



ISSN 0974-7907 (Online)
ISSN 0974-7893 (Print)

A PILOT SURVEY OF THE AVIFAUNA OF RANGDUM VALLEY, KARGIL, LADAKH (INDIAN TRANS-HIMALAYA)

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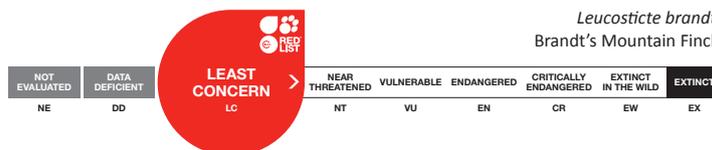
Abstract: An avifaunal survey of Rangdum Valley in Kargil District, Jammu & Kashmir, India was carried out between June and July 2011. McKinnon's species richness and total count methods were used. A total of 69 species were recorded comprising six passage migrants, 25 residents, 36 summer visitors and three vagrants. The recorded species represents seven orders and 24 families, accounting for 23% of the species known from Ladakh. A majority of the bird species are insectivores.

Keywords: Avifauna, feeding guild, Ladakh, Rangdum Valley, status.

The Himalaya constitute one of the richest and most unique ecosystems on the earth. Two of the ten bio-geographic zones of India stretch along the main Himalaya and the Trans-Himalaya (Rodgers & Panwar 1988). The Trans-Himalaya are a unique and a fragile biome characterized by low productivity, high intensity of solar radiation, extreme weather conditions and a high degree of resource seasonality. A major portion of the Trans-Himalaya in India, is in Lahul-Spiti (Himachal

Pradesh) and Ladakh (Jammu & Kashmir) at an average altitude of over 4000m. In Ladakh, studies on avifauna were initiated by A.L. Adam as early as 1859 (Adam 1859). Some avifaunal surveys in this region were carried out in early 20th century (Ludlow 1920; Wathen 1923; Osmaston 1925, 1927). Later, more studies on avian species in different parts of Ladakh were carried out by Holmes (1986), Mallon (1987), Mishra & Humbert-Droz (1998), Singh & Jayapal (2000), Pfister (2001), Namgail (2005), Sangha & Naoroji (2005a,b), Hussain & Pandav (2008) and Namgail et al. (2009). Specific studies of certain species were also carried out in Ladakh by Hussain (1985), Gole (1993), Pfister (1998), Chandan et al. (2014) and Khan et al. (2014). Other studies include William & Delany (1985, 1986), Naoroji & Forsman (2001), Sangha (2001), Sangha & Naoroji (2004, 2005a,b), and Sangha et al. (2003).

Earlier studies on birds in Ladakh were largely carried



Leucosticte brandti
Brandt's Mountain Finch



DOI: <http://dx.doi.org/10.11609/JoTT.o3965.7274-81> | **ZooBank:** urn:lsid:zoobank.org:pub:78A3664B-A0B6-46F1-8EB6-F8212744A683

Editor: C. Srinivasulu, Osmania University, Telangana, India.

Date of publication: 26 May 2015 (online & print)

Manuscript details: Ms # o3965 | Received 13 March 2014 | Final received 11 April 2015 | Finally accepted 24 April 2015

Citation: Ahmed, T., A. Khan & P. Chandan (2015). A pilot survey of the avifauna of Rangdum Valley, Kargil, Ladakh (Indian Trans-Himalaya). *Journal of Threatened Taxa* 7(6): 7274–7281; <http://dx.doi.org/10.11609/JoTT.o3965.7274-81>

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Funding: WWF-India.

Competing interests: The authors declare no competing interests.

Acknowledgements: The authors are grateful to WWF, India for providing infrastructural support which facilitated our field work. Our special thanks to Mr. Ravi Singh, Secretary General and CEO, WWF-India and Dr. Sejal Worah, Programme Director, WWF-India for their support and encouragement to work in Ladakh. Thanks are due to Mr. Jigmet Takpa, CCF and Regional Wildlife Warden, Ladakh and Mr. Abdul Rauf, Wildlife Warden, Department of Wildlife Protection Leh for granting permission to work in the area. Our deepest thanks are towards the residents of Rangdum Valley for accepting us into their community and supporting our efforts.



out in eastern and/or central parts of Ladakh. Very little information is available pertaining to the western region. The avifaunal studies in western Ladakh were largely based on opportunistic observations (Ludlow 1920; Wathen 1923; Osmaston 1925). However, Holmes (1986) and Singh & Jayapal (2000) carried out surveys in Wakha Nallah and Suru Valley reporting the occurrence of some species. Since a large part of western Ladakh remained unexplored, the present study was an attempt to systematically collect data on avifaunal status in Rangdum Valley.

