

## Status of summer birds in Delhi, India

India, known for its rich biodiversity harbors around 1,210 species of birds (BirdLife International 2020). The Delhi list now stands at 457 species of birds, depending on the taxonomic approach adopted (with another 27 that have not been re-recorded since 1970), which has given India's capital the reputation of being one of the most bird-rich capital cities of the world (Vyas 2019).

Despite the forbidding, semi-arid nature of its 574 sq. miles, the state of Delhi is a birdwatcher's paradise especially in the winter, when so many Palearctic species are present, and in the spring during the northward migration. Studies on the status of birds in Delhi so far has been done by Urfi (2003), Gupta et al. (2012), Prakash (2013), Tiwary & Urfi (2016), and Grewal et al. (2017).

The study area—Aravalli Biodiversity Park (28.546° N, 77.147° E)—having an area of 692 acres, is located on the south-central ridge in Delhi, between Vasant Vihar and Vasant Kunj. Previously known for morrum and clay mining, the park has now been reclaimed restored with different layers of native plant cover.

The vegetation type includes the tropical moist and dry deciduous, thorny jungle, shrubland, semi-evergreen forest. The tree species include Tendu *Diospyros melanoxylon*, Haldu *Haldina cardifolia*, Mahua *Madhuca longifolia*, Ken *Mitragyna parviflora*, and Soapnut *Sapindus*

*laurifolius*. The park also has a rich diversity of snakes, amphibians, birds, and mammals. More than 200 species of birds are reported till now in the park.

The field work was carried out mainly in three zones divided as restored area, unrestored area, and the open degraded area.

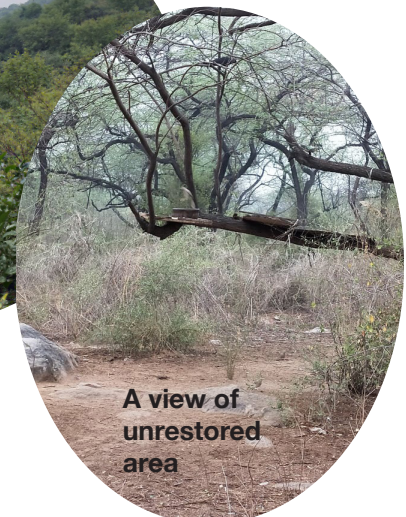
The area was monitored during the study period by systematic early morning walks through the trails to collect data on various parameters on birds. A total of 21 monitoring



A view of open degraded area



A view of restored area.



A view of unrestored area

were undertaken in restored area, nine monitoring in unrestored area and 16 monitoring in open degraded area from 29 May 2019 to 19 July 2019. The monitoring was done only by one person and about one hour was spent in each monitoring.

The bird activity was monitored using 8 x 42 Wingspan Optics's Skybirder binoculars. Mckinnon's method was used for collecting the data as number and species of birds observed during the trail walk; 6–10 lists with 10 species per list were made with specified time intervals. The checklist of birds with specified number of individuals, trail and date were recorded.

For evaluation of the diversity at three sites of study area following diversity indices- Shannon-Weiner Index (H), Margalef's Richness Index (d), Pielou's Evenness Index (J) with help of MS Excel 2007 was used. Relative abundance of species was also calculated using formula, ratio of total number of individuals of a particular species to the total number of individuals of all species. The common species has relative abundance (0.1–0.01), uncommon species (0.011–0.0016) and rare species (0.0017–0.0001). A species discovery curve was plotted for all the three areas to analyze the probability for encountering a new species in future. For statistical comparison of differences between number of individuals sighted and number of species among the three sites was assessed through ANOVA test using SPSS Version.26 software.

During present study, an assemblage of 79 bird species belonging to 16 orders, 40 families were recorded from the study area. List of recorded species along with their breeding status, residential status, relative abundance and area observed were analyzed. Order Passeriformes with 41 species in 22 families dominated the bird community which contributed for 51.89% of the whole assemblage. It was followed by Pelecaniformes, Columbiformes, and Cuculiformes order with five species each.

