

## DISTRIBUTION AND STATUS OF MAMMALS, BIRDS AND REPTILES OF SURJAN AND SUMBAK GAME RESERVES, KHIRTHAR PROTECTED AREA

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### ABSTRACT

The present study was undertaken from 2014 to 2017 to document the distribution and population status of mammals, birds and reptiles. Point Count, Roadside Count, Line Transect and Pellet Count Methods were used. Sixteen species of Mammals, 69 species of Birds and 17 species of Reptiles were recorded from Surjan, while 17 species of Mammals, 54 species of Birds and 19 species of Reptiles were recorded from Sumbak. The Threatened / Near threatened species recorded from the area included Honey Badger recorded as Critically Endangered, Urial, Egyptian Vulture as Endangered, Chinkara and Imperial Eagle as Vulnerable, while Sind Ibex and Lagger Falcon recorded as Near Threatened. The area provides favorable habitats for a variety of bird species such as Game birds, Passerines and birds of Prey. No serious threats to the species were noted in most of the area.

**Key words:** Protected Area, Game Reserves, New records, Significant habitats, Threatened species,

### INTRODUCTION

Presently, Pakistan has 349 Protected Areas including 26 National Parks, 91 Wildlife Sanctuaries, 116 Game Reserves, and 116 Community Conservation Areas (Ghalib *et al.*, 2013; Khan, 2020). Khirthar Protected Area Complex (KPAC) has four Game Reserves including Surjan Game Reserve.

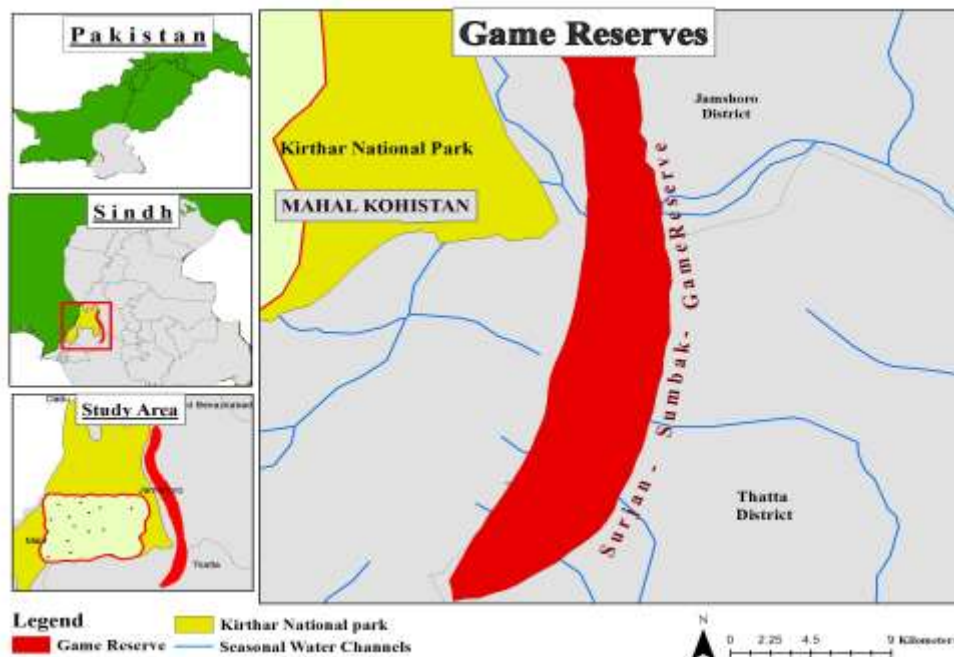


Fig. 1. Map of Game Reserves.

Concentrated level of population size of Sind Ibex were found in Surjan Game Reserve specifically at the area of Nimwari because presence of water points for wild animals and a rich grazing area. Population of Chinkara is also high at that area. A road crossing through this area resulted in the damaging the normal habitat of Surjan Game Reserve (Fig. 1).

Sumbak Game Reserve has good habitat for Sind Ibex, and also flat plains area for Chinkara. There is no disturbance to the animals. Rocky slopes of the hills and mountains, consisting of limestone or other sedimentary rock substrate, with little soil and often with loose stones on the surface and scattered plant cover of *Acacia senegal* and associated species.

The first Management Plan of the KNP was prepared in 1973, while another study conducted by the Sindh Wildlife Department and the University of Melbourne, Australia (Enright and Miller, 2000), and detailed report on the Wildlife of the area was prepared (Morgan and Harrington, 2001).

No scientific published literature available about the current status of Surjan and Sumbak areas. The present study was to update the scientific data of population of mammals, birds and reptiles with distribution of Surjan and Sumbak Game Reserves of Khirthar Protected Area Complex.

## **MATERIALS AND METHODS**

Based on baseline surveys, eight habitat types were identified for the present study. Stony Ground/ Rocky Area, Mountain Ridges and Ravines, Mountain Escarpment, Sandy Plains, Riparian Areas, Villages, Agriculture and Wetlands areas and Wasteland.