STUDY AREA

The study was carried out in Rangdum Valley ($33^{\circ}56'–34^{\circ}06'N$ & $75^{\circ}57'–76^{\circ}19'E$) that lies between Panikhar and Penzilla top. The villages within the valley are Panikhar, Achambur, Tangole, Parkachik, Zuildo and Tashi-tonge (Fig. 1; Image 1). The valley is situated to the south-west of Kargil Town at a distance of 85km on the Kargil-Zanskar route, covering an area of about 200km². The area receives heavy snowfall during winters up to a height of 1.3m. Rainfall is scanty and often remains less than 100mm in a year.

Besides the diverse assemblage of birds, the area supports large mammalian species such as Snow

Leopard *Panthera uncia*, Himalayan Brown Bear *Ursus arctos isabellinus*, Asiatic Ibex *Capra ibex*, Tibetan Wolf *Canis lupus*, and Red Fox *Vulpes vulpes*. Small mammals are represented by the Long-tailed Marmot *Marmota caudata*, Mountain Weasel *Mustela altaica*, Stoat *Mustela erminea*, Silvery Mountain Vole *Alticola argentatus*, Stoliczka's Mountain Vole *Alticola stoliczkanus*, Royle's Pika *Ochotona roylei* and Plateau Pika *Ochotona curzoniae*. The vegetation of Rangdum Valley is generally herbaceous. Some common herb species in the area include Wild Iris *Iris lactea*, Yellow Colchicum *Colchicum luteum*, Himalayan Larkspur *Delphinium* spp., Himalayan Meadow Cranesbill *Geranium pratense*, Himalayan May Apple *Podophyllum hexandrum*, Spotted Heart Orchid *Dactylorhiza hatagirea*, etc. Tree species such as *Salix* spp., *Juniper* spp. and *Beluta utilis* are confined to villages and along the river.

MATERIAL AND METHODS

The survey of birds of Rangdum Valley was carried out between 5 June and 15 July 2011. The study area was explored for recording avifauna by applying species richness counting method (MacKinnon & Phillipps 1993). Using this method, the study area was walked randomly and avian species encountered were listed. Owing to less diversity of birds within the study area a little modification was made in the method. Each list consisted of only 10 consecutive different bird species observed instead of 20. No species was included more than once in each list. Once a list of 10 species was completed another list was prepared. Lists were generated during morning (06:00–09:00 hr) and evening (17:00–19:30 hr) hours.

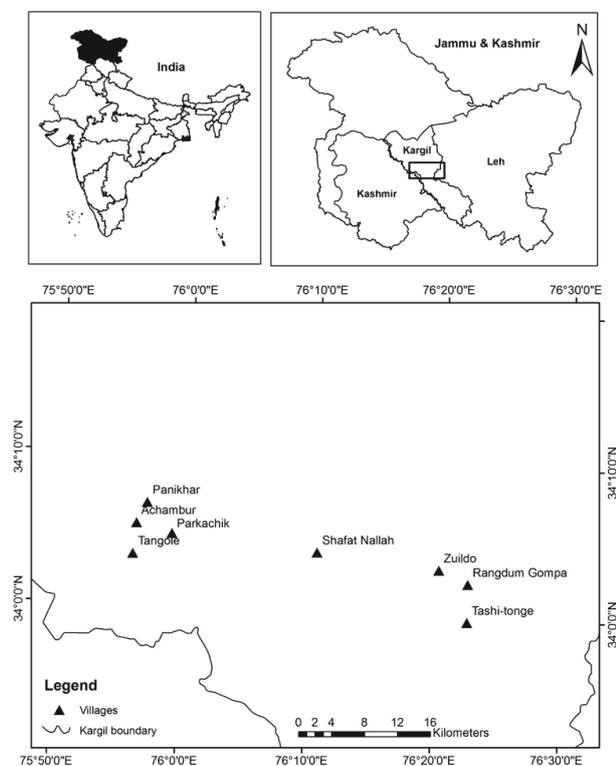


Figure 1. Rangdum Valley, Ladakh, Jammu & Kashmir, India



Image 1. Tangole - a village in the study area

The total count method was used to enumerate water birds. The investigator either walked around the wetland or stood at a vantage point and scanned the entire wetland. The bird species were identified using the Nikon binoculars (8x40) and their numbers were counted (Images 2–8). Field identification of species was verified with the help of various field guides (Ali et al. 1995; Grimmett et al. 1998). The birds were categorized according to their feeding guild and migratory status based on Ali & Ripley (1987).

