

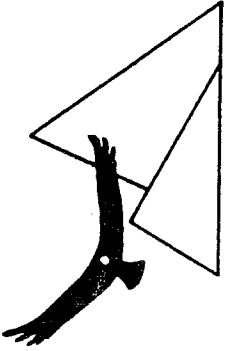
DAVE BREARLEY'S ADDITIONAL LIST FROM NEPALGANT AREA (SQUARE 34)

- ✓ STAVS CRANE
- ✓ HOUSE CROW
- ✓ JUNGLE CROW
- ✓ LARGE CUCKOO-SWALLOTT
- ✓ INDIAN RING DOVE
- ✓ RED NUTTIE DOVE
- ✓ SPOTTED DOVE
- ✓ ASHY DRONGO
- ✓ BLACK DRONGO
- ✓ WHITE-BELLIED DRONGO
- ✓ RUDDY SHELDUCK
- 1 CHANGEABLE HAWK EAGLE
- 1 IMPERIAL EAGLE
- 1 SHORT-TAILED EAGLE
- 1 STEPE EAGLE
- ✓ CATTLE EGRET
- ✓ LARGE EGRET
- ✓ INTERMEDIATE EGRET
- ✓ LITTLE EGRET
- 1 LAGGAR FALCON
- 2 BROOKS FLYCATCHER
- ✓ GRAY-HEADED FLYCATCHER
- ✓ VEEDER FLYCATCHER
- 1 WHITE-BREASTED FANTAIL FLYCATCHER
- ✓ INDIAN GRIFFON
- ✓ HGW HARRIER
- ✓ W/ARSH HARRIER
- ✓ WHITE-EYED HAWK
- ✓ GREY HERON
- ✓ COMMON HERON
- ✓ HOOPOE
- ✓ GRAY HORNBILL
- ✓ BLACK IBIS
- ✓ IORA
- ✓ EURASIAN KINGFISHER
- ✓ LARGE PIED KINGFISHER
- ✓ WHITE-BREASTED KINGFISHER
- ✓ BLACK-SHOULDERED KITE
- ✓ BRAHMINY KITE
- ✓ DARK KITE
- ✓ RED-WATTED LAPWING
- ✓ SPUR-WINGED WING
- ✓ CRESTED LARK
- ✓ GOLDEN-FRONTED LEAF-BIRD
- ✓ SAND MARTIN
- ✓ SMALL MINIVET
- ✓ SPOTTED MUNIA
- ✓ WHITE-THROATED MUNIA
- ✓ BANK MYNA
- ✓ BRAHMINY MYNA
- ✓ COMMON MYNA
- ✓ PIED MYNA

- ✓ WHITE-RUMPED NEEDLETAIL
- ✓ CHESTNUT-BELLIED NUTMATCH
- ✓ BLACK-HEADED ORIOLE
- ✓ JUNGLE OWLET
- ✓ BROWN HAWK OWL
- ✓ SHORT-EARED OWL
- ✓ BLOSSOM-HEADED PARAKEET
- ✓ LARGE PARAKEET
- ✓ ROSE-BREASTED PARAKEET
- ✓ ROSE-RINGED PARAKEET
- ✓ HADJISSON'S TREE PIPIT
- ✓ PADDYFIELD PIPIT
- ✓ RICHARD'S PIPIT
- 1 ICELAND PLOVER
- ✓ ROBIN DAYAL
- ✓ INDIAN ROLLER
- ✓ COMMON SANDPIPER
- ✓ GREEN SANDPIPER
- 1 MARSH SANDPIPER
- ✓ SHIKRA
- ✓ BROWN SHRIKE
- ✓ GRAY-BACKED SHRIKE
- ✓ RUFOUS-BACKED SHRIKE
- ✓ SPARROWHAWK
- ✓ HOUSE SPARROW
- ✓ TREE SPARROW
- ✓ EURASIAN STARLING
- ✓ TETZINCK'S STINT
- ✓ OPEN-BILLED STORK
- 1 WHITE STORK
- ✓ PURPLE SUNBIRD
- ✓ TAILORBIRD
- ✓ BLACK-BELLIED TEAL
- ✓ LITTLE TEAL
- ✓ EURASIAN THICK-KNEE
- ✓ EGYPTIAN VULTURE
- ✓ INDIAN GRIFFON
- ✓ WHITE-BACKED VULTURE
- ✓ GRAY WAGTAIL
- ✓ PIED WAGTAIL
- ✓ YELLOW-HEADED WAGTAIL
- 1 BLUNT-WINGED PADDYFIELD WARBLER
- 1 GOLDEN-HEADED CISTICOLA
- ✓ LESSER WHITETHROAT
- ✓ PLAIN PRINIA
- 1 RUFOUS PRINIA
- ✓ ZITTING CISTICOLA
- ✓ WHITE-BREASTED WATERHEN
- ✓ BATA WEAVER

- ✓ WHITE-EYE
- ✓ BROWN-CROWNED PIGMY WOODPECKER
- 2 ✓ YELLOW-FRONTED PIED WOODPECKER

10/10/83



# SAIPAL 82-83

BIOLOGICAL SURVEY OF NEPAL'S  
FAR WESTERN HILLS

D. BREAREY (1983)  
AND D. PRITCHARD

**3. Birds and other Wildlife of  
Lake Rara National Park  
Northwest Nepal**

**SAIPAL 82-83**

**BIRDS AND OTHER WILDLIFE OF  
LAKE RARA NATIONAL PARK,  
NORTHWEST NEPAL**

This report is the third in a series resulting from the SAIPAL 82-83 independent biological research project in the far west of Nepal. The Project Planning Report (Report No. 1) presented essential background information concerning the project. The Medical Report (Report No. 2) provided information on health in Nepal and all medical preparations for the Project.