Dependable methods and surveys techniques were employed for the observation and documentation of biodiversity of the area from 2014 to 2017. The mammals were identified by using the field guide such as Roberts (2005a and 2005b).

### **Field Observations of Large Mammals**

Field observations were made using Olympus spotting scope 60 x 60 and binoculars 10 x 50. During the field surveys animals were watched in the early morning and late afternoon along ridges and ravines. Point Surveys and Line transects techniques were also used.

### **Roadside Counts**

Survey method was used to observe the population status of Foxes, Jackals, Wildcats and Mongooses (Brower *et al.*, 1990). We used four wheeler vehicle for roadside counts.

### **Small Mammals**

Active searching is the most important tool of survey for small mammals for both diurnal and nocturnal species. This survey techniques covers most of the variety of habitats including Canal areas, Barren lands, forested habitat, croplands and grasslands. This technique is also very helpful to observe the population of Gerbils.

### **Birds**

The birds were identified by using spotting scopes and binoculars and making use of the field guides such as Grimmett (1998, 2008), Mirza (2007), Snobe and Usni (1993) and Roberts (1991, 1992). Different types of habitats were surveyed to study the population of birds included ponds, marshes, croplands, human population areas and grass lands.

Some common techniques were used to study the population of birds included:

#### **Transect Method:**

Two different categories of Transect method were used to observe different populations of wild species included Line Transect and Point Transect.

#### **Line Transect method**

This type of Transect can be done by moving through a vehicle to a pre defined route and by observing the species of birds during that transect. Different field guides, binoculars and other devices were used for birds identification.

#### **Point count method**

This type of transect can be done by selection of some fixed points and the observation of different species of birds by watching them through those selected points. Different species of birds were observed included passerines through this type of transect.

### **Reptiles**

Population survey of reptiles can be done through many different survey techniques. Some reptiles are diurnal while others are nocturnal. Their surveys also vary according to different seasonal variations like Skink and lizards found during day time while Geckos and snakes show their activities during the night time.

Various methods or survey techniques have been employed for the observation of reptiles. For the identification of reptiles, Minton (1966) was used. Reptiles seem to be very active after dusk during the summer season. Skinks and Lizards are diurnal in activity and seen most active during mid-morning. Certain geckos and snakes are active mostly at night. The one hour Plot Searching, night observations and turning of stones techniques were employed for collection of data regarding the occurrence and distribution of reptiles.

#### **A: Direct Counting:**

In this method an area of 20 hectares were selected and number of species of reptiles were observed and recorded in this area in a given period of time.

#### **Night Observations**

Transect Method was applied to record Lizards and Snakes with portable spotlight within transects of suitable length.

#### **Turning of Stones**

Stone hiding behavior is the important habit of reptiles; they hide themselves under big rocks and stones. To observe them the turning of rocks method is more successful to locate them in the hiding shelters.

Reptiles take shelter or hide themselves under the stones or rocks. In the day time surveys, stones or rotten fallen trees were turned over to record the presence of reptiles, if any.

#### **Indirect Evidences**

Evidences of finger or footprints, fecal pellets, tracks, burrows and tunnels were also collected to record the presence of various species.

#### **Status of the various species**

Different scales to record the population status of mammals, birds and reptiles each were framed indicating their status as Common, Less Common, Scarce and Rare, as given below (Table 1).

Table 1. Scale for mammals, birds and reptiles population status.

Mammals		Birds		Reptiles	
Rare	1 - 5	Rare	1 - 3	Rare	1 - 3
Scarce	6 - 10	Scarce	4 - 6	Scarce	4 - 6
Less Common	11 - 15	Less Common	7 - 10	Less Common	7 - 9
Common	Above - 16	Common	Above - 11	Common	Above - 10

## **RESULTS AND DISCUSSION**

Based on present study results population status of mammals, Sind Ibex, Urial and Squirrel were recorded as Common. Desert Hedgehog, Indian Hedgehog, Indian fox, Grey Mongoose, House Mouse, Balochistan Gerbil, were recorded as Less Common during the present study from Surjan.

In the Surjan Game Reserve a total 16 species of mammals were recorded belonging to 5 orders and 10 families. 10 species viz. Longeared Desert Hedgehog, Indian Hedgehog, Red fox, Grey Mongoose, Urial, Indian Hare, Five Striped Palm Squirrel, Indian Porcupine, House mouse, Balochistan Gerbil were not recorded in the previous study undertaken in the year 2010 -2011 (Khan *et al.*, 2013). While in the present study, we recorded these species. Further, two species viz. Hyaena and Caracal were not recorded during the present study, while these species were reported by Khan *et al.* (2013).

Sind Ibex, Urial and Chinkara were recorded as Common during the present study period. As regards their population status of mammals, Sind Ibex, Urial and Chinkara were recorded as Common. Desert Cat was recorded as scarce from Sumbak.

