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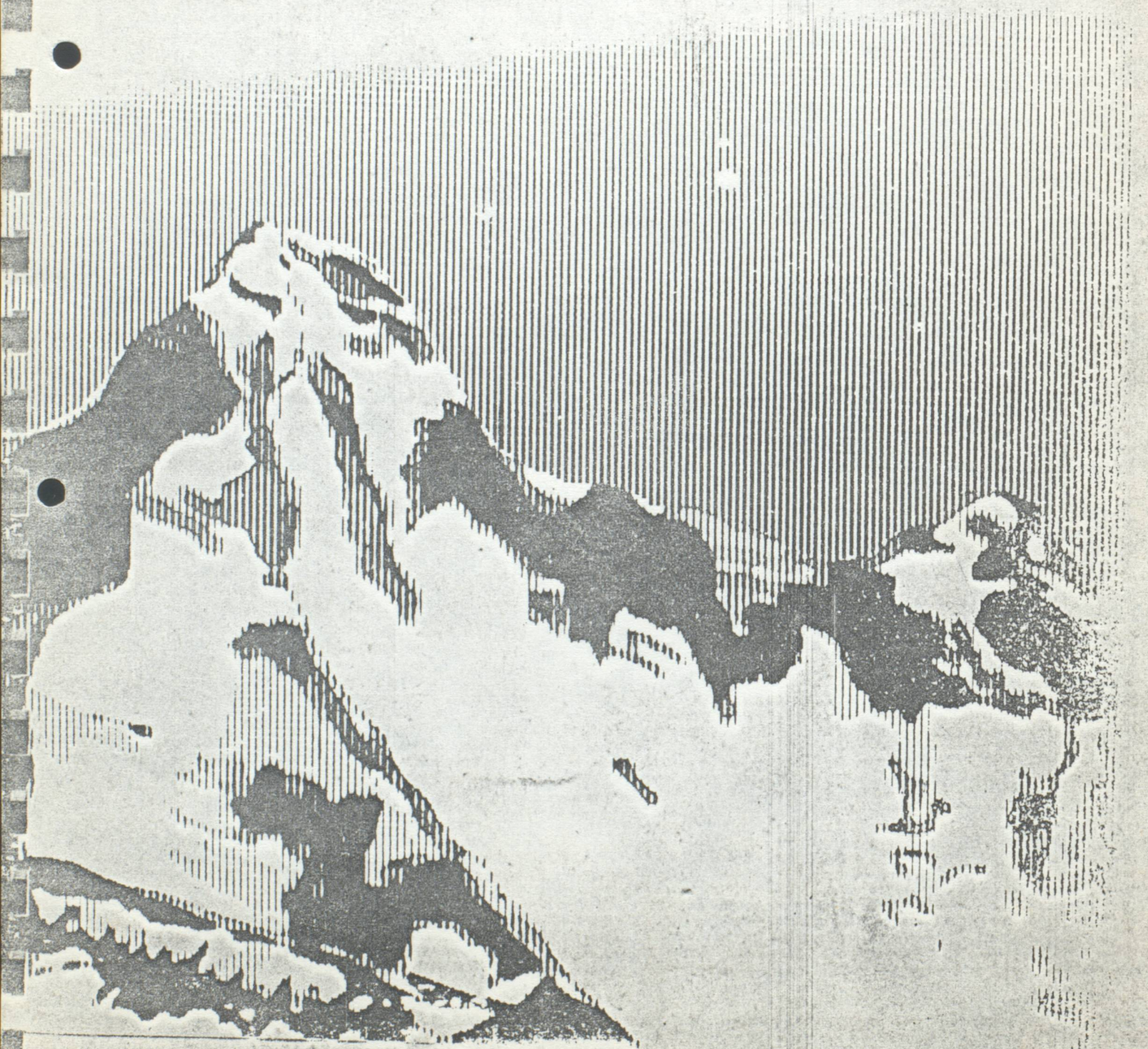
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AN ORNITHOLOGICAL SURVEY OF NANDA DEVI NATIONAL PARK

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INTRODUCTION

All wilderness areas in India are under siege from increasing human pressures. Thus for the conservationist, Nanda Devi National Park (NDNP) is an area that can be regarded with satisfaction, for it is perhaps one of the only protected areas in India that has been closed to all human use since 1982. However, human needs still had to be met, for much of the local populace were dependent on forest or grassland resources. Thus in 1988 the Govt. of India established the Nanda Devi Biosphere Reserve (NDBR).

In 1993, the Ministry of Environment and Forests, Govt. of India, sponsored a survey into the core area of NDBR to assess whether 12 years of closure has had a positive impact on the status of the flora and fauna. I looked specifically at the avifauna.

OBJECTIVES

- 1) To prepare a comprehensive list of the avifauna with specific reference to the habitats and altitudes they occurred at.
- 2) To assess the current status of rare species of avifauna.

FIELD METHODS AND DATA COMPILATION

The line transect method (Burnham *et al.* 1987) was used to assess the status of Galliformes. However, in this report, due to lack of repetitions of the transects, only encounter rates of the focal species have been calculated.

Notes were maintained on all species of birds seen, particularly the habitats and locations they occurred in. I did not attempt measuring densities of the avifauna because a) many of the species were new to me and b) I was not able to immediately identify most species by their calls. It was felt that due to the above two factors, any calculation of density would be erroneous. However, I have given an abundance ranking for the species seen and this is based only on confirmed sightings or calls heard. In the abundance ranking, a flock was considered as a single sighting. Signs of use, for instance dig marks of the monal pheasant, or droppings of the snow cock were also noted to identify areas of their occurrence.



In this report, comparison of avian assemblages between habitat types and altitudinal zones have been done using a species richness indice where the species richness is the total number of bird species seen in a given habitat or altitude type.

A simple classification of habitat types were made. Alpine meadows consisted of tree-less alpine grasslands where woody species were mainly juniper *Juniperus* sp., dwarf rhododendron *Rhododendron anthopogon*, *Cassiope fastigiata*, and *Salix karelini*. Subalpine forest were dominated by birch *Betula utilis*, fir *Abies spectabilis*, or rhododendron *Rhododendron campanulatum*. Temperate forests were dominated by oak *Quercus* sp., blue pine *Pinus valletiana*, yew *Taxis baccata* and maple *Acer* sp.

Altitudes have been compiled from 1 : 50000 scale Survey of India topo sheets. Distances were measured using a pedometer whose setting had been adjusted for smaller strides.