Minimum diversity of species was in order Anseriformes, Podicipediformes, Strigiformes, Psittaciformes, and Apodiformes with only single species. Among all, families Columbidae and Cuculidae were most dominant in list with five species each. Upon further analysis, on the basis of calculated relative abundance; 38



**Common hawk cuckoo**

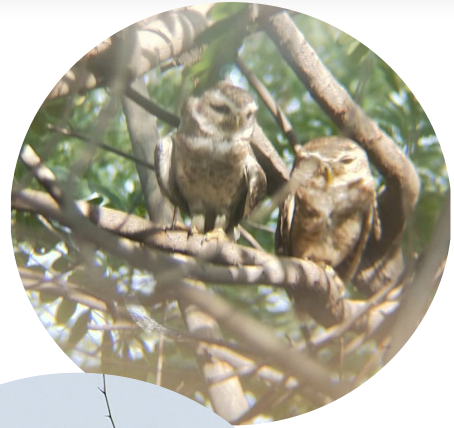


**Blue tailed bee eater**

species were categorized as “Common”, 20 species as “Uncommon” and 21 species as “Rare” in the study area. Out of 79 species, 64 species were resident, eight species were summer migrants, three species were winter migrants, one species was local migrant, one vagrant and two species were both summer visitor as well as passage migrants. Among the summer migrants were Green Bee-eater *Merops orientalis*, Blue-tailed Bee-eater *Merops philippinus*, Asian Koel *Eudynamys scolopaceus*, Common Hawk-Cuckoo *Hierococcyx varius*, Pied Cuckoo *Clamator jacobinus*, Common Cuckoo *Cuculus canorus*, Indian Golden Oriole *Oriolus kundoo*, Indian Paradise-Flycatcher *Terpsiphone paradisi*, Little Swift *Apus affinus* and Rain Quail *Coturnix coromandelica*. The winter migrants included Tree Pipit *Anthus trivialis*, Common Rosefinch *Carpodacus erythrinus* and Black Redstart *Phoenicurus ochrurus*. Two species namely Common Cuckoo *Cuculus canorus* and Indian Paradise-Flycatcher *Terpsiphone paradisi* were passage migrants also. Spotted Dove *Streptopelia chinensis* was the only local migrant recorded. Oriental Pied-Hornbill *Anthracoceros albirostris* was a vagrant species. Among the assemblage of species, only Black-headed Ibis *Threskiornis melanocephalus* was found to be Near Threatened and rest all species were found Least Concern. (IUCN 2021).

Ashy Prinia *Prinia socialis* with 690 individuals (relative abundance 0.1) was the most abundant species in the community followed by Jungle Babbler *Argya striata* with 590

Pair of spotted owl



Pied cuckoo

individuals, Common Myna *Acridotheres tristis* with 501 individuals, Rose-ringed Parakeet *Psittacula krameri* with 424 individuals, House Crow *Corvus splendens* with 414 individuals and Common Tailorbird *Orthotomus sutorius* with 389 individuals. Species which had the least abundance were Rain Quail *Coturnix coromandelica*, Spotted Dove *Streptopelia chinensis*, Eurasian Hoopoe *Upupa epops*, Oriental Pied-Hornbill *Anthracoceros albirostris*, Blue-tailed Bee-eater *Merops philippinus*, Indian Paradise-Flycatcher *Terpsiphone paradisi*, Indian White-eye *Zosteropus palpebrosus* etc with only one recorded individual during study. The diversity indices values calculated for the whole study area were; Shannon Weiner’s diversity index ( $H'$ ) = 1.44, Simpson’s dominance index ( $D$ ) = 0.052, Pielou’s evenness index ( $J$ ) = 0.759 & Margalef’s richness index ( $d$ ) = 20.58.