A total 18 species of mammals were recorded belonging to 5 orders and 10 families from Sumbak. Twelve species viz. Longeared Desert Hedgehog, Indian Hedgehog, Red fox, Grey Mongoose, Small Indian Mongoose, Urial, Indian Hare, Five Striped Palm Squirrel, Indian Porcupine, Roof Rat, House mouse, Balochistan Gerbil were not recorded in the previous study undertaken in 2010 -2011 (Khan *et al.*, 2013). While in the present study, we

recorded all these species. Further, two species viz. Hyaena and Caracal were not recorded during the present study, while in the year 2010 -2011 these species were recorded in Sumbak (Table 2).

Table 2. Consolidated mammal list recorded from Surjan and Sumbak Game Reserves during 2014 – 2017.

Order	Family	Scientific Name	Common Name	Surjan	Seasonal Status	Sumbak	Seasonal Status
Insectivora	Erinaceidae	<i>Hemiechinus collaris</i>	Longeared Desert Hedgehog	+	Less Common	+	Common
Insectivora	Erinaceidae	<i>Paraechinus micropus</i>	Indian Hedgehog	+	Less Common	+	Less Common
Carnivora	Canidae	<i>Canis aureus</i>	Asiatic Jackal	+	Common	+	Less Common
Carnivora	Canidae	<i>Vulpes bengalensis</i>	Indian Fox	+	Less Common	+	Less Common
Carnivora	Canidae	<i>Vulpes vulpes</i>	Red fox	+	Common	+	Common
Carnivora	Mustellidae	<i>Mellivora capensis</i>	Honey Badger	+	Scarce	+	Rare
Carnivora	Herpestidae	<i>Herpestes edwardsi</i>	Grey Mongoose	+	Less Common	+	Less Common
Carnivora	Herpestidae	<i>Herpestes javanicus</i>	Small Indian Mongoose	–	–	+	Less Common
Carnivora	Felidae	<i>Felis silvestris</i>	Desert Cat	+	Ra	+	Scarce
Artiodactyla	Bovidae	<i>Capra aegagrus</i>	Sind Ibex	+	Common	+	Common
Artiodactyla	Bovidae	<i>Ovis vignei</i>	Urial	+	Common	+	Common
Artiodactyl a	Bovidae	<i>Gazella bennettii</i>	Chinkara	+	Common	+	Common
Lagomropha	Leporidae	<i>Lepus nigricollis</i>	Indian Hare	+	Less Common	+	Less Common
Rodentia	Sciuridae	<i>Funambulus pennantii</i>	Five Striped Palm Squirrel	+	Common	+	Common
Rodentia	Hystriidae	<i>Hystrix indica</i>	Indian Porcupine	+	Scarce	+	Less Common
Rodentia	Muridae	<i>Rattus rattus</i>	Roof Rat	–	–	+	Scarce
Rodentia	Muridae	<i>Mus musculus</i>	House mouse	+	Less Common	+	Less Common
Rodentia	Muridae	<i>Gerbillus nanus</i>	Balochistan Gerbil	+	Less Common	+	Less Common

Surjan has high population of Sind Ibex potentially in Nim Wari, due to the presence of two water ponds and a high-quality grazing ground. It also has dynamic plain area for Chinkara.

Sumbak has sufficient ground for Sind Ibex and also flat plains area for Chinkara. There is no disturbance to the animals. Rocky slopes of the hills and mountains, consisting of limestone or other sedimentary rock substrate, with little soil and often with loose stones on the surface and scattered plant cover of *Acacia senegal* and associated species.

As regards of population status of birds , Black Kite, Blue Rock Pigeon, Ring Dove, Little Brown Senegal Dove, White breasted Kingfisher, Sind Small Green Bee-eater, Crested Lark, Grey throated Indian Sand Martin, Black Drongo, Bank Myna, Indian Myna, Sind House Crow, Common Babbler, House Sparrow were recorded as common. Red Turtle Dove and Baybacked Shrike were recorded as Less Common. Egyptian Vulture and Lagger Falcon were recorded as Rare from Surjan Game Reserve.

A total 69 species of birds were recorded belonging to 10 orders and 27 families in Surjan. Out of the 19 species of birds recorded earlier by the team of University of Melbourne (University of Melbourne, 2000 unpublished report), 8 species of birds were not observed during the present study, viz. Common Crane, Yellow-wattled Lapwing , Red - wattled Lapwing , Small Minivet, Black Redstart, Variable Wheatear, Lesser Whitethroat, Tawny Pipit and Plain Munia.

As regards the seasonal status of Birds observed during the study, 51 Resident species, 10 Winter visitors, one Winter visitor / Resident, one Summer Breeding Visitors / Passage Migrant, one Double Passage Migrant and five Passage Migrants.

