Changes in the avifauna of the Delhi Ridge: comparing 1971–1974 with 2018–2022

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Abstract: Records collected during approximately 3,000 h of bird research on the New Delhi Ridge during the period 1971–1974 were compared with the representation of species on eBird lists compiled during 2018–2022 for a comparable area of South Delhi (11,403 lists). Aside from aquatic and waterside species, 17 species recorded during the 1970s were not reported during 2018–2022, and 50 species seen in 2018–2022 were not detected in the 1970s. Most of the species not observed in the 1970s were very rare in 2018–2022, whereas some of those not observed in 2018–2022 were recorded every week in the 1970s. Comparing the frequency of records by week in the 1970s with similar statistics for 2018–2022, birds of open ground and dry scrub were found to be significantly more likely to show evidence of a decrease than were arboreal species. Winter visitors were more likely to show evidence of a decrease than residents or summer visitors, although this difference was not significant. The changes documented may be related to the cessation of grazing and firewood collection on the Ridge, to the expansion of humid habitats in South Delhi through artificial watering of gardens and parks and to a general increase in winter temperature in Northwest India.

Introduction

Analysing changes in the numbers and distribution of birds in India is complicated by a paucity of systematic observations prior to the twenty-first century. Resident birdwatchers were scarce and scattered in the early post-independence decades, while foreign birders, although they visited in increasing numbers from the 1970s onwards, rarely spent enough time in one place for records to be validly comparable. Delhi, as one of the largest cities, as a gateway for foreign tourists and as the locus of foreign embassies, has always supported a relatively high number of birders, some of whom published detailed accounts of their ornithological explorations (Basil-Edwards 1926; Frome 1947; Hutson 1954; MacDonald 1960; Donahue 1967; Gaston 1978a & b, 1981). Material up to around 1970 was summarised in Usha Ganguli's book *A Guide to the Birds of the Delhi Area* (Ganguli 1975), expanded with annotations on changes up to the early 1990s by Vyas (1993), to 2005 by Harvey et al. (2006) and up to 2018 by Vyas (2019) in his excellent annotated checklist. This makes Delhi one of the best areas in India for tracking changes in the occurrence of birds over the past century. Unfortunately, and understandably, none of the above studies used numerical data to assess changes in status because suitable data were not available until recently. In this paper, I compare numerical presence/absence data recorded in 1971–1974 (Gaston 1978a) on a restricted portion of the New Delhi Ridge with recent data uploaded to the public platform eBird (see Sullivan et al. 2009 for further details of eBird) for comparable areas of central and southern Delhi. I compare the trends suggested by these comparisons with those proposed in the recent State of India's Birds report (SoIB 2023). Some comparisons are also made with the status and trends suggested by Harvey et al. (2005), by the relative abundance suggested by the *Birds of Delhi and District, Field Checklist* (Anonymous 1967) and with those given by Vyas (2019).

Study Area and Habitat

From July 1971–June 1974, I made several hundred visits to the New Delhi Ridge, in an area of *c.*4.75 sq. km bounded by Mother Teresa Crescent (formerly Willingdon Crescent), Shankar Road, Vande Mataram Marg (formerly Ridge Road), Simon Bolivar Marg and Sardar Patel Marg (further details in Gaston 1977). "The Ridge" at Delhi refers to an intermittent line of rocky outcrops running approximately from south to north across the present city. It is the northernmost extension of the Aravalli Hills that forms the uplands of eastern Rajasthan and terminates in North Delhi approximately in the area of the Delhi University campus. To the north, land use was mostly agricultural, and semi-natural vegetation was very sparse. To the south, the rugged nature of the rocky outcrops precludes agriculture over substantial areas, allowing the persistence of semi-natural forest in patches, comprising trees such as *Dalbergia sissoo, Butea monosperma, Prosopis cineraria, Vachellia nilotica*, and *Anogeissus pendula,* as well as a diverse thorn scrub comprising shrubs such as *Capparis, Zizyphus, Cassia* sp., and *Adhatoda vasica*. Both forests and scrubs have been heavily invaded by the introduced *Prosopis juliflora*, a largely browse-resistant species.