From the above results it was found that species diversity and evenness was higher in restored area as compared to unrestored and open degraded areas. The reason for this is the negative relationship of bird diversity with *Prosopis juliflora* which is abundant in unrestored and open degraded area but only traces in restored area. Bird diversity and density are affected by the type of tree species present in the greenspaces.

The bird diversity index has a negative relationship with the total density of the exotic tree species. It was found that high density exotic tree species like Vilayati Keekar *Prosopis juliflora* had a negative relationship with the bird diversity, which can be explained by the inability of this tree species to provide feeding requirements and shelter to birds (Khera et al. 2009; Barhadiya et al. 2021).

Of the 79 species recorded during the study, 66 species were recorded from the restored area. The most abundant species was Jungle Babbler *Argya striata* (9.29%) followed by Ashy Prinia *Prinia socialis* (8.64%), Indian Peafowl *Pavo cristatus* (8.16%), House Crow *Corvus splendens* (7.21%), Red-vented Bulbul *Pycnonotus cafer* (6.68%) and Rose-ringed Parakeet *Psittacula krameri* (6.62%) in order of most abundant species of the area.

Forty-three species were recorded from the unrestored area. Out of these, the most abundant species was Jungle Babbler *Argya striata* (13.78%) followed by Blue Rock Pigeon *Columba livia* (10.28%), Rose-ringed

Parakeet *Psittacula krameri* (7.97%), Ashy Prinia *Prinia socialis* (7.6%) and Common Tailorbird *Orthotomus sutorius* (7.45%) in order of abundance.

Sixty species were recorded from open degraded area. Out of these, the most abundant species was Ashy Prinia *Prinia socialis* (12.94%) followed by Common Myna *Acridotheres tristis* (11.05%), Indian Robin *Copsychus fulicatus* (6.45%) and Red-vented Bulbul *Pycnonotus cafer* (5.18%) in order of abundance. Bank Myna *Acridotheres ginginianus* was only sighted in this area during study period preferring the open land and foraging near cattle every time they were monitored.

They are found mainly in the vicinity of open water and their usual habitat is cultivated