As regards the population status of birds, Blue Rock Pigeon, Ring Dove, Red Turtle Dove, Little Brown, Sind Small Green Bee-eater, Crested Lark, Black Drongo, Rosy Starling Pastor, Indian Myna, Sind House Crow, White-cheeked Bulbul, Common Babbler, Indian Robin and House Sparrow were recorded as Common, while Grey Partridge was recorded as Less Common and Imperial Eagle as Rare from Sumbak Game Reserve.

A total 54 species of birds were recorded belonging to 10 orders and 25 families in Sumbak during 2014 - 2017. Out of the 19 species of Birds recorded earlier by the team of University of Melbourne (University of Melbourne, 2000 unpublished report), 11 species of birds were not observed during the present study, viz. Common Crane, Yellow-wattled Lapwing, Red -wattled Lapwing, Egyptain Vulture, Small Minivet, Black Redstart, Variable Wheatear, Lesser Whitethroat, Purple Sunbird, Tawny Pipit, and Plain Munia (Table 3).

Table 3. Consolidated bird list recorded from Surjan and Sumbak Game Reserves during 2014 - 2017.

Order	Family	Scientific Name	Common Name	Seasonal Status	Surjan	Population Status	Sumbak	Population Status
Accipitriformes	Accipitridae	<i>Milvus migrans</i>	Black Kite	R	+	Common	+	Common
Accipitriformes	Accipitridae	<i>Accipiter badius</i>	Shikra	R	+	Scarce	+	Scarce
Accipitriformes	Accipitridae	<i>Accipiter nisus</i>	Asiatic Sparrow-Hawk	WV	-	-	+	Scarce
Accipitriformes	Accipitridae	<i>Buteo rufinus</i>	Long Legged Buzzard	WV	+	Scarce	-	-
Accipitriformes	Accipitridae	<i>Buteo buteo</i>	Common Buzzard	WV	-	-	+	Scarce
Accipitriformes	Accipitridae	<i>Butastur teesa</i>	White-eyed Buzzard	R	+	Scarce	+	Scarce
Accipitriformes	Accipitridae	<i>Hieraatus fasciatus</i>	Bonelli's Slender Hawk Eagle	R	+	Rare	-	-
Accipitriformes	Accipitridae	<i>Aquila heliaca</i>	Imperial Eagle	WV	+	Rare	+	Rare
Accipitriformes	Accipitridae	<i>Aquila rapax</i>	Tawny Eagle	R	+	Rare	-	-
Accipitriformes	Accipitridae	<i>Neophron percnopterus</i>	Egyptian Vulture	R	+	Rare	-	-
Accipitriformes	Accipitridae	<i>Circaetus gallicus</i>	Short-toed Eagle	R	+	Scarce	+	Scarce
Falconiformes	Falconidae	<i>Falco jugger</i>	Lagger Falcon	R	+	Rare	+	Rare
Falconiformes	Falconidae	<i>Falco peregrinus</i>	Peregrine Falcon	WV	+	Rare	-	-
Falconiformes	Falconidae	<i>Falco tinnunculus</i>	Common Kestrel	WV/r	+	Scarce	+	Scarce
Galliformes	Phasianidae	<i>Ammoperdix griseogularis</i>	See-see Partridge	R	+	Less Common	+	Less Common
Galliformes	Phasianidae	<i>Francolinus pondicerianus</i>	Grey Partridge	R	+	Less Common	+	Less Common
Galliformes	Phasianidae	<i>Conturnix conturnix</i>	Grey Quail	M/PM	+	Scarce	+	Scarce
Columbiformes	Pteroclididae	<i>Pterocles exustus</i>	Chestnut Indian Sandgrouse	R	+	Less Common	+	Scarce
Columbiformes	Columbidae	<i>Columba livia</i>	Blue Rock Pigeon	R	+	Common	+	Common
Columbiformes	Columbidae	<i>Streptopelia decaocto</i>	Ring Dove	R	+	Common	+	Common
Columbiformes	Columbidae	<i>Streptopelia tranquebarica</i>	Red Turtle Dove	R	+	Less Common	+	Common
Columbiformes	Columbidae	<i>Streptopelia senegalensis</i>	Little Brown Senegal Dove	R	+	Common	+	Common
Psittaciformes	Psittacidae	<i>Psittacula krameri</i>	Rose ringed Parakeet	R	+	Rare	-	-
Strigiformes	Strigidae	<i>Athene brama</i>	Spotted Owllet	R	+	Scarce	+	Scarce
Strigiformes	Strigidae	<i>Asio otus</i>	Longeared Owl	WV	+	Rare	+	Scarce
Caprimulgiformes	Caprimulgidae	<i>Caprimulgus mahrattensis</i>	Syke's Sind Nightjar	R	+	Scarce	+	Scarce