In this report, I have included all birds seen by me from Joshimath onwards. The primary reason for this is that temperate oak forest that is present in the NDBR did not occur on the route that this expedition took. The only temperate oak forest that I was able to look at was that above Joshimath enroute to Auli. It is presumed that bird species that occurred at Auli would occur within those areas of the NDBR which has temperate oak forest. Furthermore, it is important to compare bird assemblages in habitats which are perhaps used for wintering and lie outside the NDNP.

The status of rare avifauna has been arrived at using two methods. The first of these was recording all sightings or calls and presenting these as a total in Table 3. This information is not to be mistaken as sightings of different individuals but the cumulative of sightings and calls heard in a given area. The next method used was of encounter rates which was derived from the number of individuals seen or heard per kilometer walk. This was done only for those species which were frequently seen or heard (monal and snowcock). As the time spent at different locations varied, in this report only encounter rates provide a comparative indice for abundance of different species at different locations.

Study duration / Itinerary

This survey lasted 52 days from 2 May 1993 to 22 June 1993.

- April 24 - May 1 : Joshimath. 3 visits to Auli
- May 2 - May 6 : Rishi Ganga gorge. Reni - Kalikona - Chinwari (Chenabadi) - Malla Chinwari - Dood Ganga - Dibrugeta
- May 7 - May 16 : Dibrugeta. Areas covered included Malla Dibrugeta, Dibrugeta maidan, Parkurdhar, forested areas below Dibrugeta maidan.
- May 17 - May 19 : Deodi. Areas covered included slopes above Deodi camp and upto Malla Deodi.
- May 20 - May 22 : Ramni. Areas covered included forest before Ramni and Bagni Gadera.



May 23 - May 24	: Bethartoli. Areas covered included 'bugyal' around camp and forest and 'bugyal' before and above Bethartoli.
May 25 - May 27	: Ramni - Pataalkhan - Sarsonpatal
May 28 - May 29	: Sarsonpatal
May 30	: North Sanctuary
May 31 - June 1	: Sarsonpatal
June 2 - June 3	: North Sanctuary & Rishi 'tal'
June 4 - June 5	: Sarsonpatal
June 6 - June 7	: Nanda Devi Base camp
June 8 - June 10	: Sarsonpatal
June 11 - June 12	: Sarsonpatal - Ramni - Dibrugeta
June 13 - June 16	: Dibrugeta
June 17 - June 19	: Latha Kharak
June 20 - June 21	: Belta Kharak
June 22	: Belta Kharak - Reni (road head)

RESULTS & DISCUSSIONS

Distribution patterns

During this survey, a total of 114 species were recorded belonging to 30 families (Appendix 1 & 2). The family Turdidae (thrushes & chats) appears to be the most dominant (21 species) followed by Sylviidae and Fringillidae (11 species each) and Corvidae (9 species). Of the 114 species recorded 84 species were recorded within the NDBR and 30 species were recorded around Joshimath and the oak forest at Auli (Appendix 2).

There were three earlier expeditions for which bird lists are available from this area (Reed 1979, Casebolt 1979, Tak & Kumar 1987). 78 species of birds seen by them and not seen by me are listed in Appendix 3 (67 species were recorded by me and not by the earlier expeditions, of which 33 were from NDNP). Of the 78 species listed in Appendix 3, 57 were recorded within the National Park. Thus the total number of species recorded from within the NDNP and parts of the Biosphere Reserve is 141.

During this survey 4 major habitat types were surveyed. These were temperate forests, sub-alpine forests, alpine meadows and water courses.

Species richness was found to be highest in temperate forests with 47 species recorded within it, 24 of which were seen only in this habitat (Table 1). The species richness of temperate forest is likely to be much higher



as this habitat type was the least surveyed of all habitat types, and consisted only of three 2 to 5 hour visits to Auli, and a single 3 hour survey of Belta Kharak. Birds were found to be the most abundant in this habitat type.

Sub-alpine forest ranked the next highest in species richness with 43 species recorded there, 18 of which were only seen in that habitat type (Table 1). This habitat type along with the next were the most intensively surveyed areas during this survey.

33 species were recorded in alpine meadows of which 10 were seen exclusively in this habitat type (Table 1).

Table 1.
Distribution of bird species among different habitat types

Habitat Type	Total species	Exclusive species
1 Alpine meadow	33	10
2 Sub-alpine forest	43	18
3 Upper temperate	47	24
4 Water courses / bodies	7	6
5 Cliffs	14	3
6 Boulder strewn slopes with sparse vegetation	6	3
7 Agriculture / habitation	20	8

Of the 114 species recorded 42 (37%) were seen exclusively in forest either dominated by oak, fir, birch or rhododendron. Only 20 species (8 exclusively) were recorded in degraded forest and agriculture lands and 10 (8.7 %) were exclusive to alpine meadows. This could indicate that the majority of the species in the areas surveyed are specialists that require primary forest cover. I could not examine alpine meadows that are subjected to human activity and thus am unable to assess the impact of degradation / disturbance on the avifauna of that habitat type.

The altitudinal distribution of the avifauna is given in Table 2. There was a significant decline in species richness (and apparently of abundance) as elevation increased. Only 1 species spanned the entire altitudinal range; this was the brown dipper *Cinclus pallasi* of which I had a glimpse at the lake at base camp. The decline in species richness with increasing altitude is concurrent with the distributional patterns of avifauna with habitat (Table 1). Temperate forests generally occurred below 2800 m msl, sub-alpine forests between about 3000 m msl - 3800 m msl and alpine meadows between 3800 m msl and 5000 m msl.



These findings are concurrent with similar studies done on the avifauna of the Himalayas (for e.g. Katti *et al.* 1992).

Table 2.
Distribution of bird species according to altitude

Altitude	Total species	Species Overlap			
4800-5800	4		3		
3800-4800	28	8		1	
2800-3800	51		8		1
1800-2800	66		18		

Notes on the observed movement patterns of birds

Our survey began during very early spring and ended by early summer. This perhaps accounted for the absence of many species of birds which I expected to see, for example the buntings. When the survey commenced, May 2, leafing of birch (the dominant sub-alpine tree species) had only just begun and even snow fall occurred a few times during this period. It was obvious that the immigration into alpine and sub-alpine areas had only just commenced.