Project work was principally overseen by two ecologists: D.M. Brearey (USA) and D.E. Pritchard (UK). Both researchers spent a total of eight months in Nepal from September 1982 through April 1983. Field work concentrated on the Jumla, Mugu and Humla districts and continued studies begun there by both researchers while leaders of SAIPAL 79, the Durham (England) University Expedition to Western Nepal in 1979. SAIPAL 79 and SAIPAL 82-83 were designed to conduct biological surveys of the Karnali region and form the basis for further ecological study of the area.

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### SUMMARY

Birds and other wildlife of Lake Rara National Park were observed in 1979, 1982 and 1983. The field work was twofold: 1) to catalogue the animals found in the Park; and 2) to describe some of the ecological processes that are occurring now that habitation and grazing are no longer permitted in the Park. The importance of a lakeshore meadow site, especially for birds of prey, is described. Management will be required to counter the threat of scrub encroachment at this site following the removal of grazing stock. Data from these visits are summarized here separately from the project's other work, in response to a pressing need to improve the basic plant and animal inventories available to the Government's National Parks and Wildlife Conservation Department, Park Warden staff and trekkers alike. All species of birds and mammals seen or heard at the Park are listed, and relevant ecological observations included. The importance of the Park in the wider context of bird migration is discussed. The data reported here will be valuable in developing conservation management programs and enhancing tourist appreciation of the ecological complexity of the area. Future research needs are briefly discussed.

SAIPAL 82-83 has demonstrated that a small scale, independent and flexible project team can collect a significant amount of information in a relatively short time, and at comparatively little cost (see SAIPAL 82-83 Report No. 1).