Apodiiformes	Apodidae	<i>Apus affinis</i>	House Swift	R	+	Scarce	+	Scarce
Coraciiformes	Alcedinidae	<i>Ceryle rudis</i>	Indian Pied Kingfisher	R	+	Scarce	+	Rare
Coraciiformes	Alcedinidae	<i>Halcyon smyrensis</i>	White breasted Kingfisher	R	+	Scarce	+	Scarce
Coraciiformes	Meropidae	<i>Merops superciliosus</i>	Blue cheeked Bee-eater	SBV/PM	+	Scarce	+	Scarce
Coraciiformes	Meropidae	<i>Merops orientalis</i>	Sind Small Green Bee-eater	R	+	Common	+	Common
Coraciiformes	Coraciidae	<i>Coracias benghalensis</i>	Roller Blue Jay	R	+	Less Common	+	Less Common
Coraciiformes	Upupidae	<i>Upupa epops</i>	Hoopoe	WV	+	Less Common	+	Scarce
Piciformes	Picidae	<i>Picoides assimilis</i>	Sind Woodpecker	R	-	-	+	Scarce
Passeriformes	Alaudidae	<i>Eremopterix grisea</i>	Ashycrowned Finch-Lark	R	+	Scarce	+	Rare
Passeriformes	Alaudidae	<i>Eremopterix nigriceps</i>	Blackcrowked Finch-Lark	R	+	Less Common	+	Less Common
Passeriformes	Alaudidae	<i>Ammomanes deserti</i>	Indian Desert Finch-Lark	R	+	Less Common	+	Less Common
Passeriformes	Alaudidae	<i>Alaemon alaudipes</i>	Greater Hoopoe Lark	R	+	Scarce	+	Scarce
Passeriformes	Alaudidae	<i>Galerida cristata</i>	Crested Lark	R	+	Common	+	Common
Passeriformes	Hirundinidae	<i>Mirafra erythroptera</i>	Indian Bush Lark	R	+	Scarce	+	Less Common
Passeriformes	Hirundinidae	<i>Alauda arvensis</i>	Common Skylark	WV	+	Scarce	-	-
Passeriformes	Hirundinidae	<i>Riparia paludicola</i>	Grey throated Indian Sand Martin	R	+	Less Common	+	Common
Passeriformes	Hirundinidae	<i>Hirundo rustica</i>	Common Swallow	WV	+	Scarce	-	-
Passeriformes	Laniidae	<i>Lanius isabellinus</i>	Rufous-tailed Isabelline Shrike	WV	+	Scarce	-	-
Passeriformes	Laniidae	<i>Lanius excubitor</i>	Grey Shrike	R	+	Common	+	Less Common
Passeriformes	Laniidae	<i>Lanius vittatus</i>	Baybacked Shrike	R	+	Less Common	-	-
Passeriformes	Laniidae	<i>Lanius schach</i>	Rufous-backed Shrike	R	+	Scarce	+	Scarce
Passeriformes	Dicruridae	<i>Dicrurus adsimilis</i>	Black Drongo	R	+	Common	+	Common
Passeriformes	Sturnidae	<i>Sturnus roseus</i>	Rosy Starling Pastor	DPM	+	Scarce	+	Scarce
Passeriformes	Sturnidae	<i>Acridotheres ginginianus</i>	Bank Myna	R	+	Common	-	-
Passeriformes	Sturnidae	<i>Acridotheres tristis</i>	Indian Myna	R	+	Common	+	Common
Passeriformes	Corvidae	<i>Dendrocitta vagabunda</i>	Tree Pie	R	+	Scarce	-	-
Passeriformes	Corvidae	<i>Corvus splendens</i>	Sind House Crow	R	+	Common	+	Common
Passeriformes	Corvidae	<i>Corvus corax</i>	Common Raven	R	+	Scarce	-	-
Passeriformes	Pyconotidae	<i>Pycnonotus leucogenys</i>	White-cheeked Bulbul	R	+	Common	+	Common
Passeriformes	Pyconotidae	<i>Pycnonotus cafer</i>	Red-vented Bulbul	R	+	Scarce	-	-
Passeriformes	Timaliidae	<i>Turdoides caudatus</i>	Common Babbler	R	+	Common	+	Common
Passeriformes	Timaliidae	<i>Turdoides striatus</i>	Sind Jungle Babbler	R	+	Scarce	+	Less Common
Passeriformes	Sylviidae	<i>Prinia gracilis</i>	Indian Long tailed Warbler	R	+	Scarce	+	Less Common