Analysis

Abundance: The abundance status of each species was assessed on a frequency scale as per the following categories: rare = (0–5 sightings); common = (6–25 sightings); abundant = (26–50 sighting); very abundant = (>51 sightings).

Sorenson’s Similarity Index: The avian species similarity between different habitats was calculated using the following formula.

$$S = 2C/A+B, \text{ where,}$$

C = common species between the habitats

A = total number of species in habitat A

B = total number of species in habitat B

RESULTS AND DISCUSSION

During the study a total of 69 species were encountered belonging to seven orders and 24 families (Appendix 1). It accounts for 23% of the species known so far from Ladakh (Pfister 2004). A low diversity of birdlife can be attributed to extremely harsh climatic conditions, topography, low vegetative cover and scanty rainfall in Rangdum Valley. The correlation of bird diversity with topography, precipitation and an interaction between topography and latitude had already been validated (Rahbek & Graves 2001). The outcome of our finding is in line with an earlier study conducted by Price et al. (2003).

The classification of observed species revealed that, Passeriformes was the dominant order with a maximum number of species (44 species) followed by Ciconiiformes (13 species) and Columbiformes (5 species). Apodiformes and Anseriformes were represented by two species each whereas, Galliformes, Upupiformes and Cuculiformes by a single species only (Fig 2). Other studies conducted earlier have also advocated that Passeriformes is the dominant order in the Himalayan landscape (Bhat & Bhat 2012; Singh et al. 2013)

An analysis of data revealed that a majority of the species were summer visitors (50.72%) followed by



Figure 2. Order-wise species richness of birds observed in Rangdum Valley, Ladakh, Jammu & Kashmir, India

Table 1. Number and percentage of species under different residential status in Rangdum Valley, Ladakh, Jammu & Kashmir, India

Status	Number of species	Percentages
1 Resident	25	36.23
2 Passage migrant	6	8.70
3 Summer visitor	35	50.72
4 Vagrant	3	4.35

Table 2. Number and percentage of bird species in different abundance categories in Rangdum Valley, Ladakh, Jammu & Kashmir, India

Abundance	Number of species	Percentages
1 Very Abundant	19	27.54
2 Abundant	7	10.14
3 Common	19	27.54
4 Rare	24	34.78

residents (36.23%) and passage migrants (8.70%). A few species (4.35%) were vagrants in the study area (Table 1). Of the total species sighted, 19 species were very abundant, seven species were abundant, 19 species were common but the majority of species (24) were rare (Table 2). Further analysis of the data on migratory status and abundance revealed that of the 35 summer visitors, eight were most abundant, four were abundant, 14 were common and nine were rare. Similarly, among the resident species 10 were most abundant, three were abundant, four were common and eight were rare. All three vagrant species were rare. Of the passage migrants one was most abundant, one was common and four species were rare. Holmes (1986) also reported that the maximum birds identified from this range were summer visitors. Elsewhere, in the Himalayan landscape, Thakur & Mattu (2011) reported

Table 3. Number and percentage of bird species in different habitat of Rangdum Valley, Ladakh, Jammu & Kashmir, India

	Habitat type	Number of species	Percentage
1	Scrub	22	31.88
2	Herbaceous meadows	27	39.13
3	Rocky	24	34.78
4	Cultivation	22	31.88
5	Plantation	20	28.99
6	Grassy meadows	23	33.33
7	Human habitation	18	26.09
8	Marsh meadows	14	20.29
9	Water body	8	11.59

a higher percentage of summer visitors. This high percentage of summer visitors can be correlated with the availability of resources specially breeding sites in Ladakh (Osmaston 1925; Chandan et al. 2006; Hussain & Pandav 2008; Namgail et al. 2009). Moreover, during summer, food availability is suddenly high as this is the only time after the snow melt when most plant species bear fruits and other lifeforms become active. Of the habitats, herbaceous meadows accounted for maximum species (27 species, 39.13%) followed by rocky habitats and grassy meadows accounted for 24 species (34.78%), and 23 species (33.33%) respectively. Only eight species (11.59%) were recorded in water bodies (Table 3). The low occurrence of aquatic avifauna may probably be due to a few lentic waterbodies in the region and low productivity of high altitude wetlands.