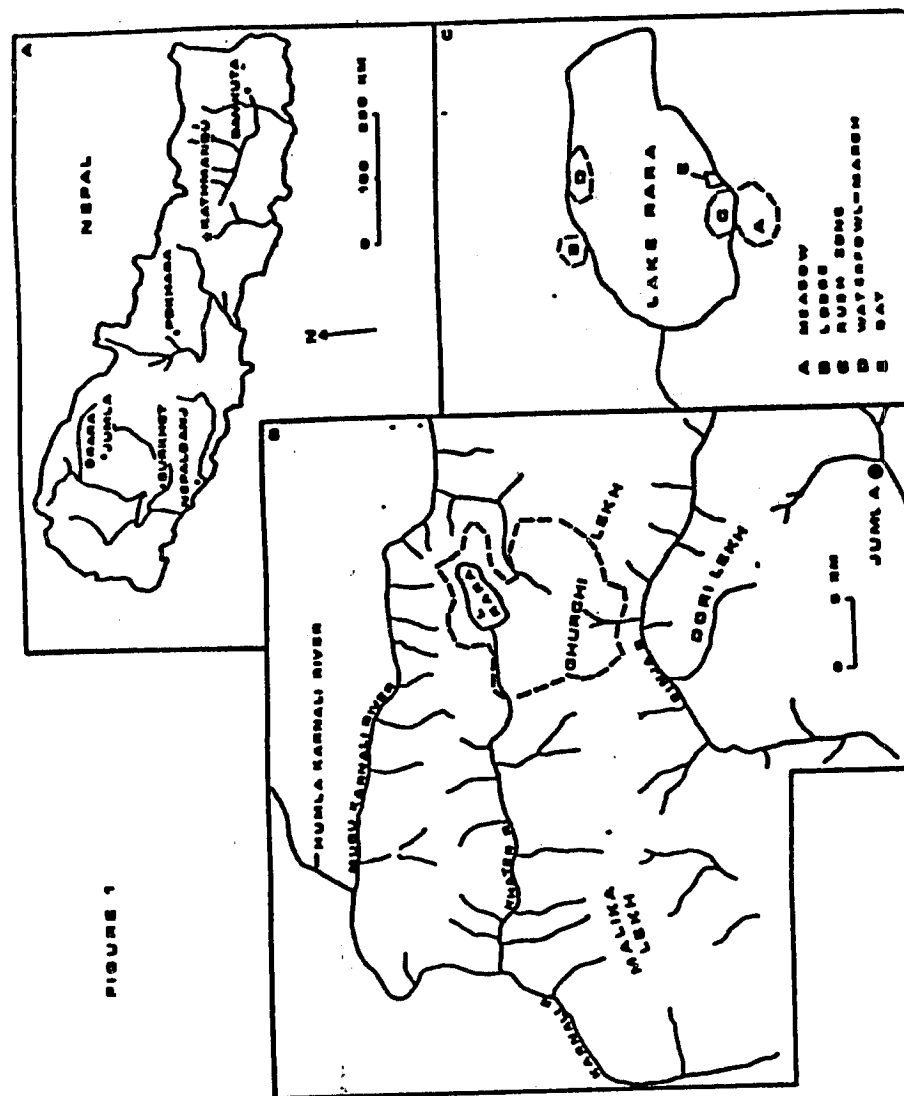


FIGURE 1

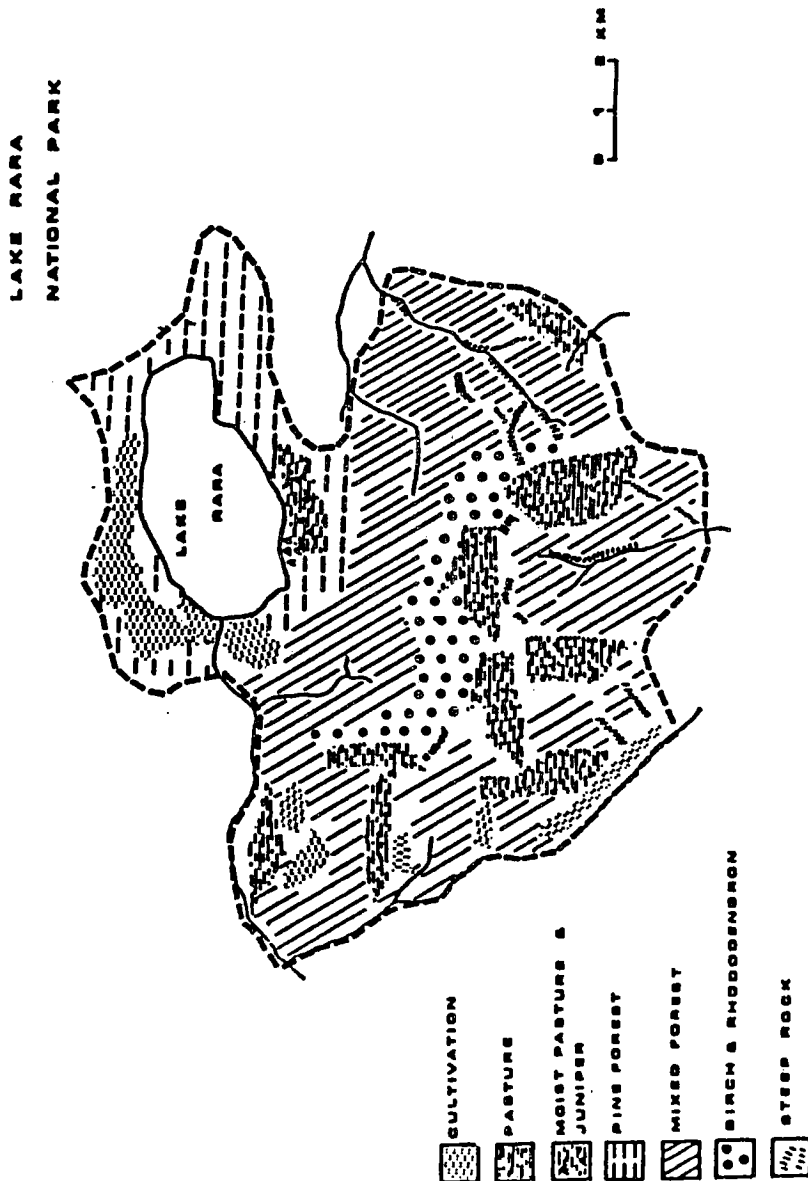
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## 1. INTRODUCTION

Lake Rara National Park is one of five national parks in Nepal and covers roughly 106 sq km (41 sq mi). The Park is located in Nepal's western belt of coniferous forest known as the "Rara-Ringmo Finger", and encompasses Lake Rara, the largest lake in Nepal with a surface area of 11 sq km (4 sq mi). The lake is 9780 ft (2983 m) above sea level and is over 60 mi (100 km) from any other sizable body of standing water. Open meadows and mixed forests in the Park support a large number of bird species. Of special note are the migrant shorebirds and waterfowl which use Lake Rara and its shores. The meadow area bordering the lake's southwestern shore is also of particular interest, especially for birds of prey. Some previous data concerning the Park have been published (e.g., Bolton 1976 and notes in Fleming 1976); but these data refer only to a few species and cover only a part of the year. A summary of the vegetation immediately surrounding the lake is provided in Figure 2. Limnological and biological data for the lake can be found in Ferro (1978/79).

Visits to Lake Rara National Park were made in: summer (June 21 to June 25) 1979, autumn (October 4 to October 22) 1982 and winter (February 27 to March 2) 1983. Summers at Lake Rara are dominated by the monsoon, with sunny periods, and heavy and light precipitation. Autumn at Rara is characterized by changeable days with sun and rain, progressively more severe frosts and some light snow on the surrounding hills. Heavy snowfalls occur during winter.

FIGURE 2



## 2. LAKE AND SHORE BIRDS

This section does not include those birds which made occasional use of the lake habitats, such as Osprey, Hobby and Pied Wagtail (see Sections 3 and 4). Where a species is marked with an asterisk, no reference has been found to its previous occurrence at Lake Rara. Areas A through E mentioned below refer to locations on the lake and are shown in Fig. 1C.