Passeriformes	Sylviidae	<i>Prinia burnesii</i>	Long tailed Grass Warbler	R	+	Scarce	+	Less Common
Passeriformes	Sylviidae	<i>Sylvia communis</i>	Common White throat	M	+	Less Common	+	Scarce
Passeriformes	Sylviidae	<i>Phylloscopus collybita</i>	Chiff chaff	WV	+	Less Common	+	Scarce
Passeriformes	Turdidae	<i>Cercotrichas alacototes</i>	Rufous tailed Scrub Robin	PM	+	Scarce	-	-
Passeriformes	Turdidae	<i>Saxicoloides fulvicata</i>	Indian Robin	R	+	Less Common	+	Less Common
Passeriformes	Motacillidae	<i>Anthus similis</i>	Long billed Rock Pipit	R	+	Scarce	-	-
Passeriformes	Motacillidae	<i>Motacilla flava</i>	Yellow Citrine Wagtail	PM	+	Less Common	+	Less Common
Passeriformes	Motacillidae	<i>Motacilla alba</i>	White Pied Wagtail	WV	+	Less Common	+	Less Common
Passeriformes	Nectariniidae	<i>Nectarinia asiatica</i>	Purple Sunbird	R	+	Scarce	-	-
Passeriformes	Passeridae	<i>Passer domesticus</i>	House Sparrow	R	+	Common	+	Common
Passeriformes	Passeridae	<i>Passer pyrrhonotus</i>	Sind Jungle Sparrow	R	+	Less Common	+	Scarce
Passeriformes	Turdidae	<i>Saxicola caprata</i>	Pied Bush Chat	R	-	-	+	Less Common
Passeriformes	Emberizidae	<i>Emberiza melanocephala</i>	Blackheaded Bunting	PM	+	Scarce	-	-
Passeriformes	Emberizidae	<i>Emberiza striolata</i>	Striped House Bunting	R	+	Scarce	-	-

## Seasonal Status

R - Resident; WV/ r - Winter Visitor/ Resident; SBV/ PM - Summer Breeder Visitor/ Passage Migrant

DPM - Double Passage Migrant; PM/ WV - Passage Migrant/ Winter Visitor; PM - Passage Migrant

In this study, there are new records of occurrence of 59 species of birds in the Surjan and 46 species in the Sumbak Game Reserve areas (Table 4).

As regards the population status of reptiles, Brilliant Agama, Red - throated Agama, Indian Fat-tailed Gecko, Warty Rock Gecko, Blotched House Gecko, Flat-tail Gecko, Cliff Racer, Sindh Ribbon Snake and Black Cobra were recorded as Rare species from Surjan Game Reserve.

A total 17 species of Reptiles were recorded belonging to one order and eight families in Surjan. Earlier, 39 species of Reptiles were recorded (University of Melbourne, 2000 unpublished report), while in the present study, 22 species viz. Afghan Agama, Persian Spider Gecko, Keeled Rock Gecko, Sind Yellow tailed Sand Gecko, Spotted Indian House Gecko, Persian House Gecko, Persian Banded Sind Dwarf Gecko, Indian Fringe-toed Lizard, Punjab Snake, Orange tail Skink, Indian Sand Swimmer, Indian Spiny tailed Lizard, Brahminy Blind Snake, Slender Blind Snake, Common Sand Boa, Glossy bellied Racer, Indian Sand Snake, Blotched Diadem Snake, Common Krait, Tree bark Gecko, Yellow- bellied Mole Skink and Indian Monitor were not recorded from Surjan.

As regards the population status of reptiles, the species were recorded having different status in whole study period, recorded from Sumbak Game Reserve.

A total 19 species of Reptiles were recorded belonging to one order and nine families in Sumbak during 2014 - 2017. Earlier, 39 species of Reptiles recorded (University of Melbourne, 2000 unpublished report), while in this study, 20 species viz. Afghan Agama, Red- throated Agama, Persian Spider Gecko, Keeled Rock Gecko, Sind Yellow tailed Sand Gecko, Persian House Gecko, Persian Banded Dwarf Gecko, Indian Fringe-toed Lizard, Punjab Snake, Orange tail Skink, Indian Sand Swimmer, Indian Spiny tailed Lizard, Slender Blind Snake, Common Sand Boa, Glossy bellied Racer, Indian Sand Snake, Common Krait, Tree bark Gecko, Yellow- bellied Mole Skink, and Indian Monitor were not recorded from Sumbak (Table 5).

Table 4. Surjan and Sumbak Game Reserves, new record of bird species during 2014 - 2017.