I continued to visit Delhi, mostly in the winter, up to 2019, and during these visits, I made many birding trips to the Ridge and to city parks and gardens. Generalisations about changes to avian habitats since the 1970s have been made on the basis of these observations and those of Vyas (2019). My study site, situated adjacent to Mother Teresa Crescent, has not been much altered since 1974. A small area at the northeast corner was used to create a stadium and swimming pool for the Asian Games of 1982. However, that area amounts to only 5% of the original forest. Otherwise, the main change has been the elimination of feral cattle and the domestic grazing of goats, both of which severely affected the ground and shrub flora during the 1970s, preventing regeneration of browse-sensitive species (AJG pers. obs.). The disappearance of regular livestock grazing seems to have happened in the late 1970s, as by the 1980s, there were clear signs of reversion towards a denser and more diverse shrub layer, with a reduction in the poisonous *Adhatoda* and very spiny *Zizyphus* and an increase in *Jatropha*, *Anogeissus*, and *Balanites*. The slaughter and skinning of cattle that took place in the area periodically in the 1970s also ceased

by the 1980s (AJG pers. obs.).

My study area contained only one, very small, area of permanent water, although a few other ponds appeared in the rains. Permanent standing water is uncommon on the Ridge where not artificially impounded, so waterbirds and birds favouring moist vegetation, abundant in the riverine tract along the Yamuna, are mostly absent from semi-natural areas of the Ridge. However, most open spaces within the urban bounds of New Delhi have been heavily modified by the planting of exotic trees and shrubs, the clearing of undergrowth, and the creation of artificial ponds. Regular watering of flowerbeds and lawns in some of these spaces results in year-round vegetative growth, with attendant flowering and insect populations that were formerly not typical of such areas (AJG pers. obs.). On unmanaged parts of the Ridge, which my study area constituted in the 1970s and continues to constitute (as computed on Google Earth images), the largest contiguous area within the city, herbaceous vegetation typically dries off during the period between winter showers and the June onset of the southwest monsoon, while many trees shed some or all of their leaves. Hence, human intervention over the past half-century, in the form of watering and irrigation, has had the effect of suppressing the ecological significance of the dry season.

Methods

In the 1970s, I visited the Ridge study area 2–6 times a week, spending 4–10 h daily, during which I was involved mostly in trapping, banding and observing the behaviour of *Argya* babblers as part of my D.Phil. research at Oxford University. The total observation time during 1971–1974 was approximately 3,000 hours, with most being directed at *Argya* sp. However, all bird species seen during these visits were recorded, as well as estimates of numbers for unusual species. Because daily visits were not evenly spread within or between years, species presence was summarised by weeks (i.e., species recorded/not recorded in a given week; Gaston 1978a). During 1971–1974, observations were made for 106 out of a total of 160 weeks. Records were available for only one week in June, when I was absent from Delhi in two of the three years, but all other months included at least four weeks (over the 3-year period) in which observations occurred. Mist netting, by which a variety of species in addition to babblers were captured, was carried out almost daily in October–December 1971 but only intermittently thereafter. Here, I use the proportion of weeks when a species was recorded at least once as an index of the species' commonness in the 1970s.

The 1971–1974 index is compared with the proportion of weeks during the period from 1 January 2018 to 31 December 2022 on which a given species was recorded by eBird listers, aggregated over the area bounded by 28.44° N and 28.65° N and 77.10° to 77.22° E (eBird 2023; lists downloaded on 13 September 2023). This area was further divided into a northern area, north of 28.60° N (North Zone), which includes the 1970s study site, and a southern area (South Zone), which includes many currently popular birdwatching sites that have similar ecological characteristics to those of the 1970s study site (e.g., Aravalli Biodiversity Park, JN University Campus, Grounds of IIT Delhi, and Qutub Minar; Fig. 1). Only eBird lists coded as complete were included (as recommended by Johnston et al. 2021), and only records identified to species (i.e., records of *Acrocephalus* sp., etc., were not included). Duplicates were not removed, as their exclusion would have no impact on the number of weeks in which a species was recorded.