### BLACK-NECKED GREBE *Podiceps nigricollis*

Two individuals were observed in non-breeding plumage on June 25. One or two birds were present throughout October in association with Coot and Great Crested Grebes (area C). During the Feb/Mar visit, one was seen with a considerable amount of breeding plumage. Other records include: Fox (1975): 15 birds, midwinter; Fleming (1976): "a dozen pairs in February".

### GREAT CRESTED GREBE *Podiceps cristatus*

Two individuals were seen in early October (one with the remains of summer plumage), and one was present for the remainder of the month. This species was associated with Coot and Black-necked Grebes (area C). A total of 81 Great Crested Grebes was counted on February 27, 60 on February 28, and 20 on March 1. These numbers may reflect a progressive departure of birds, but visibility differences in snowy conditions could also account for this. This species was widely scattered over the lake. A few individuals were observed with some summer plumage. Other records: Fox (1975): 19 birds in midwinter; Fleming (1976): 85 birds in February.

### \* LARGE CORMORANT *Phalacrocorax carbo*

Single individuals were seen at Rara on three dates in October. This species was also recorded on the Tila and Humla Karnali rivers.

### \* EURASIAN BITTERN *Botaurus stellaris*

A migrant was seen resting at area E on the morning of October 19.

### \* GREAT WHITE EGRET *Egretta alba*

Two migrants spent a few hours at area E on the morning of October 15.

\* GREY HERON *Ardea cinerea*

A single individual was present on the north shore in February/March.

RUDDY SHELDUCK *Tadorna ferruginea*

A single migrant (without the neck-band of the breeding male) spent a short time resting on the lake on October 21 before flying off to the southwest. Bolton (1976) recorded "a few" in May.

MALLARD *Anas platyrhynchos*

Individuals were present during visits in October (with a peak of 17) and February/March (a peak of 8). Individuals were also heard on the Nisa (Khatyar) Khola, the river which flows out from the lake. Other records include: Bolton (1976): lists Mallards as a "regular winter migrant", and Fox (1975).

COMMON TEAL *Anas crecca*

There were 2 or 3 Teal at area C throughout October. The remains of one individual were found on the shore on October 17. After this time, no more than 2 individuals were seen. As many as 40 were seen in February. Other records include: Bolton (1976): lists them as a "regular winter migrant" and Fox (1975): recorded 9 in midwinter.

\* GADWALL *Anas strepera*

On March 1, 5 males and 6 females were observed with other wildfowl at area D. This is one of India's commonest wintering ducks.

WIDGEON *Anas penelope*

A pair was seen on March 1 with other wildfowl at area D. Bolton (1976) recorded 3 Widgeon in April 1976, and Ali and Ripley (1968) mention that this species is known to use high-altitude lakes in east Nepal on its northward migration in May and June.

\* PINTAIL *Anas acuta*

There were 2 to 4 individuals, and possibly as many as 20, on the lake in October. In March, 36 Pintail were recorded with other wildfowl at area D. This species is considered to be one of the most numerous ducks to cross Nepal (Fleming 1976).

RED-CRESTED POCHARD *Netta rufina*

As many as 9 birds were seen in October, and between 7 and 11 were seen in February. Fleming (1976) indicated that individuals overwinter at Lake Rara, as does Bolton (1976), with sightings in midwinter and May. Fox (1975) recorded 40 Red-crested Pochard in midwinter.

\* POCHARD *Aythya ferina*

On October 20, a single individual was seen with the Coot at area C. In March, 7 Pochard were seen with other wildfowl at area D.

\* FERRUGINOUS DUCK *Aythya nyroca*

One individual was seen on the north side of the lake on February 27.

TUFTED DUCK *Aythya fuligula*

One individual was seen regularly at area E in October until mid-month, after which up to 4 birds were present. A single individual was seen in March. Other records are: Bolton (1976) who recorded this species in winter and in May, and Fox (1975), who gives a midwinter figure of 50. Ali and Ripley (1968) mention the occurrence of this species at high-altitude lakes in east Nepal from March to May.

GOLDENEYE *Bucephala clangula*

Two females were recorded on March 1. Fleming (1976) recorded 3 individuals in February.

GOOSANDER *Mergus merganser*

A male was sighted near the north shore on February 27. Fleming (1976) noted 11 Goosander in February.

\* MOORHEN or INDIAN GALLINULE *Gallinula chloropus*

Two first year birds were present in the bay at area E throughout October. This species was very secretive.



COOT *Fulica atra*

During October, a flock of Coot increasing in number from 8 to 27 concentrated at area C along with the grebes. In March, between 150 and 200 Coot were present. Fleming (1976) gives a winter figure for Rara of 40 to 50 Coot, while Fox (1975) reported 92.

\* PHEASANT-TAILED JACANA *Hydrophasianus chirurgus*

A single individual was seen feeding at area E on October 6 and 10. This was an unusually high altitude and latitude for this species.

\* LITTLE STINT *Calidris minutus*

Two individuals were seen at area C on October 15.

\* GREEN SANDPIPER *Tringa ochropus*

One individual was seen at area C on October 18.

\* WOOD SANDPIPER *Tringa glareola*

One individual was seen at area C throughout October, accompanied by a second Wood Sandpiper on at least two dates. The remains of what was probably a third individual were found on the shore nearby.