Scientific Name	Common Name	Surjan	Sumbak	Seasonal Status
<i>Milvus migrans</i>	Black Kite	+	+	R
<i>Accipiter nisus</i>	Asiatic Sparrow-Hawk	-	+	WV
<i>Buteo buteo</i>	Common Buzzard	-	+	WV
<i>Buteo rufinus</i>	Long Legged Buzzard	+	-	WV
<i>Butastur teesa</i>	White-eyed Buzzard Eagle	+	+	R
<i>Hieraatus fasciatus</i>	Bonelli's Slender Hawk Eagle	+	-	R
<i>Aquila heliaca</i>	Imperial Eagle	+	+	WV
<i>Aquila rapax</i>	Tawny Eagle	+	-	R
<i>Circaetus gallicus</i>	Short-toed Eagle	+	+	R
<i>Falco jugger</i>	Lagger Falcon	+	+	R
<i>Falco peregrinus</i>	Peregrine Falcon	+	-	WV
<i>Falco tinnunculus</i>	Common Kestrel	+	+	WV/r
<i>Ammoperdix griseularis</i>	See-see Partridge	+	+	R
<i>Francolinus pondicerianus</i>	Grey Partridge	+	+	R
<i>Conturnix conturnix</i>	Grey Quail	+	+	M/PM
<i>Pterocles exustus</i>	Chestnut Indian Sandgrouse	+	+	R
<i>Streptopelia decaocto</i>	Ring Dove	+	+	R
<i>Streptopelia tranquebarica</i>	Red Turtle Dove	+	+	R
<i>Psittacula krameri</i>	Rose ringed Parakeet	+	-	R
<i>Athene brama</i>	Spotted Owllet	+	+	R
<i>Asio otus</i>	Longeared Owl	+	+	WV
<i>Caprimulgus mahrattensis</i>	Syke's Sind Nightjar	+	+	R
<i>Apus affinis</i>	House Swift	+	+	R
<i>Ceryle rudis</i>	Indian Pied Kingfisher	+	+	R
<i>Halcyon smyrensis</i>	White breasted Kingfisher	+	+	R
<i>Merops superciliosus</i>	Blue cheeked Bee-eater	+	+	SBV/PM
<i>Coracias benghalensis</i>	Roller Blue Jay	+	+	R
<i>Upupa epops</i>	Hoopoe	+	+	WV
<i>Picoides assimilis</i>	Sind Woodpecker	-	+	R
<i>Eremopterix grisea</i>	Ashycrowned Finch-Lark	+	+	R
<i>Eremopterix nigriceps</i>	Blackcrowded Finch-Lark	+	+	R
<i>Alaemon alaudipes</i>	Greater Hoopoe Lark	+	+	R
<i>Galerida cristata</i>	Crested Lark	+	+	R
<i>Mirafra erythroptera</i>	Indian Bush Lark	+	+	R
<i>Alauda arvensis</i>	Common Skylark	+	-	WV
<i>Riparia paludicola</i>	Grey throated Indian Sand Martin	+	+	R
<i>Hirundo rustica</i>	Common Swallow	+	-	WV
<i>Lanius isabellinus</i>	Rufous-tailed Isabelline Shrike	+	-	WV
<i>Lanius excubitor</i>	Grey Shrike	+	+	R
<i>Lanius vittatus</i>	Baybacked Shrike	+	-	R
<i>Lanius schach</i>	Rufous-backed Shrike	+	+	R
<i>Dicrurus adsimilis</i>	Black Drongo	+	+	R
<i>Sturnus roseus</i>	Rosy Starling Pastor	+	+	DPM
<i>Acridotheres</i>	Bank Myna	+	-	R
<i>Acridotheres tristis</i>	Indian Myna	+	+	R
<i>Dendrocitta vagabunda</i>	Tree Pie	+	-	R
<i>Corvus splendens</i>	Sind House Crow	+	+	R
<i>Corvus corax</i>	Common Raven	+	-	R
<i>Pycnonotus cafer</i>	Red-vented Bulbul	+	-	R
<i>Turdoides striatus</i>	Sind Jungle Babbler	+	+	R
<i>Prinia gracilis</i>	Indian Long tailed Warbler	+	+	R
<i>Prinia burnesii</i>	Long tailed Grass Warbler	+	+	R
<i>Sylvia communis</i>	Common White throat	+	+	M
<i>Cercotrichas alacototes</i>	Rufous Scrub Robin	+	-	PM
<i>Saxicoloides fulvicata</i>	Indian Robin	+	+	R
<i>Anthus similis</i>	Long billed Rock Pipit	+	-	R
<i>Motacilla flava</i>	Yellow Citrine Wagtail	+	+	PM
<i>Motacilla alba</i>	White Pied Wagtail	+	+	WV
<i>Passer domesticus</i>	House Sparrow	+	+	R
<i>Passer pyrrhonotus</i>	Sind Jungle Sparrow	+	+	R
<i>Emberiza melanocephala</i>	Blackheaded Bunting	+	-	PM
<i>Emberiza striolata</i>	House Bunting	+	-	R
<i>Saxicola caprata</i>	Pied Bush Chat	-	+	R



Table 5. Consolidated reptile list recorded from Surjan and Sumbak Game Reserves during 2014 – 2017.