The most abundant of the first arrivals appear to be *Phylloscopus* warblers, crested black tit *Parus melanolophus*, yellow-bellied fantail flycatcher *Rhipidura hypoxantha*, orange flanked bush robin *Erithacus cyanurus*, bluefronted redstart *Phoenicurus frontalis*, Indian tree pipit *Anthus hodgsoni* and vinaceous breasted pipit *Anthus roseatus*. Three species of Corvidae, yellowbilled chough *Pyrrhocorax graculus*, redbilled chough *P. pyrrhocorax* and jungle crow *Corvus machrorhynchus* and one Columbidae, the snow pigeon *Columba leuconota* were commonly seen.

Abundance of avifauna was low, and though territories were being established (for e.g. crested black tits were exceedingly vocal at Dibrugeta) this appeared to be an inconsistent activity among species generally. Many birds seemed to cover larger areas in search of food (for e.g. the yellow-bellied fantail flycatcher). Some species, notably the tits (green backed and crested black) and the orange flanked bush robin had commenced nesting as was evidenced by individuals observed with nesting material (hair/fur of tahr and musk deer).

I expected to see a substantial change in species richness with the onset of warmer weather and the emergence



of vegetation. This did not occur. The only apparent change was a considerable increase in bird abundance, but species richness did not increase dramatically. Later arrivals (some of which did exist earlier in low numbers) included some species of rosefinch (e.g. common rosefinch *Carpodacus erythrinus*) and the nutcracker *Nucifraga caryocatactes*, the latter being the most conspicuous late immigrant. Some *Phylloscopus* warblers also appeared to immigrate into sub-alpine forests later, for instance the largebilled leaf warbler *Phylloscopus magnirostris*. Enroute to Sarsonpatal, this species was recorded only at Deodi, in the sub-alpine birch/fir forest alongside the Rishi Ganga river (May 17 - May 19). During the return journey, I found it to be common at Dibrugeta. Similarly, between May 7 - May 16 I had only one sighting of the large bush warbler *Cettia major* at Dibrugeta while between 13 June and June 16 I came across this species 7 - 8 times. (The large bush warbler was also interesting because it occurred in a very small patch < 10 ha. of alpine meadow with cotton easter and rose bushes only. I did not come across this species elsewhere).

The only plausible explanation I have is that the sub-alpine forests of NDNP are cut off from forested areas of lower elevations by a ring of high mountains over 4500 m msl. The only forested inlet into the core area is the Rishi Ganga gorge. However, the forest is not contiguous, and often broken by steep cliffs along the gorge. This could perhaps be why many species, for example laughing thrushes do not ascend to the sub-alpine forests within the core area because of the lack of contiguous forest through which to move.

Birds immigrate into the sub-alpine and alpine areas to breed in the resource rich habitats of summer (Ali & Ripley 1983). On the return journey, early June onwards, many individuals of several species were seen carrying food or nesting material in the sub-alpine forest indicating that breeding was well under way. A nest of the orange-flanked bush robin was seen in a cavity in the ground below a tussock of grass in fir dominated forest.

Status of Galliformes

The Himalayas are inhabited by a great diversity of gallinaceous birds that include 13 species of pheasant, 10 partridges and at least 3 species of quail (Ali & Ripley 1993). During this survey, I recorded the presence of 5 species, Snow partridge *Lerwa lerwa*, Himalayan snowcock *Tetraogallus himalayensis*, Black partridge *Francolinus francolinus* Monal pheasant *Lophophorus impejanus* and Koklas pheasant *Pucrasia macrolopha* and reliably learnt of the existence of three more species Chukar partridge *Alectoris chukar* Kaleej pheasant *Lophura leucomelana*, Chir pheasant *Catreus wallichii*.

The sightings of Galliformes during this survey are given in Table 3 and a comparison is made with the Z.S.I surveys between 1981-84 in Table 4. The problem of comparing the two data sets is that Lamba (1987) has not stated the locations of sightings. Thus I only compare total numbers recorded.

Fig. 1. Nanda Devi National Park with sighting locations of Gallinaceous birds.