**Red wattled  
Lapwing chick**



**Red wattled  
lapwing adult**

**Table 1. Checklist of bird species recorded during the study**

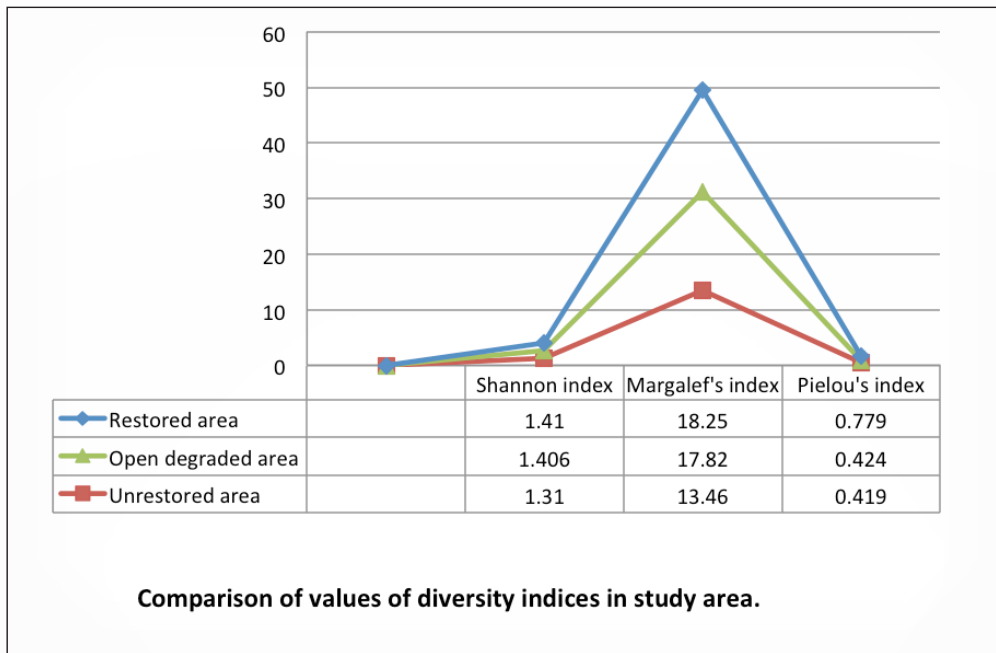
Species	Global threat status	Breeding status	Residential status	Relative observation abundance	Area
Grey Francolin <i>Francolinus pondicerianus</i>	LC	Br.	RS	0.0295	R,U,OD
Indian Peafowl <i>Pavo cristatus</i>	LC	Br.	RS	0.0154	R,U,OD
Rain Quail <i>Coturnix coromandelica</i>	LC	Br.	SM	0.0001	OD
Indian Spot-billed Duck <i>Anas poecilorhyncha</i>	LC	Br.	RS	0.0009	U,OD
Little Grebe <i>Trachybaptus ruficollis</i>	LC	Br.	RS	0.0004	U
Blue Rock Pigeon <i>Columba livia</i>	LC	Br.	RS	0.0408	R,U,OD
Yellow-footed Green -igeon <i>Treron phoenicoptera</i>	LC	Br.	RS	0.0171	R,U,OD
Eurasian Collared-Dove <i>Streptopelia decaocto</i>	LC	Br.	RS	0.0082	R,U,OD
Laughing Dove <i>Streptopelia senegalensis</i>	LC	Br.	RS	0.0289	R,U,OD
Spotted Dove <i>Streptopelia chinensis</i>	LC	NBr.	LM	0.0001	R
Greater Coucal <i>Centropus sinensis</i>	LC	Br.	RS	0.016	R,U,OD
Asian Koel <i>Eudynamys scolopaceus</i>	LC	Br.	SM	0.0294	R,U,OD
Common Hawk-Cuckoo <i>Hierococcyx varius</i>	LC	Br.	SM	0.0027	R,U,OD
Eurasian Cuckoo <i>Cuculus canorus</i>	LC	Br.	SM	0.0003	R,OD
Pied Cuckoo <i>Clamator jacobinus</i>	LC	Br.	SM	0.002	U,OD
Eurasian Moorhen <i>Gallinula chloropus</i>	LC	Br.	RS	0.0001	U
White breasted Waterhen <i>Amaurornis phoenicurus</i>	LC	Br.	RS	0.0007	R,OD
Cattle Egret <i>Bubulcus ibis</i>	LC	Br.	RS	0.0017	R
Little Egret <i>Egretta garzetta</i>	LC	Br.	RS	0.0007	R,U
Black-headed Ibis <i>Threskiornis melanocephalus</i>	LC	Br.	RS	0.0015	R
Glossy Ibis <i>Plegadis falcinellus</i>	LC	Br.	RS	0.0001	OD
Red-naped Ibis <i>Pseudibis papillosa</i>	LC	Br.	RS	0.0006	OD
Red-wattled Lapwing <i>Vanellus indicus</i>	LC	Br.	RS	0.0131	R,U,OD