A comparison of bird species diversity with reference to different habitat types revealed a distinct habitat overlap among them. The maximum avian species overlap (35.56%) was observed between rocky and

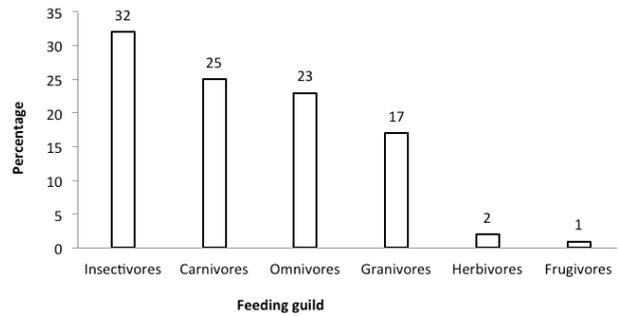


Figure 3. Percentages of avifaunal species in different feeding guilds observed at Rangdum valley, Ladakh, Jammu & Kashmir, India

grassy meadows followed by scrub and herbaceous meadows (34.69%). The minimum overlap (3.85%) occurred between grassy meadows and waterbody (Table 4). Our results of Sorenson’s Similarity Index also depicted that similarity values were highest between scrub and herbaceous meadows (0.69) and between rocky and grassy meadows (0.69). Grassy meadows and waterbody had a minimum similarity value of 0.03 (Table 5). Our results are in agreement with Tubelis & Cavalcanti (2001) who speculated that habitats with greater structural similarity tend to support more similar bird species communities.

A classification of observed species among the feeding guild revealed that the dominant guild was the insectivore representing the highest number of species (32%). It was followed by carnivorous, omnivorous and granivorous bird species representing 25%, 23% and 17% respectively. The least represented avian communities were herbivores and frugivores accounting for only 2% and 1%, respectively (Fig. 3). The domination of the bird

Table 4. Bird species overlap in different habitats of Rangdum Valley, Ladakh, Jammu & Kashmir, India

	WB	MM	HH	GM	PL	CL	RO	HM	SC
SC	0.00	7 (19.44)	10 (27.03)	15 (33.33)	13 (33.33)	13 (29.55)	13 (28.89)	17 (34.69)	
HM	0.00	8 (19.51)	10 (23.81)	16 (32.00)	13 (29.55)	16 (32.65)	16 (32.00)		
RO	0.00	10 (27.03)	10 (25.00)	16 (35.56)	7 (17.50)	9 (20.00)			
CL	0.00	6 (16.67)	10 (25.64)	11 (24.44)	12 (30.00)				
PL	0.00	6 (18.75)	5 (14.29)	9 (21.95)					
GM	1 (3.85)	10 (27.03)	8 (20.00)						
HH	0.00	6 (19.35)							
MM	2 (11.11)								
WB									

Key: CL = Cultivation; GM = Grassy Meadows; HH = Human Habitation; MM = Marsh Meadows; PL = Plantation; RO = Rocky; SC = Scrub; WB = Waterbody. (Figures in parenthesis are percentages)

Table 5. Sorenson's Similarity Index values between different habitats

	WB	MM	HH	GM	PL	CL	RO	HM	SC
SC	--	0.38	0.41	0.66	0.66	0.59	0.57	0.69	
HM	--	0.39	0.47	0.64	0.59	0.65	0.44		
RO	--	0.54	0.5	0.69	0.35	0.4			
CL	--	0.33	0.51	0.48	0.6				
PL	--	0.37	0.28	0.43					
GM	0.03	0.54	0.4						
HH	--	0.38							
MM	0.11								
WB									

Key: SC = Scrub; HM = Herbaceous meadows; RO = Rocky; CL = Cultivation; PL = Plantation; GM = Grassy Meadows; HH = Human Habitation; MM = Marsh Meadows; WB = Waterbody.



Image 2. Great Rosefinch *Carpodacus rubicilla*



Image 3. Yellow-billed Cough *Pyrhacorax graculus*



Image 4. Black-billed Magpie *Pica pica*

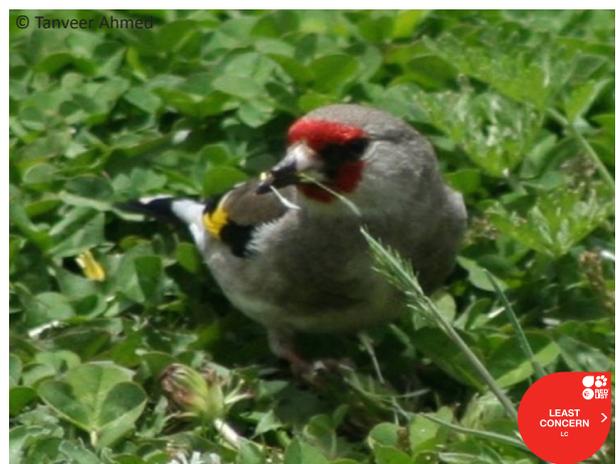


Image 5. European Goldfinch *Carduelis carduelis*

community by insectivores is a common trend observed in other studies also (Sultana & Khan 2000; Sultana et