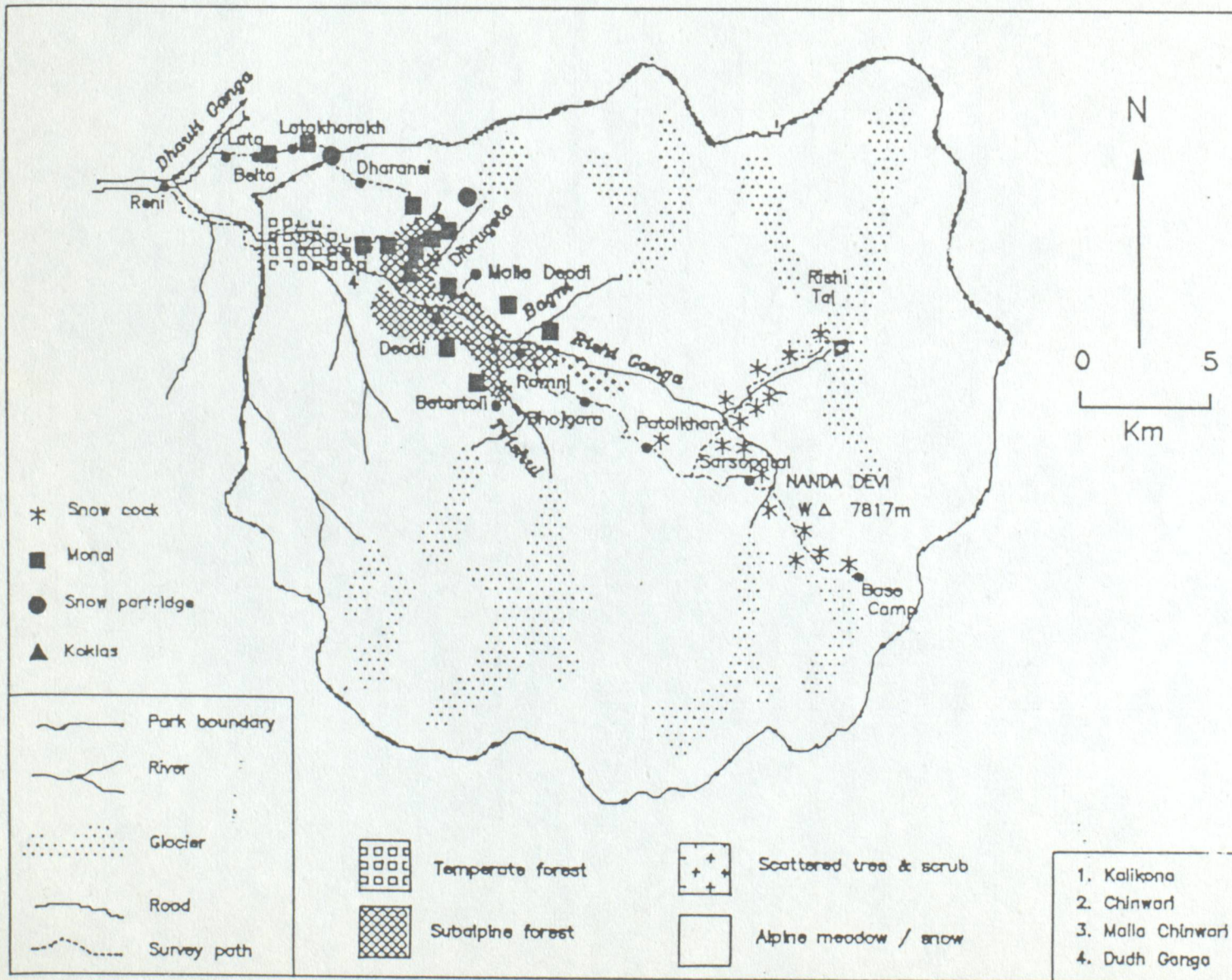




Table 3
Status of Galliformes in Nanda Devi National Park

Species	Location	Total seen/heard	Encounter rate/km
Monal	Maltoni pass	3	-
	Dibrugeta	81	4.7
	(Dibrugeta	16)	
	Deodi	5	1.25
	Deodi-Ramni	2	0.4
	Bagni Gadera	1	0.8
	Ramni-	2	0.4
	Bethartoli		
	Bethartoli	3	0.6
	Dibrugeta-	2	-
	Dharansi		
	Latha Kharak	3	-
Belta Kharak	3+		
Koklas	Dibrugeta	2 sightings (14 times heard)	
Snow partridge	Dibrugeta	Heard twice	
	Sath kula	1	
Himalayan snowcock	Pathalkhan	1	
	Sarsonpatal &	28 sightings	2.8
	North sanctuary	>60 calls	2.4

n.b. Numbers are sums of all sightings / calls heard and are irrespective of repetitions over subsequent days. Paranthesis are sightings on return journey.



Table 4
Comparison of sightings of Galliformes in NDNP

Species	This study	Lamba 1987
Himalayan snow cock	28 sightings >60 calls	11 (49)
Monal	121 (including calls)	34 (63)
Koklas	2 sightings 14 calls	15 (48)

Lamba (1987) : nos = number of observations
() = total individuals seen

1. Snow partridge *Lerwa lerwa*

I heard this bird twice at Dibrugeta in the rocky area above the meadow at an altitude of about 4000 m. I guessed that a covey of 4 - 6 birds occurred there. I sighted one individual beyond 'Sat Kula' enroute to Lata Kharak. 5 days later Trilok Singh Bisht, Wildlife Guard, saw a bird with chicks at exactly the same place. I believe this species to be uncommon in NDNP, though Khacher (1978) found them to be 'plentiful'.

2. Chukor partidge *Alectoris chukar*

Though not seen during this survey this species is present in agriculture lands in the NDBR.

3. Black partridge *Francolinus francolinus*

This species was heard frequently around Joshimath in agriculture lands and appeared to be present in good numbers.

4. Himalayan snowcock *Tetraogallus himalayensis*

This bird was frequently seen from Pathalkhan (4100 m) onwards, and occurred as high as Camp 2 (5900 m). I found them to be very shy and those birds that were flushed at Sarson Patal invariably flew across the river and landed on the steep rocky cliffs at the base of the Nanda Devi Mountain. They occurred at similar densities in the North Sanctuary (Table 3).



A comparison of data available does not reveal a significant change in the population of this species between 1981/84 and 1993 (Table 4). However, the duration of time spent in the area was considerably less by me than by Tak & Kumar (1987). Thus, it is probable that numbers of this species has increased. Alternately it is possible that the lack of disturbance has resulted in more birds using Sarson Patal meadow.

Some expeditions have reported the presence of Tibetan snowcock *Tetraogallus tibetanus* in NDNP (Reed 1979, Casebolt 1979), and Ali & Ripley (1983) have said that the range extends upto Nanda Devi. None of the individual that I had good looks at were Tibetan snowcock. However, the birds around Base Camp seemed to have slightly different calls from those at Sarsonpatal. The existence of Tibetan snowcock in NDNP needs confirmation.

5. Western tragopan *Tragopan melanocephalus*

Tak & Kumar (1987) suspected the presence of this bird in NDNP. I did not see or hear any and inquiries amongst the locals also did not result in any information on this species. I believe that this species does not exist in NDNP.

This species is the rarest pheasant in western Himalayas (Gaston et al. 1981) and its range apparently ends west of Nanda Devi (Hume & Marshall 1879, Delacour 1977, Ali & Ripley 1983).

6. Monal pheasant *Lophophorus impejanus*

This pheasant was the most common Galliform in NDNP. Up to 10 or males could be sighted at Dibrugeta meadow in the early morning or late evening hours. Females were less frequently seen, perhaps because nesting had commenced. (One female with chicks was seen enroute to Bethartoli on 20 May 1993; V.K. Pangtey pers. comm.). Monal were less frequently seen elsewhere in NDNP, but a few occurred at the tree line throughout the survey route excepting at Bhujgara. The lowest altitude monal was seen at was at Belta Kharak (2800 m msl) where 2 females and one male were sighted and were heard a few times as well.

There appears to have been a distinct increase in the population of monal in NDNP. Between 1981 and 1984 six expeditions totaling 167 days were made to NDNP by Tak and Kumar (1987). Only 63 individuals were sighted by them (Lamba 1987), whereas in less than 35 days in monal habitats, I sighted or heard monal on more than 121 occasions. Khachcher (1978) did not see any monal during his survey in 1977, though he documented the presence of suitable habitats. Thus absolute protection has certainly benefited this species.

7. Kallej pheasant *Lophura leucomelana*

Not seen during this survey, but is present at Belta Kharak, and in forested areas around Lata and Reni village. Its status there is unknown and it seems that some amount of hunting pressures exist on this species.



8. Koklas pheasant *Pucrasia macrolopha*

A rare bird within NDNP. Occurred only in the forested area below Dibrugeta maidan. A single sighting by me and one by the wildlife guards were the only two records of this species during this survey. However, this bird was heard at least on 14 different occasions and the maximum number of individuals that I heard was five. The feathers of a female pheasant found between Kalikona and Chinwari was possibly of this species.