Species	Global threat status	Breeding status	Residential status	Relative observation abundance	Area
Yellow-wattled Lapwing <i>Vanellus malabaricus</i>	LC	Br.	RS	0.0015	OD
Spotted Owlet <i>Athene brama</i>	LC	Br.	RS	0.0003	R
Black Kite <i>Milvus migrans</i>	LC	Br.	RS	0.0251	R,U,OD
Shikra <i>Accipiter badius</i>	LC	Br.	RS	0.0004	R,U
Eurasian Hoopoe <i>Upupa epops</i>	LC	Br.	RS	0.0001	R
Indian Grey Hornbill <i>Ocyroceros birostris</i>	LC	Br.	RS	0.0011	R,U,OD
Oriental Pied-Hornbill <i>Anthracoceros albirostris</i>	LC	Br.	V	0.0001	R
Blue-tailed Bee-eater <i>Merops philippinus</i>	LC	Br.	SM	0.0001	R
Green Bee-eater <i>Merops orientalis</i>	LC	Br.	SM	0.0275	R,U,OD
White-throated Kingfisher <i>Halcyon smyrnensis</i>	LC	Br.	RS	0.0122	R,U,OD
Black-rumped Flameback Woodpecker <i>Dinopium benghalense</i>	LC	Br.	RS	0.0027	R,U,OD
Brown-headed Barbet <i>Psilopogon zeylanicus</i>	LC	Br.	RS	0.0011	R,U,OD
Coppersmith Barbet <i>Psilopogon haemacephalus</i>	LC	Br.	RS	0.0073	R,U,OD
Rose ringed Parakeet <i>Psittacula krameri</i>	LC	Br.	RS	0.0674	R,U,OD
Rufous Treepie <i>Dendrocitta vagabunda</i>	LC	Br.	RS	0.013	R,U,OD
House Crow <i>Corvus splendens</i>	LC	Br.	RS	0.0658	R,U,OD
Indian Jungle Crow <i>Corvus macrorhynchos culminatus</i>	LC	Br.	RS	0.0049	R,U,OD
Black Drongo <i>Dicrurus macrocerus</i>	LC	Br.	RS	0.0085	R,U,OD
Oriental Skylark <i>Alauda gulgula</i>	LC	Br.	RS	0.0003	OD
Crested Lark <i>Galerida cristata</i>	LC	Br.	RS	0.0003	OD
Indian Paradise-Flycatcher <i>Terpsiphone paradisi</i>	LC	Br.	SM&PM	0.0001	OD
Red-vented Bulbul <i>Pycnonotus cafer</i>	LC	Br.	RS	0.0618	R,U,OD
Red-whiskered Bulbul <i>Pycnonotus jocosus</i>	LC	Br.	RS	0.0036	R,U
White-eared Bulbul <i>Pycnonotus leucotis</i>	LC	Br.	RS	0.0079	R,U,OD

Species	Global threat status	Breeding status	Residential status	Relative observation abundance	Area
Common Babbler <i>Argya caudata</i>	LC	Br.	RS	0.0073	R,OD
Jungle Babbler <i>Argya striata</i>	LC	Br.	RS	0.0938	R,U,OD
Large Grey Babbler <i>Argya malcolmi</i>	LC	Br.	RS	0.0019	R,U,OD
Yellow-eyed Babbler <i>Chrysomma sinense</i>	LC	Br.	RS	0.0085	R,U,OD
Indian Golden Oriole <i>Oriolus kundoo</i>	LC	Br.	SM	0.0003	R,OD
Wire-tailed Swallow <i>Hirundo smithii</i>	LC	Br.	RS	0.0007	U,OD
Red-rumped Swallow <i>Cecropsis daurica</i>	LC	Br.	RS	0.0003	OD
Asian Pied Starling <i>Gracupica contra</i>	LC	Br.	RS	0.0004	R,U,OD
Brahminy Starling <i>Sturnia pagodarum</i>	LC	Br.	RS	0.0042	R,OD
Common Myna <i>Acridotheres tristis</i>	LC	Br.	RS	0.0796	R,U,OD
Bank Myna <i>Acridotheres ginginianus</i>	LC	Br.	RS	0.0065	OD
Common Woodshrike <i>Tephrodornis pondicerianus</i>	LC	Br.	RS	0.0006	U
Long-tailed Shrike <i>Lanius schach</i>	LC	Br.	RS	0.0036	R,OD
White-browed Wagtail <i>Motacilla maderaspatensis</i>	LC	Br.	RS	0.0001	R
Tree Pipit <i>Anthus trivialis</i>	LC	Nbr.	WM	0.0001	R
Common Tailorbird <i>Orthotomus sutorius</i>	LC	Br.	RS	0.0492	R,U,OD
Ashy Prinia <i>Prinia socialis</i>	LC	Br.	RS	0.1	R,U,OD
Grey-breasted Prinia <i>Prinia hodgsonii</i>	LC	Br.	RS	0.0009	R,U
Plain Prinia <i>Prinia inornata</i>	LC	Br.	RS	0.0001	R,OD
Indian Silverbill <i>Euodice malabarica</i>	LC	Br.	RS	0.0193	R,U,OD
Common Rosefinch <i>Carpodacus erythrinus</i>	LC	NBr.	WM	0.0001	U
Indian Robin <i>Copsychus fulvatus</i>	LC	Br.	RS	0.04	R,U,OD
Oriental Magpie-Robin <i>Copsychus saularis</i>	LC	Br.	RS	0.005	R,U
Black Redstart <i>Phoenicurus ochrurus</i>	LC	NBr.	WM	0.0001	OD