\* COMMON SNIPE *Gallinago gallinago*

A single individual was seen at area C on October 15 and 17.

\* RED-NECKED PHALAROPE *Phalaropus lobatus*

A single individual was seen at area C on October 18. This was the first record of this species in Nepal, the bird possibly being en route to wintering grounds off the coast of India.

\* GREAT BLACK-HEADED GULL *Larus ichthyaetus*

Up to 20 were seen in October and 3 in February/March. These included adults in both breeding and non-breeding plumage, and immatures. The only gull mentioned by Fleming (1976) as being seen at Rara (and the most likely species at high altitudes in Nepal) is the Herring Gull.

*Larus argentatus*.

Bolton (1976) listed only the Black-headed Gull *Larus ridibundus* at Rara. However, neither of these species were recorded by the Saipal projects, and no gulls were recorded in June.

Bolton (1976) lists seven additional lake and lakeshore species which were not recorded during the Saipal project visits. These were:

LITTLE GREBE  
BAR-HEADED GOOSE  
SHOVELER  
GREATER SAND PLOVER  
GREENSHANK  
COMMON SANDPIPER  
GULL-BILLED TERN

*Tachybaptus ruficollis*  
*Anser indicus*  
*Anas clypeata*  
*Charadrius leschenaulti*  
*Tringa nebularia*  
*Tringa hypoleucos*  
*Gelochelidon nilotica*

### 3. OPEN MEADOW BIRDS

The open meadow area south of the west end of Lake Rara is unique to the Park and probably to the region. The meadow is rough grassland, rich in flowering plants in the summer and grades to marshland towards the lake. Juniper *Juniperus indica* and pine *Pinus excelsa* scrub invade from the surrounding forest and now threaten to diminish the extent of open meadow.

The meadow habitats have their own assemblages of wildlife. (See also MAMMALS below.) The bird species that occasionally use the meadow area, but are mainly birds of scrub and forest, are listed in Section 4. The openness of the meadow seemed to attract in particular a rich variety of birds of prey in autumn and winter. It is likely that these birds favored this area since the larks *Alauda gulgula* (and *A. arvensis*?), wagtails *Motacilla alba* and pipits *Anthus hodgsoni*, which occurred only there, provided a ready source of passerine prey. In addition, voles were extremely plentiful and accessible in the meadow habitat. (Bolton (1976) suggests the species of vole that occurs there is *Pitymys sikimensis* although *Alticola roylei* would in some respects seem more likely (see Prater 1980)). There is also evidence that the ducks and shorebirds (see above) concentrated at area C and were also preyed upon (see Teal and Wood Sandpiper in Section 2). Dragonflies were plentiful at the open lake edge and were taken by Hobbies *Falco subbuteo*.

Voles, which may be the main prey of some raptors and mammals appeared to be far more numerous in 1982 than in 1979. The density of tunnels and entrance-holes in 1982 suggested that vole numbers might have been at or near a maximum. Thus, the abundance of raptors in 1982 may have been atypically high although this does illustrate what the meadow habitats are periodically capable of supporting. (The implications of this for short-term survey work are clear, longer term studies could better determine the carrying capacity of raptors in the meadow area.) That at least some birds of prey (Goshawk *Accipiter gentilis*, Kestrel *Falco tinnunculus*) were feeding on voles was determined by observation, and by examination of bones found in pellets cast up by at least one Goshawk. Predation on voles was observed only in the open meadow area, and at least some bird species may well be dependent on this one site for their occurrence in the Park (see DISCUSSION). Table 1 (pages 14-15) summarizes the use of the meadow area by the birds of prey. The range of raptor species is impressive. Most of the birds concerned appeared to be resident throughout October, hunting the same areas day after day. Several birds were individually identifiable. Species present in the same area at the same times or presumed to be in sight of each other are summarized in Table 2 (page 16).

Six species of birds of prey, and the Crow *Corvus macrorhynchos* were observed in aggressive encounters over the southwest meadow. These encounters usually occurred in the form of short aerial chases. Figure 3 shows the number of observed incidents of aerial chases during the October stay. The most frequent encounters were between Goshawks and Eurasian Buteos *Buteo buteo* which were the only pair of species where "ambiguous dominance" was noted. These two species were defending contiguous parts of their hunting ranges. The ranges were adjacent. One or two Eurasian Buteos occurred in an area centered on the east side of the meadow that included the forest edge, and two Goshawks occurred in an area centered on the west side of the meadow. The aggressor in encounters between these two species tended to be the one in its own area. This held true for the incidents between Eurasian Buteos and Black Eagle *Ictinaetus malayensis* and between Goshawks and Hen Harrier *Circus cyaneus*. This suggests that territories may be defended outside the breeding season, and in the case of the Buteo at least, probably away from the breeding areas. This emphasizes that some of the habitats at Lake Rara may be seasonally important. The maintenance of the open meadow and lakeshore habitats should be an important management objective. Much more basic data still needs to be collected to help carry out management objectives.