Has the Koklas reduced in number? Lamba (1987) recorded koklas on 15 occasions with a total of 48 individuals. However, as he has not given location of sightings a comparison can not be made. Khachcher (1978) heard them at above Lata village, an area I did not survey. Locals confirmed their continued presence in the area.

9. Chir pheasant *Catreus wallichii*

Not seen during this survey. This pheasant occurs in the forested areas near Reni village and like other pheasants that occur near villages appear to be under some hunting pressures. Possibly one individual was heard at Belta Kharak (Negi, AWLW, pers. comm.).

It is unlikely that chir exist within NDNP as they avoid forested areas but are often found in association with agriculture (Garson et al. 1992).

Status of Raptors

My sightings of raptors were few (Appendix 2), and only the Himalayan griffon *Gyps fulvus* and the lammergeier *Gypaetus barbatus* were seen frequently. Presumably an influx of raptors into the surveyed areas would occur only when immigration of avifauna into alpine and sub-alpine areas reaches its peak or the maximum emergence of rodents after winter hibernation (for e.g. though pika *Ochotona roylei* was seen in a number of locations populations were low) would result in an adequate prey base.

Conservation

I classify the conservation perspective in this report into four main categories, namely those pertaining to NDBR, Research Priorities, implications to western Himalayas and Auli.

1. Nanda Devi Biosphere Reserve

The NDBR in reality needs to be treated as two separate units. The core area or Nanda Devi National Park and the Buffer Zone of NDBR.



1.1. Nanda Devi National Park

Perhaps the ultimate achievement of protection of nature in India is the absolute ban of human use within the protected area. A ban on human use has been in effect in NDNP since 1982. I believe that this ban should not be lifted because the evidence collected during this survey more than amply proved the increase in rare avifauna and mammals in the intervening years.

We did come across signs of illicit entry into the NDNP. Some signs were of collectors of plants of commercial value, while others were apparently of poachers. Infact, signs of probably poached (sic) musk deer were seen at a few sites (see also Sathya Kumar, this report). However, poaching pressures appear to be minimal or occurs rarely as evidenced by the frequency and numbers of animals seen; I had about 20 sightings of musk deer (see also Sathya Kumar, this report).

The only way to stop or further reduce the existing musk deer poaching pressures is to have regular patrols by armed wildlife guards. I am against this because :

- a) The idea of a total ban in Nanda Devi is to prevent totally the entry of humans into the core zone.
- b) The constant patrolling of guards along with their logistic support can be a disturbance in key wildlife areas.
- c) Bridges etc. that will have to be constructed for the guards can just as well be used by poachers.
- d) Patrolling can only minimise poaching; cannot eradicate it as is evidenced from examples all over India where commercially important animals exist (the Indian Rhino and Asian elephant are classical examples). I believe that poaching pressures in Nanda Devi National Park are minimal and do not warrant the disturbance levels that can be caused by regular armed patrols with necessary logistic support. I also doubt whether patrols can eradicate poaching.
- e) However, the traditional entry points to the NDNP should be closely gaurded, to deter possible illegal entry.

A monitoring survey once every five or more years can be made to assess status of mammals and birds. There was no indication during the current survey that patrolling or any other management practice needs implementation within NDNP.

Nanda Devi National Park is a success story of the Uttar Pradesh Forest Department. If permits for expeditions are granted in future, it will defeat the essence of NDNP. It is hoped that the Government of India will be able to withstand the pressures that is bound to come due to this one time permit (1993 expedition) that was granted.

No more permits to mountaineering or trekking expeditions.



1.2 Buffer Zone of NDBR

The Buffer of NDBR is a multiple use area, where needs of nearby villages are met, e.g. fuel and fodder. The only area of the Buffer Zone that we covered during this survey were Lata Kharak and Belta Kharak.

Several areas of the Buffer Zone are rich in wildlife. These are easily accessible. Information was gathered on probable hunting pressures and excessive or unsustainable collection of plants of commercial value.

The need in NDBR is not to waste valuable resources and personnel on the NDNP (which is in excellent condition) but to increase strength of personnel and patrolling in the wildlife rich areas of the Buffer Zone and adjacent areas and inculcate sustainable exploitation of plants of economic value amongst the locals.

2. Research Priorities

There is scope for much research in the NDBR. However research activities must not be permitted within the NDNP or core zone of the NDBR. I base this on the following arguments.

- a) Permanent field stations can be a source of disturbance, and will be a source of human interference. The purpose of banning entry into NDNP was to prevent human influence in toto in the area. Thus any source of human activity, for e.g. permanent or temporary research stations should not be permitted within NDNP.
- b) Since NDNP receives total protection, no obvious conservation problems were seen during this survey. Thus research for 'management' or conservation of the area is not required.
- c) Research activity as with all other human activity should be restricted to the buffer zone only.

3. Conservation of avifauna in western Himalayas

I base this section on scanty data, having no information on the status of forested land in the area as a whole.

Almost all species of avifauna in the Himalayas show altitudinal migration, ascending into sub-alpine and alpine areas in summer to breed and descending into temperate and tropical areas in the winter when snow and extreme climatic conditions create a resource crunch at higher altitudes (Ali & Ripley 1983).

The lower temperate and tropical forests of the Himalayas are perhaps amongst the most vulnerable in this biogeographic zone simply because this is the inhabited belt. It is in the lower temperate and tropical belt that maximum deforestation is taking place (D. Mohan pers. comm.).

Apparently, most protected areas in western Himalayas are situated at higher altitudes, encompassing mostly alpine or sub-alpine areas. Do these protected areas have sufficient temperate and tropical forest below them



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into which birds can descend during winter ?

Thus, I argue that it is necessary for a protected area network around and below high altitude Protected Areas. These should encompass forested and other areas at lower altitudes which are used for wintering by birds. Lack of sufficient protection of wintering areas will result in reduction in the populations that migrate into Alpine or sub-alpine areas to breed in.

4. Auli

In spite of the fact that during this survey the forests at Auli (above Joshimath) were the least surveyed, it was the richest bird habitat that was seen in the entire expedition. I propose that a specific survey/study is made to find ways and means by which to better protect this excellent forest.