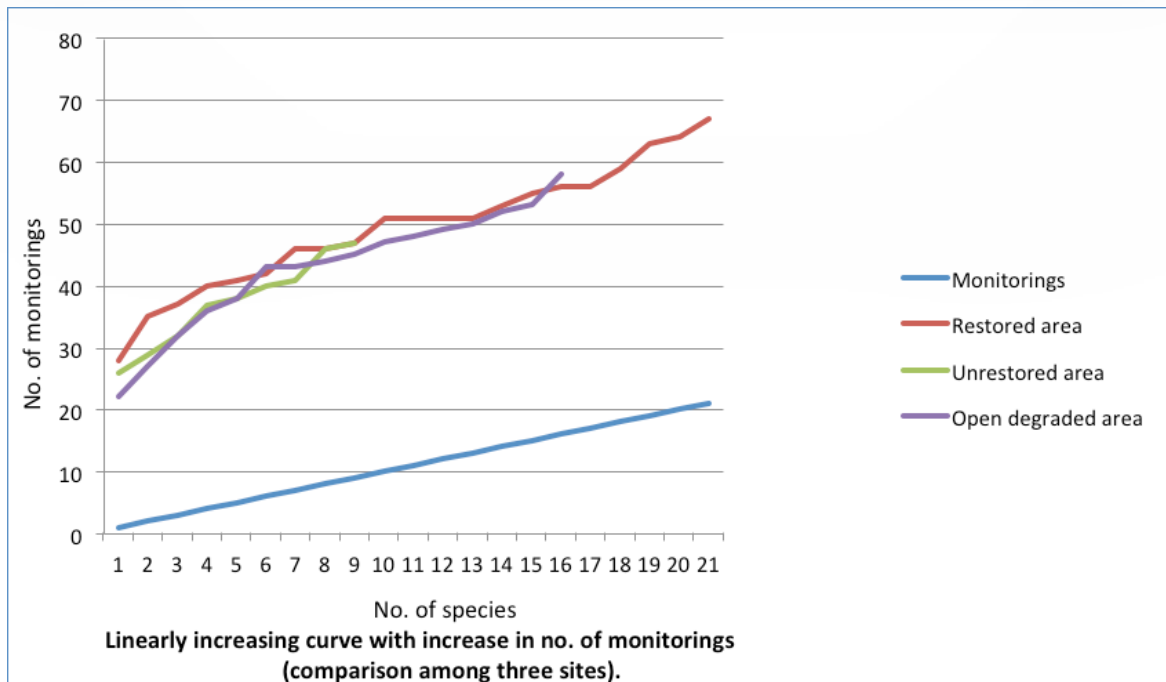
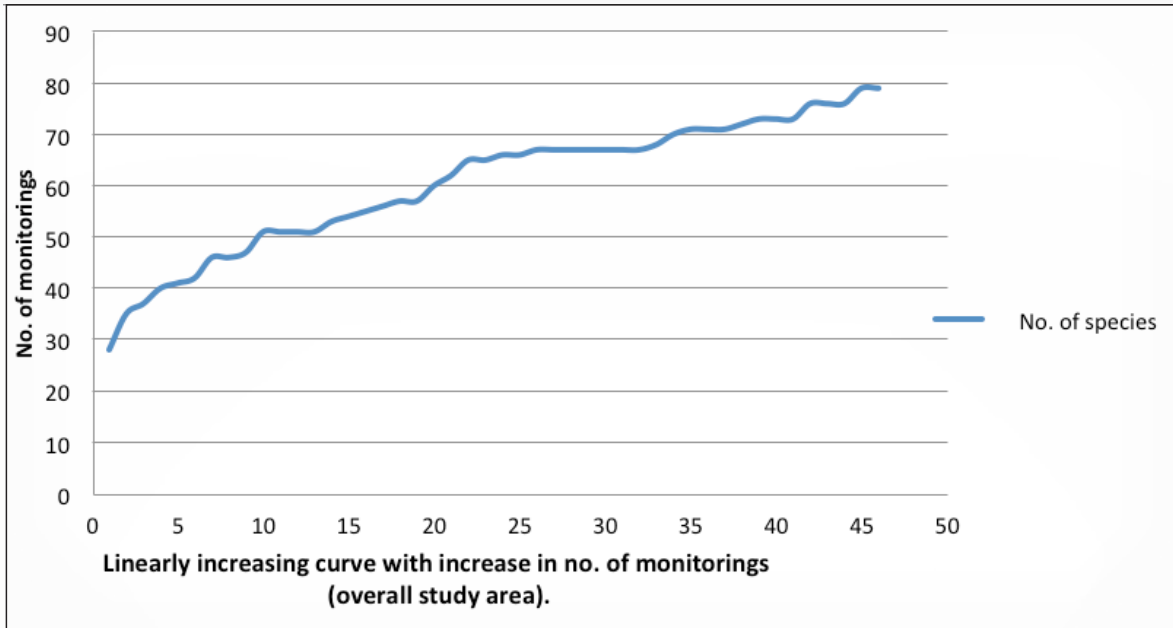
Species	Global threat status	Breeding status	Residential status	Relative observation abundance	Area
Pied Buschat <i>Saxicola caprata</i>	LC	Br.	RS	0.0004	R,OD
Brown Rock Chat <i>Oenanthe fusca</i>	LC	Br.	RS	0.0003	R,OD
Purple Sunbird <i>Cinnyris asiaticus</i>	LC	Br.	RS	0.0111	R,U,OD
House Sparrow <i>Passer domesticus</i>	LC	Br.	RS	0.0119	R
Cinereous Tit <i>Parus cinereus</i>	LC	Br.	RS	0.0003	R
Black-breasted Weaver <i>Ploceus benghalensis</i>	LC	Br.	RS	0.0003	R
Indian White-eye <i>Zosteropus palpebrosus</i>	LC	Br.	RS	0.0001	R
Little Swift <i>Apus affinus</i>	LC	Br.	SM	0.0044	R,U,OD