TABLE 1  
SUMMARY OF HABITAT USE AND FEEDING BY  
RAPTORS IN THE SOUTHWEST MEADOW AREA

	Osprey	Black Kite	Goshawk	Sparrow Hawk
Mature Perches Mature Forest				
Scrub/Edge Perches			X	X
Juniper Trees Perches in Open			X	
Post/Rock Perch			X	
Hunting Over Lake Edge	X	X	X	
Hunting Over Meadow - Low		X	X	X
Hunting Over Meadow - High			X	
Hunting Just Over Forest				X
Hunting Over Forest - High				
Seen Taking Dragonflies			?	
Seen Taking Small Birds				
Seen Chasing Small Birds			X	
Vole Prey Identified			X	
Vole Prey Suspected				
Number of October Dates	2	8	16	1

	Buteo	Black Eagle	Hen Harrier	Hobby	Kestral
	X				
				X	
	X				X
			X		
	X		X	X	
			X	X	X
	X			X	X
	X	X		X	
	X			X	
				X	
				X	
					X
	X				
	18	1	3	13	6

TABLE 2  
SUMMARY OF JOINT OCCURRENCES OF RAPTOR  
SPECIES IN THE S. W. MEADOW AREA

	Black		Sparrow		Black		Hen		Kestrel	
	Osprey	Kite	Goshawk	Hawk	Buzzard	Eagle	Harrier	Hobby	Hobby	Kestrel
Osprey										
Black Kite			X		X			X		
Goshawk		X			X		X	X	X	X
Sparrow Hawk										
Buzzard		X	X			X	X	X	X	X
Black Eagle					X					
Hen Harrier			X		X					
Hobby		X	X		X					
Kestrel			X		X					

#### 4. SCRUB AND FOREST BIRDS

In addition to those bird species already mentioned, a number of species were recorded that were wholly or largely dependent on the scrub or forest habitats. These species are listed below.

HIMALAYAN MONAL (IMPEYAN PHEASANT)  
 KALIJ PHEASANT  
 ROCK PIGEON (BLUE ROCK PIGEON)  
 SNOW PIGEON  
 RUFOUS TURTLE DOVE  
 COMMON CUCKOO (EURASIAN CUCKOO)  
 HOOPOE  
 LARGE SCALY-BELLIED GREEN WOODPECKER  
 HIMALAYAN PIED WOODPECKER  
 OLIVE-BACKED PIPIT  
 (HODGSON'S TREE PIPIT)  
 GREY WAGTAIL  
 LONG-TAILED MINIVET  
 BROWN DIPPER  
 COMMON WREN  
 RUFOUS-BREASTED ACCENTOR  
 BLACK-THROATED ACCENTOR  
 ORANGE-FLANKED BUSH ROBIN  
 BLUE-HEADED REDSTART  
  
 BLUE-FRONTED REDSTART  
 PLUMBEOUS REDSTART  
 DARK GREY BUSH CHAT  
 BLACK THROATED THRUSH  
 (DARK THROATED THRUSH)  
 MISTLE THRUSH  
 SPOTTED FORKTAIL  
 BLYTH'S CROWNED LEAF WARBLER  
 (CROWNED LEAF WARBLER)  
 GREEN/GREENISH WARBLER  
 (DULL GREEN LEAF WARBLER)  
 ORANGE-BARRED LEAF WARBLER  
 LARGE-BILLED LEAF WARBLER  
 PALLAS' LEAF WARBLER  
 YELLOW-RUMPED LEAF WARBLER)  
 TICKELL'S LEAF WARBLER  
 GOLDCREST  
 SLATY BLUE FLYCATCHER  
 ORANGE-GORGETTED FLYCATCHER  
 YELLOW-BELLIED FANTAIL FLYCATCHER  
 SCALY-BREASTED WREN BABBLER  
 VARIEGATED LAUGHING THRUSH  
 STREAKED LAUGHING THRUSH

*Lophophorus impejanus*  
*Lophurus leucomelana*  
*Columba livia*  
*C. leuconota*  
*Streptopelia orientalis*  
*Cuculus canorus*  
*Upupa epops*  
*Picus squamatus*  
*Dendrocopos himalayensis*  
  
*Anthus hodgsoni*  
*Motacilla cinerea*  
*Pericrocotus ethologus*  
*Cinclus pallasii*  
*Troglodytes troglodytes*  
*Prunella strophliata*  
*P. atrogularis*  
*Tarsiger cyanurus*  
*Phoenicurus*  
*caeruleocephalus*  
*P. frontalis*  
*Rhyacornis fuliginosus*  
*Saxicola ferrea*  
  
*Turdus ruficollis*  
*T. viscivorous*  
*Enicurus maculatus*  
  
*Phylloscopus reguloides*  
  
*P. trochiloides (nitidus)*  
*P. pulcher*  
*P. magnirostris*  
  
*P. proregulus*  
*P. affinis*  
*Regulus regulus*  
*Ficedula tricolor*  
*F. strophliata*  
*Rhipidura hypoxantha*  
*Pnoepyga (pusilla?)*  
*Garrulax variegatus*  
*G. lineatus*