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Appendix 1

Classification of birds seen according to families

1	Accipiteridae	6		
2	Falconidae	2		
3	Phasianidae	5		
4	Columbidae	5		
5	Cuculidae	1		
6	Caprimulgidae	1		
7	Apodidae	2		
8	Upupidae	1		
9	Captonidae	1		
10	Picidae	3		
11	Lannidae	1		
12	Dicruridae	1		
13	Corvidae	9		
14	Campephagidae	1		
15	Pycnonotidae	2		
16	Muscicapidae	41	Timalinae	4
			Muscicapinae	4
			Sylviinae	11
			Turdinae	21
17	Troglodytidae	1		
18	Cinclidae	1		
19	Prunellidae	3		
20	Paridae	5		
21	Sittidae	1		
22	Certhidae	2		
23	Motacillidae	3		
24	Dicaeidae	1		
25	Zosteropidae	1		
26	Ploceidae	1		
27	Fringillidae	11		



APPENDIX 2
Annotated list of the birds of Nanda Devi National Park
(Including birds at Joshimath & Auli)

No. Species		Locations	Habitat	Altitudes	Abundance ranking	Outside reserve	
1	Sparrow-hawk	<i>Accipiter nisus</i>	Dibrugeta	2,1	3500	2	
2	Longlegged buzzard	<i>Buteo rufinus</i>	Maltoni pass, Malla Dibrugeta	2,1	3900	2	
3	Booted hawk-eagle	<i>Hieraaetus bennatus</i>	Rishi Ganga gorge, above Bethartoli ?	3,1,5	2600-3900	2	
4	Himalayan golden eagle	<i>Aquila chrysaetos</i>	Above Trisul nalla & Rishi ganga confluence; Sarsonpatal	1,2	3700-4200	2	
5	Himalayan griffon	<i>Gyps himalayensis</i>	Reni / Latha to Sarsonpatal	1,2,3,5	2000-4500	6	
6	Lammergeier	<i>Gypaetus barbatus</i>	Dibrugeta to Sarsonpatal	1,2,5	3500-4500	4	
7	Falcon sp.	<i>Falco sp.</i>	Doodganga	5	2800	1	
8	European kestrel	<i>Falco tinnunculus</i>	Dibrugeta to Ramni, Bethartoli	1,5	3500-3600	3	
9	Snow partridge	<i>Lerwa lerwa</i>	Above Dibrugeta, 'Sath kula'	1,6	4000	2	
10	Himalayan snowcock	<i>Tetraogallus himalayensis</i>	Pathalkhan, Sarsonpathal, N. sanctuary, base camp upto 'camp II'	1,5	4100-5900	4	
11	Black partridge	<i>Francolinus francolinus</i>	Around Joshimath	7	2000-2300	4	
12	Himalayan monal pheasant	<i>Lophophorus impejanus</i>	Belta Kharak to Ramni	2,3,1	2800-3900	5	+
13	Koklas pheasant	<i>Pucrasia macrolopha</i>	Dibrugeta	2	3500	3	
14	Snow pigeon	<i>Columba leuconota</i>	Doodganga & above	1,2,5	2800-4500	6	
15	Blue rock pigeon	<i>Columba livia</i>	Around Joshimath	7	2000	-	
16	Hill pigeon	<i>Columba rupestris</i>	Near Bethartoli	6	3700	1	+
17	Speckled wood-pigeon	<i>Columba hodgsonii</i>	Reni, Kalikona, Belta khadak	3	2100-2900	4	
18	Rufous turtle dove	<i>Streptopelia orientalis</i>	Beltahadak, Auli around Joshimath	3,7	2000-2700	4	
19	Cuckoo	<i>Cuculus canorus</i>	Dibrugeta to Reni	2,3	2000-3900	3	
20	Himalayan jungle nightjar	<i>Caprimulgus indicus</i>	Belta Kharak	3	2800	1	
21	Himalayan swiftlet ?	<i>Collocalia brevirostris</i>	Rishiganga gorge	5	2000-2500	-	
22	Large whiterumped swift	<i>Apus pacificus</i>	Rishiganga gorge	5	2000-2800	5	
23	Hoopoe	<i>Upupa epops</i>	Around Joshimath, Auli	7,3	2000-2700	3	+
24	Great hill barbet	<i>Megalaima virens</i>	Auli	3	2300-2700	4	+
25	Sapsucker	<i>Hypopicus hyperythrus</i>	Auli	3	2300-2700	2	+
26	Himalayan pied woodpecker	<i>Picoides himalayensis</i>	Auli	3	2300-2700	3	+
27	Woodpecker sp.	<i>Picoides ? sp.</i>	Dibrugeta	2	3500	2	+
28	Rufousbacked shrike	<i>Lanius schach</i>	Above Joshimath, Auli	7,3	2000-2500	4	+
29	Ashy drongo	<i>Dicrurus leucophaeus</i>	Around Joshimath	7,3	2000	4	+
30	Common mynah	<i>Acridotheres tristis</i>	Around Joshimath	7	2000	4	+
31	Redcrowned jay	<i>Garrulus glandarius</i>	Auli	3	2500	2	+
32	Blackthroated jay	<i>Garrulus lanceolatus</i>	Auli	3	2500	1	+
33	Redbilled blue magpie	<i>Cissa erythrorhyncha</i>	Auli	3	2700	2	+
34	Himalayan tree pie	<i>Dendrocitta formosae</i>	Auli	3	2500	1	+
35	Nutcracker	<i>Nucifraga caryocatactes</i>	Reni / Latha to Ramni	2,3,1	2200-3700	4	
36	Yellowbilled chough	<i>Pyrhocorax graculus</i>	Above Ramni to Sarsonpatal	1,2,5	4000-5900	6	
37	Redbilled chough	<i>Pyrhocorax pyrrhocorax</i>	Maltoni pass to Pathalkhan	1,2,5	3700-4100	6	
38	House crow	<i>Corvus splendens</i>	Around Joshimath	7	2000	-	
39	Jungle crow	<i>Corvus machrorhynchus</i>	Joshimath to Dibrugeta	1,2,3,5,7	2000-3700	5	+
40	Longtailed minivet	<i>Pericrocotus ethologus</i>	Auli	3	2200-2700	3	
41	Whitecheeked bulbul	<i>Pycnonotus leucogenys</i>	Around Joshimath	7	2000-2100	5	+