al. 2007; Aggarwal et al. 2008; Acharya et al. 2010; Joshi & Bhatt 2011). The higher percentage of insectivores



Image 6. Fire-fronted Serin *Serinus pusillus*



Image 7. Brandt's Mountain Finch *Leucosticte brandti*



Image 8. Chukar *Alectoris chukar*

in Ladakh may be due to the fact that nearly 60% avian species are migratory and hence they require protein rich diet in order to meet high energy demands due to increased energy expenditure during the process of migration.

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Appendix 1. Checklist of bird species recorded in Rangdum Valley, Ladakh, Jammu & Kashmir, India

	Family	Common name	Scientific name	Habitat	Occurrence	Status
1	Phasianidae	Chukar	<i>Alectoris chukar</i>	2, 6, 8,9	A	RE
2	Anatidae	Mallard	<i>Anas platyrhynchos</i>	7	R	PM
3		Common Merganser	<i>Mergus merganser</i>	7	R	RE
4	Upupidae	Common Hoopoe	<i>Upupa epops</i>	1	A	SV
5	Cuculidae	Eurasian Cuckoo	<i>Cuculus canorus</i>	5, 6	R	SV
6	Apodidae	Common Swift	<i>Apus apus</i>	6,7	VA	SV
7		Fork-tailed Swift	<i>Apus affinis</i>	6,7	R	RE
8	Columbidae	Rock Pigeon	<i>Columba livia</i>	1, 3	VA	RE
9		Hill Pigeon	<i>Columba rupestris</i>	1,3	VA	RE
10		Snow Pigeon	<i>Columba leuconota</i>	1, 4, 9	A	RE
11		Oriental Turtle Dove	<i>Streptopelia orientalis</i>	1, 8	A	SV
12		Laughing Dove	<i>Streptopelia senegalensis</i>	9	R	PM
13	Pteroclididae	Common Redshank	<i>Tringa totanus</i>	2,4	VA	SV
14		Common Greenshank	<i>Tringa nebularia</i>	4	R	PM
15		Common Sandpiper	<i>Actitis hypoleucos</i>	7	C	PM
16	Charadriidae	Ibisbill	<i>Ibidorhyncha struthersii</i>	7	R	SV
17		Black-winged Stilt	<i>Himantopus himantopus</i>	4,7	R	PM
18		Lesser Sand Plover	<i>Charadrius mongolus</i>	6,7	C	SV
19	Laridae	Common Tern	<i>Sterna hirundo</i>	7	C	SV
20	Accipitridae	Lammergeier	<i>Gypaetus barbatus</i>	6	R	RE
21		Himalayan Griffon	<i>Gyps himalayensis</i>	6	R	RE
22		Eurasian Sparrowhawk	<i>Accipiter nisus</i>	6	R	SV
23		Golden Eagle	<i>Aquila chrysaetos</i>	6	C	RE
24	Falconidae	Common Kestrel	<i>Falco tinnunculus</i>	6	R	SV
25	Ardeidae	Indian Pond Heron	<i>Ardeola grayii</i>	4,7	R	SV
26	Laniidae	Long-tailed Shrike	<i>Lanius schach</i>	8,5	C	SV
27	Corvidae	Black-billed Magpie	<i>Pica pica</i>	1, 2, 3, 5, 6, 7, 8, 9	VA	RE
28		Red-billed Chough	<i>Pyrrhocorax pyrrhocorax</i>	2, 3, 6	VA	RE
29		Yellow-billed Chough	<i>Pyrrhocorax graculus</i>	1, 3, 4, 6, 9	VA	RE
30		House Crow	<i>Corvus splendens</i>	3, 6	R	VG
31		Carrion Crow	<i>Corvus corone</i>	1, 8	C	RE
32		Common Raven	<i>Corvus corax</i>	1	R	RE
33		Cinclidae	White-throated Dipper	<i>Cinclus cinclus</i>	7	R
34	Brown Dipper		<i>Cinclus pallasii</i>	7	R	RE
35	Muscicapidae	Blue Rock Thrush	<i>Monticola solitarius</i>	6, 9	C	SV
36		Blue Whistling Thrush	<i>Myophonus caeruleus</i>	2, 3, 7	C	SV
37		White-tailed Rubythroat	<i>Luscinia pectoralis</i>	5	C	SV
38		Bluethroat	<i>Luscinia svecia</i>	8	R	SV
39		Black Redstart	<i>Phoenicurus ochruros</i>	1, 2, 3, 4, 5, 6, 7, 8, 9	VA	SV
40		White-capped Water Redstart	<i>Chaimarrornis leucocephalus</i>	2,6,7	A	SV
41	Sturnidae	Brahminy Starling	<i>Sturnus pagodarum</i>	3	R	SV
42	Paridae	Great Tit	<i>Parus major</i>	1, 5, 8,9	C	RE
43	Hirundinidae	Eurasian Crag Martin	<i>Hirundo rupestris</i>	6	C	SV
44		Northern House Martin	<i>Delichon urbica</i>	6	C	SV
45	Sylviidae	Common Chiffchaff	<i>Phylloscopus collybita</i>	1, 5, 7, 9	VA	PM
46		Mountain Chiffchaff	<i>Phylloscopus sindianus</i>	1, 3, 5, 7, 8, 9	C	SV
47		Plain Leaf Warbler	<i>Phylloscopus neglectus</i>	1	R	VG
48		Tickell's Leaf Warbler	<i>Phylloscopus affinis</i>	2, 4, 6, 7, 8, 9	C	SV
49		Sulphur-bellied Warbler	<i>Phylloscopus griseolus</i>	5	R	SV
50		Greenish Warbler	<i>Phylloscopus trochiloides</i>	5, 9	C	SV
51		Dusky Warbler	<i>Phylloscopus fuscatus</i>	8	R	VG
52		Lesser Whitethroat	<i>Sylvia curruca</i>	8	C	SV

