 meters of water (Table 4).

Table 4. Grey francolin to water sources

Distance (meters)	Grey francolin	
	Number	%
0-25	6	00
25-50	13	10
50-75	32	23
75-100	7	55
>100		12

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 0600 and 1000: The highest percentage was observed in the morning (46%).

Table 5. Grey francolin observed in Sewagali Game Reserve

Sighting time of birds	Grey francolin. *(n = 58)*	
	Observed	%
0600-0800	18	30
0800-1000	9	16
1000-1200	11	19
1200-1400	8	14
1400-1600	5	9
1600-1800	4	7
1800-2000	3	5

DISCUSSION

Habitats

The results showed, Grey francolin displayed a significant degree of habitat selection for woody ravines, avoid completely the mountain slopes, barren rocks, and grass lands. In summery it prefers cover habitats.

The proximity of the bird was 55% between 75 and 100m. 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

The 91% of Grey francolin use the northerly aspects. This can be straightforwardly 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/evening as and on shaded aspects.

Time

The highest population of Grey francolins 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 35°c in the mid-afternoon so this behaviour is also clearly connected with the need to reduce heat stress. Moreover the maximum number of Grey francolin was recorded in pairs or in family groups of 2-6. These findings conform broadly to those of Campbell and Lack, 1985; Delacour Amadon, 1973; Johnsgard, 1999; Jones, Dekker, Weigand 1980; Roselaar, 1995; Madge and McGowan, 2002 that Galliformes are solitary while others spend some part of the year in mated pairs or in flocks.

CONCLUSION

- Grey francolin prefer dry habitat. This can contribute to species habitat improvement practices.

- The Grey francolin prefer northerly aspects 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.

- Grey francolin forage in large group of two to six .This can encourage species behavioral studies.

- Grey francolin use agricultural fields, shrub lands and woody ravines but showed preference for woody ravines. This could attract natural resource managers to develop management plan focused on conservation interventions for the study species in the preferred habitats. The intervention in the preferred habitats should include raising of feed lots, spreading of cow dung, development of kacha water ponds, plantation of indigenous species of forest plants and to mitigate encroachment into marginal lands for agriculture, human settlements in the species habitats, the use of mechanized farming, pesticides and unregulated hunting.

- 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; identifying core areas for protection; assessment of the effects of resource use like livestock grazing, grass cutting, fuelwood collection etc.

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