No.	Species		Locations	Habitat	Altitudes	Abundance ranking	Outside reserve
42	Black bulbul	<i>Hypsipites madagascariensis</i>	Auli	3	2300-2700	4	+
43	Variiegated laughing thrush	<i>Garrulax varieiegatus</i>	Beltakhadak, Auli	3	2300-3000	4	
44	Streaked laughing thrush	<i>Garrulax lineatus</i>	Around Joshimath	7,3	2300-2700	5	
45	Barthroated siva	<i>Minla strigula</i>	Dibrugeta, Deodi	2	3300-3500	2	
46	Blackcapped sibia	<i>Heterophasia capistrata</i>	Auli	3	2400-2800	2	+
47	Orange gorgetted flycatcher	<i>Muscicapa stophiata</i>	Deodi, Trishul	2	3300-3500	2	
			nallah & Rishiganga confluence				
48	Whitebrowed blue flycatcher	<i>Muscicapa superciliaris</i>	Belta Kharak	3	2900	1	
49	Greyheaded flycatcher	<i>Culicicapa ceylonensis</i>	Auli	3	2300-2700	2	+
50	Yellowbellied fantail	<i>Rhipidura hypoxantha</i>	Maltoni to Ramni	2	3400-3800	5	
			flycatcher				
51	Paradise flycatcher	<i>Terpsiphone paradisi</i>	Above Joshimath,	3,7	2000	2	+
52	Strongfooted bush warbler	<i>Cettia montana</i>	Belta Kharak,	7,3	1800-2800	5	
			around Joshimath				
53	Large bush warbler	<i>Cettia major</i>	Dibrugeta	1	3600	3	
54		<i>Cettia sp.</i>	Above Bethartoli	1	4400	1	
55	Olivaceous leaf warbler	<i>Phylloscopus griseolus</i>	Sarsonpatal	1	4200	2	
56	Pallas's leaf warbler	<i>Phylloscopus proregulus</i>	Doodganga	2,3	2800	1	
57	Largebilled leaf warbler	<i>Phylloscopus magnirostris</i>	Deodi, Dibrugeta	2,3	2800-3600	4	
			Belta Kharak				
58	Dullgreen leaf warbler	<i>Phylloscopus trochiloides</i>	Dibrugeta	2	3500	2	
59	Largecrowned leaf warbler	<i>Phylloscopus occipitalis</i>	Rishi Ganga gorge,	3,2	2200-2800	3	
			Belta Kharak				
60	Blyth's leaf warbler	<i>Phylloscopus reguloides</i>	Dood Ganga,	2,3	2800-3600	3	
			Dibrugeta				
61	Blackbrowed flycatcher-warbler	<i>Seicercus burkii</i>	Dibrugeta	2	3600	3	
62	Greyheaded flycatcher-warbler	<i>Seicercus xanthoschistos</i>	Doodganga	3	2800	1	
63	Goldcrest	<i>Regulus regulus</i>	Dibrugeta	2	3600	3	
64	Himalayan rubthroat	<i>Erithacus pectoralis</i>	Bethartoli,	1,6	4100-4200	2	
			Sarsonpatal				
65	Blue chat	<i>Erithacus brunneus</i>	Maltoni pass	2	3800	1	
66	Orangeflanked bushrobin	<i>Erithacus cyanurus</i>	Maltoni to Ramni	2,3	2800-3900	5	
			Belta khadak				
67	Blueheaded redstart	<i>Phoenicurus caeruleocephalus</i>	Belta Kadak	3	2900	2	
68	Black redstart	<i>Phoenicurus ochrurus</i>	Sarsonpatal	1	4200	1	
69	Bluefronted redstart	<i>Phoenicurus frontalis</i>	Dibrugeta to	2,1	3500-4300	5	
			Sarsonpatal				
70	Plumbeous redstart	<i>Rhyacornis fuliginosus</i>	Kalikona	4	2600	2	
71	Hodgson's grandala	<i>Grandala coelicolor</i>	Sarsonpatal	1	4300	1	
72	Little forktail	<i>Enicurus scouleri</i>	Dibrugeta	4	3500	1	
73	Spotted forktail	<i>Enicurus maculatus</i>	Above Joshimath,	4	2000-2400	2	+
			Auli				
74	Collared bush chat	<i>Saxicola torquata</i>	Around Joshimath	7	2000	4	+
75	Dark-grey bush chat	<i>Saxicola ferrea</i>	Around Joshimath	7	2000	4	+
76	Whitecapped redstart	<i>Chaimarrornis leucocephalus</i>	Reni to Sarson	4	2000-4200	5	
			Pathal				
77	Blueheaded rock thrush	<i>Monticola cinclorhynchus</i>	Above Joshimath	3,7	2000-2400	2	+
78	Blue whistling thrush	<i>Myophonus caeruleus</i>	Reni to Ramni,	4,5,1	2000-3800	6	
			Bethartoli				
79	Plainbacked mountain thrush	<i>Zoothera mollissima</i>	Dibrugeta	1/2	3600	2	
80	Tickell's thrush	<i>Turdus unicolor</i>	Auli	3	2500	2	+
81	Whitecollared blackbird	<i>Turdus albocinctus</i>	Belta Kharak	3	2500-2800	1	
82	Greywinged blackbird	<i>Turdus boulboul</i>	Auli	3	2500	2	+
83	Blackbird	<i>Turdus merula</i>	Belta Kharak,	3	2500-2800	2	
			Auli				+
84	Mistle thrush	<i>Turdus viscivorus</i>	Dibrugeta	2	3500	1	
85	Wren	<i>Troglodytes troglodytes</i>	Deodi, Ramni	6	3400-3700	2	
86	Brown dipper	<i>Cinclus pallasi</i>	Kalikona to	4	2600-3500	4	
			Doodganga, Dibrugeta, Base camp (5000)				
87	Alpine accentor	<i>Prunella collaris</i>	Pathalkhan	5,1	4200	2	
88	Robin accentor	<i>Prunella rubeculoides</i>	Sarsonpatal	1	4200	1	
89	Rufousbreasted accentor	<i>Prunella strophata</i>	North Sanctuary	2			