CHESTNUT-BELLIED MINLA  
 (BAR-THROATED MINLA)  
 WHITE-BROWED FULVETTA  
 (WHITE-BROWED TIT BABBLER)  
 WHITE-THROATED TIT  
 BLACK-THROATED TIT (RED HEADED TIT)  
 GREY CRESTED TIT (CRESTED BROWN TIT)  
 RUFIOUS-VENTED BLACK TIT  
 (RUFIOUS-BREASTED BLACK TIT)  
 SPOT-WINGED BLACK TIT  
 GREEN-BACKED TIT  
 EURASIAN NUTHATCH  
 BAR-TAILED TREECREEPER  
 (HIMALAYAN TREECREEPER)  
 RUSTY-FLANKED TREECREEPER  
 (NEPAL TREECREEPER)  
 GREY-BACKED SHRIKE  
 LANCEOLATED JAY (BLACK-THROATED JAY)  
 YELLOW-BILLED BLUE MAGPIE  
 EURASIAN NUTCRACKER  
 CHAFFINCH  
 BRAMBLING  
 RED-FRONTED SERIN  
 (GOLD-FRONTED FINCH)  
 YELLOW-BREASTED GREENFINCH  
 (HIMALAYAN GOLDFINCH)  
 EURASIAN GOLDFINCH  
 PLAIN MOUNTAIN FINCH  
 (HODGSON'S MOUNTAIN FINCH)  
 BEAUTIFUL ROSE FINCH  
 PINK-BROWED ROSE FINCH  
 RED-HEADED BULLFINCH  
 ROCK BUNTING

*Minla strigula*  
*Alcippe vinipectus*  
*Aegithalos niveoogularis*  
*A. concinnusir*  
*Parus dichrous*  
  
*P. rubidiventris*  
*P. melanocephalus*  
*P. monticolus*  
*Sitta europaea*  
  
*Certhia himalayana*  
  
*C. nipalensis*  
*Lanius tephronotus*  
*Garrulus lanceolatus*  
*Urocissa flavirostris*  
*Nucifraga caryocatactes*  
*Fringilla coelebs*  
*F. montifringilla*  
  
*Serinus pusillus*  
  
*Carduelis spinoides*  
*C. carduelis*  
  
*Leucosticte nemoricola*  
*Carpodacus pulcherrimus*  
*C. rhodochrous*  
*Pyrrhula erythrocephala*  
*Emberiza cia*

## 5. MAMMALS

In general, little time was spent searching for mammals, and relatively few species were seen. Winter was the best season for observing mammals for the following reasons:

- (i) mammals are much more easily seen due to the reduced foliage in deciduous forests and in grassland;
- (ii) harsh weather conditions give rise to more daytime feeding in species otherwise less active during daylight;
- (iii) harsh and changeable weather (e.g., sudden snow falls at higher altitudes) forces movements of mammals (e.g., down river valleys) and increases the chances of sightings;
- (iv) snow cover increases the chances of finding tracks.

The following mammal species were recorded in Lake Rara National Park:

### COMMON LANGUR *Presbytis entellus*

Two individuals were seen on one date in October. This species was recorded by Bolton (1976): "probably a small resident population".

### JUNGLE CAT *Felis chaus*

One individual was seen in early October and walked unconcernedly along the trail past the camp in the early morning. This confirms the occurrence in the Park of this species, which Bolton (1976) recorded as probably present.

### JACKAL *Canis aureus*

One or two individuals were commonly seen hunting in more open areas in October and February, especially around the "airstrip". They were feeding possibly on voles, which may account for jackals being aggressively mobbed more than once by Goshawks. Jackals were seen hunting at all times of the day, but most often at dawn and dusk. Small shingle-mounds, topped by droppings were constructed on the lakeshore in October. This species was also recorded by Bolton (1976).

## 6. DISCUSSION

### RED FOX *Vulpes vulpes*

One male was heard barking at night in June and there was one unconfirmed sighting in the same month. Bolton (1976) lists the Indian Fox *V. bengalensis* as possibly present, but this latter species would seem less likely than *V. vulpes* at these altitudes (Prater 1980).

### RED PANDA *Ailurus fulgens*

One individual was seen on the south shore of the lake on October 14. This confirms the presence of this species which Bolton (1976) noted as probably present.

### YELLOW-THROATED MARTEN *Martes flavigula*

Pairs were seen searching for voles close to the forest edge on three October dates. Bolton (1976) lists this species as a resident.

### FLYING SQUIRREL *Petaurista sp.*

One was recorded in April just outside the National Park boundary at the top of the Chautha Khola gorge. This species was recorded in the Park by Bolton (1976). The Common Giant Flying Squirrel *P. petaurista* is the most likely species.

### VOLE *Microtus sp.*

See under OPEN MEADOW BIRDS above for species names and other comments. These extremely abundant animals were also recorded by Bolton (1976) and were quite often seen active in daytime, especially after heavy rain or snow and in severe cold. They are very likely to be an important element in the diet of many of the Park's predators.

### WILD BOAR *Sus scrofa*

Recorded on several dates in October. This species occurred in mixed groups (males, females and young) of up to 24. Boars were shy and disturbed by human intrusion. They engaged in very extensive working-over of surface soil by digging (for tubers?) in scrub and forest-edge areas, causing a physical impact which is probably significant in the annual soil and vegetation cycles. This species was also recorded by Bolton (1976).

