

ECOLOGY OF BLACK FRANCOLIN IN SWEGALI GAME RESERVE OF SWAT DISTRICT KHYBER 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. We investigated habitat selection of Black francolin (*Francolinus francolinus*) in Sewagali Game Reserve. The main method for collecting data was line transects. We observed 75 Black francolins, six habitat types were identified in the reserve and were mapped using GIS and field surveys. The species was distributed in three of the available six habitat types: woody ravines, shrub land and agricultural fields. Chi-square tests was used and the species showed highly significant preference 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 use that an animal makes of its environment, specifically, the kind of food it consumes and the varieties of habitats it occupies, is essential to the study of animal ecology (Johnson, 1980). If an animal is faced with a variety of possible habitat types, it uses 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 Black francolin in Sewagali Game Reserve.

Key research question

To investigate habitat selection of Black francolin (*Francolinus francolinus*) 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 from 34⁰-42` to 34⁰-46` Northern latitudes and 72⁰-11` to 72⁰-15` Eastern longitudes' with an area of 1820 Hectares.

Black francolin (*Francolinus francolinus*)

The species belong to the Kingdom Animalia; *Phylum* Chordata; *Class* Aves; *Order* Galliformes; *Family* Phasianidae; *Species* *Francolinus francolinus*; *Common*

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Name Black francolin. In Pakistan the species occur from sea level to 750 m elevation, on flat, rolling hilly terrain. Soil varies from desert sandy clay in drier habitats to alluvial loam in river valleys to mountain forest soils in hilly region (Roberts. 1991).

Methods

The study was conducted after breeding season of the bird during June, as the breeding season is 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 transects 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 species 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:

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

Results

Transects and area

Table 1 shows that a total of 12 transects 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 transects 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

Black francolins observed

A total of 75 Black francolins in pairs and family groups were observed, the number of males was 48 and female were 27. The group size was singly or in pairs, 63 out of 75 Black francolin were observed singly and only 12 in pairs.

Species and aspects

Northern aspects (representing 37.5% of the available habitats) were preferred by Black francolin (75%).

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

Aspect	Black francolin (<i>n</i> = 75)	
	Observed	%
North	33	45
North East	13	17
North West	10	13
South	00	00
South East	00	00
South West	00	00
East	10	13
West	09	12

Species and habitat utilization

Table 3 shows, the use of the six habitats by Black 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. Black francolin showed a strong preference for woody ravines (56% of birds in 15% of the study area).

Table 3. Percent use of Black francolin in various habitats of Sewagali Game reserve

Habitats Type	Area (Hectares)	% area	Black francolin	
			No. of birds	% Birds
Agricultural field	450	17	17	23
Woody ravines	405	15	42	56
Shrub lands	395	15	16	21
Mountain slopes	715	27	00	00
Grass lands	360	14	00	00
Barren rocks	320	12	00	00

The data show that Black francolin prefers some habitats and avoid others. The mountain slopes, grass lands and barren rocks were avoided. However agricultural fields, woody ravines and shrub lands were used. The Chi- square test showed habitats preference of Black francolin ($\chi^2 = 120.71$, $p < 0.001$) and found highly significant. The use of wood ravines were of highly significant ($\chi^2 = 84$, $p < 0.001$).

Proximity of species to water sources

The proximity of Black francolin to nearest water source (springs or rain-fed pool) was calculated. These distances were classified into five distance classes and

47% of birds observed occurred within 0-25 meters of water (Table 4).

Table 4. Black francolin to water sources

Distance (meters)	Black francolin	
	Number	%
0-25	35	47
25-50	24	32
50-75	10	13
75-100	6	8
>100	00	00

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 06.00 AM and 10.00 AM: The highest percentage was observed in the morning (65%) and evening (20%).

Table 5. Black francolin observed through the day in Sewagali Game Reserve

Sighting time of birds	Black francolin. (n= 75)	
	Observed	%
0600-0800	22	30
0800-1000	18	24
1000-1200	9	12
1200-1400	4	5
1400-1600	7	9
1600-1800	11	15
1800-2000	4	5

Discussion

Habitats

The results showed Black francolin displayed a significant degree of habitat selection. It showed a significant preference for woody ravines, avoid completely the mountain slopes, barren rocks, and grass lands. However, once the distance from water is examined, some differences emerge. The proximity of the bird was consistently recorded closer to water sources. These findings on habitat are in general agreement with those reported by Ali, S., Ripley 1969, Roberts 1991, Khan 1999, Madge *et al.*, 2002, De Graaf, Richard M.; Scott, Virgil E.; Hamre, R. H.; [and others]. (1991). Johnsgard 1973, Leopold *et. Al.*, 1981, Sibley, CG; Monroe, BL Jr. (1990). Walter, 2000.

Aspects

The 75% of Black 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 northern slopes, promotes better vegetation growth. The birds will seek to minimize the effects of heat stress by foraging early morning/evening and on shaded aspects.

Time

More than 2/3rd population of Black francolins was sighted foraging in the morning and evening, the maximum temperature of the study area registered during the field work was 35°C in the mid-afternoon so this behavior is also clearly connected with the need to reduce heat stress. Moreover the maximum number of Black francolin was recorded singly or in pairs, they were solitary or in mated pairs. These findings conform broadly to those of Campbell and Lack, 1985; Delacour Amadon, 1973; Johnsgard, 1999; Jones, Dekker, Weigand 1980; Madge, S., P. McGowan. (2002); that Galliformes are solitary while others spend some part of the year in mated pairs or in flocks.

Conclusion

- Black francolin use agricultural field, woody ravines and shrub lands.
- Black francolin prefer habitat at the nearest distance to water source. This can contribute to species habitat improvement practices.
- The Black 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.
- Black francolin forage in large group of two birds. This can encourage species behavioral studies.

The study attracts wildlife conservationists' government departments to plan conservation interventions for the study species in the preferred habitats. The interventions will include supplementing feed of the species by raising feed lots and spreading cow dung for nourishment of insects in marginal lands of shrub lands; planting forest indigenous plants to provide cover, hiding and resting places to the species; avoiding excessive use of pesticides over crops by the farmers require capacity building of farmers; stopping of human settlements in the species habitats by devising a government policy.

This study can contribute further studies by the researchers on population dynamics of the study species; modeling and projecting the impact of habitat change on species population; assessment of the effects of resource use like livestock grazing, grass cutting, fuel wood collection etc on population of the species.

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