Order	Family	Scientific Name	Common Name	Surjan	Seasonal Status	Sumbak	Population Status
Squamata	Agamidae	<i>Calotes versicolor</i>	Indian Garden Lizard	+	Scarce	+	Scarce
Squamata	Agamidae	<i>Laudakia lirata</i>	Yellow-headed Spotted Rock Agama	+	Scarce	+	Scarce
Squamata	Agamidae	<i>Laudakia melanura</i>	Black Rock Agama	+	Rare	+	Scarce
Squamata	Agamidae	<i>Laudakia nupta</i>	Rock Agama	+	Rare	+	Rare
Squamata	Agamidae	<i>Trapelus agilis</i>	Brilliant Agama	+	Rare	+	Scarce
Squamata	Agamidae	<i>Trapelus rubrigularis</i>	Red- throated Agama	+	Rare	–	–
Squamata	Eublepharidae	<i>Eublepharis macularius</i>	Indian Fat-tailed Gecko	+	Rare	+	Scarce
Squamata	Gekkonidae	<i>Cyrtopodion kachhensis</i>	Warty Rock Gecko	+	Rare	+	Scarce
Squamata	Gekkonidae	<i>Hemidactylus brookii</i>	Spotted Indian House Gecko	–	–	+	Scarce
Squamata	Gekkonidae	<i>Hemidactylus flaviviridis</i>	Yellow bellied House Gecko	+	Scarce	+	Scarce
Squamata	Gekkonidae	<i>Hemidactylus triedrus</i>	Blotched House Gecko	+	Rare	+	Rare
Squamata	Gekkonidae	<i>Teratolepis faciata</i>	Flat-tail Gecko	+	Rare	+	Scarce
Squamata	Lacertidae	<i>Mesalina watsonana</i>	Long tailed Desert Lacerta	+	Rare	+	Rare
Squamata	Varanidae	<i>Varanus griseus</i>	Desert Monitor	+	Scarce	+	Scarce
Squamata	Typhlopidae	<i>Ramphotyphlops braminus</i>	Brahminy Blind Snake	–	–	+	Rare
Squamata	Colubridae	<i>Platycephalus rhodorachis</i>	Cliff Racer	+	Rare	+	Rare
Squamata	Colubridae	<i>Psammophis leithii</i>	Sindh Ribbon Snake	+	Rare	+	Rare
Squamata	Colubridae	<i>Spalerosophis diadema</i>	Blotched Diadem Snake	–	–	+	Scarce
Squamata	Elapidae	<i>Naja naja</i>	Black Cobra	+	Rare	+	Rare
Squamata	Viperidae	<i>Echis carinatus</i>	Saw scaled Viper	+	Scarce	+	Rare

Some photographs of recorded species from Surjan and Sumbak Game Reserves, during 2014 to 2017.

Fig. 2. *Canis aureus* (Asiatic Jackal)Fig. 3. *Hystrix indica* (Indian Porcupine)

Fig. 4. *Capra aegagrus* (Sind Ibex)Fig. 5. *Ovis vignei* (Urial)Fig. 6. *Gazella bennettii* (Chinkara)Fig. 7. *Falco tinnunculus* (Common Kestrel)Fig. 8. *Alauda arvensis* (Sky Lark)Fig. 9. *Lanius isabellinus* (Rufous-tailed Isabelline Shrike)Fig. 10. *Cercotrichas galacototes* (Rufous-tailed Scrub Robin)Fig. 11. *Calotes versicolor* (Indian Garden Lizard)

Fig. 12. *Laudakia melanura* (Black Rock Agama)Fig. 13. *Varanus griseus* (Desert Monitor)

During the present work we observed *Arerva javanica*, *Pistacia chinensis*, *Rhazia stricta*, *Oxystelma esculenta*, *Capparis deciduas*, *Launaea resedifolia*, *Convolvulus arvensis*, *Cressa cretica*, *Euphorbia caducifolia*, *Acacia Senegal*, *Alhagi maurorum*, *Taverniera cuneifolia*, *Tephrosia purpurea*, *Salvadora oleoides*, *Withania somnifera*, *Zygophyllum simplex*, *Fimbristylis turkestanica*, *Cymbopogon jwarancusa*, *Dicanthium foveolatum*, *Eragrostis cilianensis*, *Eragrostis minor* and *Phragmites karka* as dominate vegetations of the study areas.

#### Threatened faunal species of the study areas

Based on present study results Honey Badger, *Mellivora capensis* (CR), Urial, *Ovis vignei* (E), Egyptian Vulture, *Neophron percnopterus* (E), Chinkara, *Gazella bennettii* (V), and Imperial Eagle, *Aquila heliacal* (V), Sind Ibex, *Capra aegagrus* (NT) were recorded as threatened species of Surjan and Sumbak Game Reserves (Table 6).

Table 6. Surjan and Sumbak Game Reserves, observed seasonal status of birds

Seasonal Status	Species of Surjan	Species of Sumbak
Resident Species	51	41
Winter visitors	10	07
Winter visitors / Resident	01	01
Summer Breeding Visitors / Passage Migrants	01	01
Double Passage Migrants	01	01
Passage Migrants / Winter visitors	-	-
Passage Migrants	05	03

#### CONCLUSION

Surjan and Sumbak Game Reserves have good population of Sind Ibex due to the presence of water points and good grazing grounds. Community supports some very significant species such as Grey Partridge and See see Partridge. These seem accustomed to human presence. Species of birds are quite common and are thriving safely in the area. Indian Fat-tail Gecko is economically very important in this area as it has been illegally captured for commercial purposes due to the value of its skin. This is the first inclusive and up-to-date study of biodiversity of Surjan and Sumbak Game Reserves. It will provide a baseline for the future work on the wildlife of these areas. The data may be used in the preparation of the monitoring program of the Game reserves.

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