The basis for the management objectives for the Rara National Park described in the first Park Management Plan (Bolton 1976) are the preservation of the ecological integrity of the lake, maintenance of the natural diversity of habitats and vegetation, and conservation (or where applicable enhancement) of wildlife populations. Secondary objectives include research (e.g., surveys of plant and animal species) and the exploitation of the educational and recreational potentials of the Park. The continued existence of human settlements was considered incompatible with these aims, and accordingly the inhabitants of Rara and Chhapru villages were evacuated to the terai, or southern lowlands of Nepal. Since this evacuation, habitat changes have resulted which should be included in the management objectives. In response to increasing tourism pressure in other parts of Nepal, provisions are presently being made for a substantial increase in the number of visitors who will be encouraged to visit Rara, and who will be accommodated at a residential lodge on the north shore. If this development is to avoid the conflict with conservation purposes which was originally feared from the presence of a resident population, very careful planning and a sound information base will be required.

The presence of man in low numbers at Rara has helped to shape habitats available to wildlife. Seed-bearing plants and berry-bearing bushes in the terraced fields around the two village areas provide abundant food for finches and thrushes while open meadows, formerly maintained by grazing, constitute a habitat of special botanical richness, and one of importance for a number of mammals and birds. Following the evacuation of the Park however, cultivated fields are reverting to scrub, and the grazing-meadows are being invaded by juniper and pine. This was recognized in the first Management Plan, which also emphasized that the grazing influence could not be replaced by a burning regime. It was thought that an increase in wild ungulate populations might reintroduce a measure of natural grazing, but this will depend on disturbance being kept to a minimum. The disturbance caused in 1982 to both mammals and birds by the arrival of a limnological expedition was quite considerable, and the possible effects of a regular tourist presence should not be underestimated.

The Management Plan statement (Bolton 1976 p30) that "the encroachment of forest on to the meadow south of the lake would represent no real loss to the Park" may illustrate the difficulties inherent in formulating plans on less than year-round data. The information provided in the foregoing pages (on, for example, the seasonal importance of the area to raptors) suggests that the loss of this meadow would be likely

to constitute a loss to the value of the Park. There is also an amenity aspect, in that during the monsoon flowering season, strikingly colorful expanses of flowers such as *Polygonum imilletii*, *Oxygraphis polypetala* and *Ranunculus* sp. make this one of the most scenically attractive areas. So, while the marshiest parts of the meadow are developing some peat deposits and may be seasonally too wet to support encroaching forests, the rest may be regarded as under threat, worth safeguarding, and therefore in need of protective management.

An increase in the visitor pressure at Rara will necessitate a range of measures to minimize environmental impacts. Until now the area's remoteness has "served to protect... some of Nepal's greatest assets" simply by remaining "relatively undisturbed because access is difficult" (Jackson 1983). As access improves, disturbance will increase. For example, small numbers of visitors during the period covered by this study deterred wild boar and migrant shorebirds, while attracting Black Kites, Nutcrackers and Jungle Crows all within a few hours.

The Park boundary, fortunately, encompasses the entire catchment of the lake basin. Nothing flows into the Park from outside. This assists the primary management aim of preserving the unspoilt nature of the lake, which is classically oligotrophic. It would appear, however, that untreated wastes from the new accommodation facilities on the north shore may drain directly into the lake waters, which could cause irrevocable harm through eutrophication. (Sewage from the two former villages was not piped and would not have reached the lake.) If this serious new threat is to be avoided, alternative waste treatment provisions will be required.

There is still a need for much basic biological survey work and inventories of species occurring in the Park. Further documentation of the bird species utilizing the lake in months for which there is as yet poor coverage (e.g., during spring and autumn passage) will be especially useful and, in this respect, it is worth mentioning the relative ease with which "complete counts" for the whole lake may be obtained. Although migration across the Nepal Himalaya tends to occur on a broad front, there is unlikely to be any other single high-altitude site in the west of the country which is of equivalent importance as a staging-post for wetland birds. Botanical surveys will involve research during the monsoon while winter may be the best time for recording mammals. Future work in the Park might address the promising educational potential which lake birds and other wildlife can provide, and this aspect could be enhanced if funds were available for providing binoculars and interpretative material for visitors, posters aimed at local people.

## 7. CONCLUSIONS

In future phases of refining and implementing the management prescriptions for the Lake Rara National Park, survey work will identify the different "elements" which should be considered. These may include habitat units (e.g., the open meadow), biotic communities (e.g., the vole population), and man-induced processes (e.g., disturbance, eutrophication, scrub encroachment). Each of these can be evaluated in terms such as action priority, susceptibility to change, prescribed limits on management aims at an early stage in data-collection. (See Wood and Warren 1978.) These "elements" provide a framework on which a more detailed database can be built.

This elemental approach to management-oriented information-collection minimizes the problems of incompatibility often experienced by "expedition-type" survey projects. Much of the data required at Rara is observational and descriptive. It is, for instance, pointless to speculate on the influence of fluctuating vole populations on birds of prey until it is known which raptor species actually prey on the voles.

Two priority issues are suggested:

1. The open meadow area to the south of the lake is of special interest but under threat and should be conserved by management of the forest which is encroaching upon it;
2. Provision should be made for strictly controlling disturbance to wildlife and pollution of the lake, both of which are threatened consequences of a rise in tourism.

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