	Family	Common name	Scientific name	Habitat	Occurrence	Status
53	Alaudidae	Oriental Skylark	<i>Alauda gulgula</i>	1, 2, 9	A	SV
54		Horned Lark	<i>Eremophila alpestris</i>	2, 3, 4, 5, 7, 9	VA	RE
55	Passeridae	House Sparrow	<i>Passer domesticus</i>	1, 2, 3, 5, 6, 8, 9	VA	RE
56		Tibetan Snowfinch	<i>Montifringilla adamsi</i>	2, 3, 6, 9	VA	RE
57		White Wagtail	<i>Motacilla alba</i>	1, 2, 4, 5, 7, 8	VA	SV
58		Citrine Wagtail	<i>Motacilla citreola</i>	1, 2, 3, 4, 5, 6, 7, 8, 9	VA	SV
59		Yellow Wagtail	<i>Motacilla flava</i>	2	R	SV
60		Grey Wagtail	<i>Motacilla cinerea</i>	7	C	SV
61		Robin Accentor	<i>Prunella rubeculoides</i>	1, 2, 6, 7, 8, 9	A	RE
62		Fire-fronted Serin	<i>Serinus pusillus</i>	1, 5, 6, 8, 9	VA	RE
63	Fringillidae	European Goldfinch	<i>Carduelis carduelis</i>	3, 5, 8, 9	C	SV
64		Plain Mountain Finch	<i>Leucosticte nemoricola</i>	2, 4, 6, 7, 8, 9	VA	SV
65		Brandt's Mountain Finch	<i>Leucosticte brandti</i>	2, 6, 8, 9	VA	RE
66		Common Rosefinch	<i>Carpodacus erythrinus</i>	1, 2, 3, 4, 5, 6, 8, 9	VA	SV
67		Great Rosefinch	<i>Carpodacus rubicilla</i>	2, 7	C	RE
68		Red-fronted Rosefinch	<i>Carpodacus puniceus</i>	2	R	RE
69		Rock Bunting	<i>Emberiza cia</i>	1, 2, 5, 6, 8, 9	VA	SV

Habitat: 1 = Cultivation; 2 = Grassy Meadows; 3 = Human Habitation; 4 = Marsh Meadows; 5 = Plantation; 6 = Rocky; 7 = Waterbody; 8 = Scrub; 9 = Herbaceous meadows. Occurrence: VA = Very abundant; A = Abundant; C = Common; R = Rare. Status: RE = Resident; SV = Summer Visitor; PM = Passage Migrant; VG = Vagrant

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