**Abbreviations:** LC- Least Concern, NT- Near Threatened, Br.- Breeding, NBr.- Non-breeding, RS- Resident, SM- Summer migrant, WM- Winter migrant, PM- Passage migrant, LM- Local migrant, V-Vagrant, R-Restored area, U-Unrestored area, OD- Open degraded area



farmland and open country, but flocks often live within cities, in markets and railway stations. Bank mynas feed on grain, insects, and fruits. Like the Common Myna, they sometimes follow grazing animals picking up disturbed insects or even ticks on the animals.

One way ANOVA showed significant difference in the abundance of species between all three areas ( $F_{(2,23)}=28.204, p=0.000$ ). Similarly, number of species was also significantly different between all three areas ( $F_{(2,42)}=7.996, p=0.001$ ).



The species discovery plots for overall study area and for all three (Restored area, Unrestored area and Open degraded area) showed a linearly increasing curve which has not yet reached an asymptote. Thus, it can be concluded that there is more probability of encountering a new species when finite efforts are made for monitoring in the unexplored areas.

Moreover, during the study period many resident birds were engaged in nesting as this period was the peak breeding season in summer. Yellow-footed Green-Pigeon *Treron phoenicoptera*, Black Drongo *Dicrurus macrocerus*, Red-wattled Lapwing *Vanellus indicus* and House Crow *Corvus splendens* were observed nesting in restored area. Common Myna was found nesting on the

rocks in open degraded area. Nest of Purple Sunbird *Cinnyris asiaticus*, Yellow-eyed Babbler *Chrysomma sinense* and Rufous Treepie were observed in unrestored area. This shows that the study area is a viable habitat for birds.

Some novel as well as off-season/unusual observations were made during the study period. There were few bird species recorded that had not been sighted before in the park.

- Oriental Pied-Hornbill *Anthracoceros albirostris*  
This vagrant species was spotted in restored area during monitoring on 20 June 2019. The sighting was incidental when an individual flew from a eucalyptus tree. The white belly and white rectrices under tail, overall black plumage and cream coloured bill and casque were visible.
- Rain Quail/Black-breasted Quail *Coturnix coromandelica*  
This quail species is a breeding summer visitor to Delhi region. A male bird was spotted in the open degraded area on 23 June 2019. It was identified on basis of black beak and distinct head pattern of black and white; white supercillium, blackish-brown eye-stripe and prominent moustachial stripe, blackish-brown crown with white crown-stripe. The black breast-patch was visible slightly when it turned its head aside and flew into the ditch nearby. This was the first record for this park.
- Eurasian Cuckoo *Cuculus canorus*  
This species is a summer visitor as well as passage migrant in Delhi region. Most probably two different individuals of this species were observed at two different areas during monitoring. On 20 June 2019, one adult male was sighted perching on a tree in grassland and was identified by its distinct two note song “koo-coo”. The iris was yellow with yellow eye-ring, black barrings on white belly. The second individual was only heard in Open degraded area on 26 June 2019. This was also the first record for the park.
- Common Rosefinch *Carpodacus erythrinus*  
A female was sighted in the unrestored area on a tree while foraging but couldn't be photographed. The identification was made on the basis of visual sight of short thick beak (thicker than house sparrow), light brown triangular-shaped head with a creamy-white belly and two white edges to primaries. It was sighted on 5 July 2019 that seems to be an individual that might be over-summering. Earlier also in Delhi region, few sightings had been reported during summer season (Kumar 2018; Prakash 2019).
- Black Redstart *Phoenicurus ochrurus*  
An individual was heard in the open degraded area with the distinct faint “tsip...” calls repeated after every 1.5/2 seconds. The identification was confirmed after listening to the recording from Merlin eBird app. It was sighted on 14 June 2019. One sighting had been reported in the

same year during summer season in Delhi (Singh 2019).

- Tree Pipit *Anthus trivialis*

This individual was seen perching on a tree near the Office in restored area. Identification was done based on the fact the individual was heavily streaked on breast with an overall wheat coloured plumage though no photographic evidence could be possibly provided. Olive backed pipit was ruled out because no ear spot was observed. It was sighted on 31 May 2019. Few sightings had been reported previously also during summer months in Delhi region (Ray 2015).

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## \*Himanshu Sharma, Aisha Sultana\* & Mohammad Shah Hussain\*

\*Department of Zoology, Hansraj College, University of Delhi, Mahatma Hans Raj Marg, Malka Ganj, Delhi 110007, India.

#Biodiversity Parks Programme, CEMDE, University of Delhi, Delhi 110007, India.

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