No. Species		Locations	Habitat	Altitudes	Abundance ranking	Outside reserve	
90	Greenbacked tit	<i>Parus monticolus</i>	Upto Chinwari, Auli	3	2000-2700	4	
91	Crested black tit	<i>Parus melanolophus</i>	Belta Kharak/Reni to Ramni, Bethartoli	2,3	2000-3800	5	
92	Black tit	<i>Parus rubidiventris</i>	Deodi, Trishul nallah-Rishiganga confluence	2	3400-3700	2	
93	Firecapped tit	<i>Cephalopyrus flammiceps</i>	Near Trishulnallah Rishiganga confluence, Joshimath	2	3500, 1800	2	
94	Whitethroated tit	<i>Aegithalos niveogularis</i>	Deodi, Dibrugeta	2	3500-3700	2	
95	Whitecheeked nuthatch	<i>Sitta leucopsis</i>	Dibrugeta	2	3500	1	
96	Tree creeper	<i>Certhia familiaris</i>	Dibrugeta	1	3500	1	
97	Himalayan tree creeper	<i>Certhia himalayana</i>	Dibrugeta, Deodi Trishul n.-Rishiganga confluence	2	3300-3500	3	
98	Indian tree pipit	<i>Anthus hodgsoni</i>	Dibrugeta - Deodi	2/1	3300-3600	4	
99	Vinaceousbreasted pipit	<i>Anthus roseatus</i>	Dibrugeta to Sarsonpatal	1	3500-4500	5	
100	Grey wagtail	<i>Motacilla caspica</i>	Rishiganga gorge	4	2000-2800	2	
101	Yellowbellied flowerpecker	<i>Dicaeum melanoxanthum</i>	Reni-Kalikona	3	2300	1	
102	White-eye	<i>Zosterops palpebros</i>	Auli	3	2500	3	
103	House sparrow	<i>Passer domesticus</i>	Around Joshimath	7	2000	-	+
104	Black-and-yellow grosbeak	<i>Mycerobas icteroides</i>	Auli	3	2500-2700	2	+
105	Spottedwinged grosbeak	<i>Mycerobas melanoxanthos</i>	Belta Kharak, Dibrugeta, Auli	3,2	2800-3600	4	+
106	Goldfronted finch	<i>Serinus pusillus</i>	Around Joshimath	7,3	2000	6	+
107	Hodgson's mountain finch	<i>Leucosticte nemoricola</i>	North Sanctuary	1	4000	2	
108	Common rosefinch	<i>Carpodacus erythrinus</i>	Dibrugeta	1	3600	1	
109	Pinkbrowed rosefinch	<i>Carpodacus rhodochrous</i>	Dibrugeta, Pathalkhan	2,6	3500-4100	-	
110	Spottedwinged rosefinch	<i>Carpodacus rhodopeplus</i>	Deodi, North Sanctuary, Joshimath	2,1,7	1900-4100	-	
111	Whitebrowed rosefinch	<i>Carpodacus thura</i>	Dibrugeta	2	3500	-	
112	Beautiful rosefinch	<i>Carpodacus pulcherrimus</i>	Bethartoli	6	4000	1	
113	Redbreasted rosefinch	<i>Carpodacus puniceus</i>	Dibrugeta, Ramni Sarsonpatal, Joshimath	2,1,7	1800-4200	-	
114	Redheaded bullfinch	<i>Pyrrhula erythrocephala</i>	Near Ramni	2	3600	2	

Key : Habitat
 1 = Alpine meadow
 2 = Sub-alpine forest
 3 = Upper temperate forest
 4 = water courses / bodies
 5 = cliffs
 6 = boulder strewn slopes with sparse vegetation
 7 = Agriculture / habitation

Abundance ranking (based on sightings or calls heard)

1 = 1
 2 = 2-5
 3 = 6-10
 4 = 11-50
 5 = 50-100
 6 = >100

Field guides : Ali *et al.* 1989
 Fleming *et al.* 1976



APPENDIX 3.
Bird species seen by Tak & Kumar (1987) and Reed (1979)
but not recorded during this expedition

		Tak & Kumar 1987	Reed 1979	Casebolt 198*	Not in reserve
1	Geese		+		
2	Black kite		+		+
3	Steppe eagle	+	+		
4	Black eagle		+		
5	Cinereous vulture		+		
6	Whitebacked vulture		+		+
7	Egyptian vulture	+	+		+
8	Peregrine falcon		+		+
9	Tibetan snowcock		+	+	
10	Chukor partridge	+			
11	Kalij pheasant		+		
12	Woodcock	+			
13	Indian spotted dove	+			
14	Pied crested cuckoo	+			
15	Great horned owl	+			
16	Indian edible nest swiftlet	+			
17	Whiterumped spinetail swift	+			
18	Honeyguide	+			
19	Scalybellied green woodpecker	+			
20	Fulvousbreasted pied woodpecker		+		+
21	Rufous short-toed lark	+			
22	Calandra lark			+	
23	House martin		+		
24	Nepal house martin	+			
25	Tibet greybacked shrike	+		+	
26	Golden oriole		+		+
27	Maroon oriole		+		+
28	Grey drongo	+			
29	Spangled drongo	+			
30	Carrion crow		+		
31	Raven		+		+
32	Yellowthroated minivet		+		+
33	Rosy minivet		+		+
34	Striated babbler			+	+
35	Redheaded laughing thrush	+			
36	Brown flycatcher		+		
37	Rufousbreasted blue flycatcher			+	
38	Little pied flycatcher		+		+
39	Slaty blue flycatcher	+			
40	Rufousbellied niltava	+		+	
41	Verditer flycatcher	+			
42	Whitethroated fantail flycatcher		+		+
43	Spotted bush warbler			+	
44	Hume's bush warbler			+	
45	Tickell's leaf warbler		+	+	
46	Smoky leaf warbler		+		
47	Orangebarred leaf warbler			+	
48	Yellowbellied warbler		+		+
49	Golden bush robin		+		
50	Whitefronted redstart			+	
51	Guldenstadt's redstart		+		
52	Hodgson's shortwing	+			
53	Chestnutbellied rock thrush		+		+
54	Blue rock thrush	+	+		
55	Pied ground thrush	+			+
56	Blackthroated accentor		+		+
57	Maroonbacked accentor		+		+
58	Grey tit	+			
59	Brown crested tit	+		+	



		Tak & Kumar 1987	Reed 1979	Casebolt 198*	Not in reserve
60	Yellowbrowed tit				
61	Brown tit-mouse		+		+
62	Red headed tit			+	
63	Wall creeper	+		?	
64	Upland pipit		+		
65	Pied wagtail		+		
66	Allied grosbeak		+		
67	Whitewinged grosbeak	+	+		+
68	Himalayan goldfinch		+		
69	Tibetan twite		+		+
70	Himalayan mountain finch		+		
71	Nepal rosefinch			+	
72	Eastern great rosefinch		+		
73	Redheaded rosefinch		+		
74	Orange bullfinch		+		
75	Pine bunting	+			
76	Rock bunting	+			
77	Greyheaded bunting		+		
78	Crested bunting		+		+