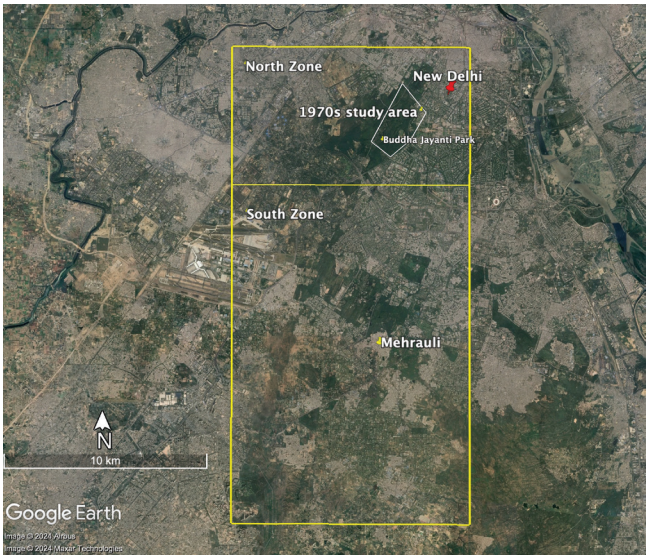

Fig. 1. The areas within which eBird records for 2018-2022 were analysed.

Because of the lack of standing water in my study area, I did not consider waterbirds (herons, rails, shorebirds, etc.) in my analyses. To illustrate the effects of habitat and feeding, I divided the species into raptors (R), aerial feeders (A), urban species (U), and others. The remaining species were divided according to feeding habitat into arboreal (T), shrub (S) and ground (G) feeders, and the classification was based on personal observations and accounts in Harvey et al. (2005). Status was divided into residents (R), winter visitors (W), summer visitors (S) and passage migrants (PM) based on notes in Gaston (1978a) and Harvey et al. (2005). The comments on habitat in the discussion are based on the descriptions in Ali & Ripley (1969–73), Grimmett et al. (1998), Harvey et al. (2005) and Vyas (2019). A list of all species recorded in either dataset, as well as the frequency with which they were recorded, is provided as supplementary information on Zenodo (https://doi/10.5281/zenodo.10701034).

To compare the frequency of sightings in 1971–1974 with that in 2018–2022, I classified species into five categories of status: Probable Increase, Possible Increase, Stable, Possible Decrease, and Probable Decrease. The indices used to define status categories were based on the ratio of the proportion of weeks in which a species was recorded in the 1970s to the proportion in which it was recorded in the 2018–2022 period, calculated separately for the two zones (Table 1). Because of the much larger sample for the South Zone, the number of weeks in which a species was recorded was generally greater there. Consequently, the definitions of status categories differed between the two zones. Direct comparison between the indices for the two periods is not possible, as the probability of a species being recorded is probably higher and the range of habitats is definitely wider, when based on thousands of eBird lists collected over an area of 274 sq. km, rather than a few hundred visits (albeit probably longer in duration than the average eBird list) to an area of less than 5 sq. km. However, trends among different taxonomic and habitat groups can be compared, and extreme

differences can be highlighted. In addition, it is possible to rank species according to the likelihood that they have increased or decreased since the 1970s, which might be a useful indicator for conservation planning.

Table 1. Definition of trend categories for comparisons of 2018–2022 results with 1971–1974 results.

Category	Ratio, % of weeks in 2018–2022 / % of weeks in 1971–1974			
	North Zone		South Zone	
	Upper	Lower	Upper	Lower
Probable Decrease	0.01		0.25	
Possible Decrease	0.1	0.01	0.75	0.25
Stable	1	0.1	2	0.75
Possible Increase	3	1	5	2
Probable Increase		3		5

For most analyses comparing records in the 1970s with those in 2018–2022, uncommon species were omitted by eliminating species recorded in less than 10% of weeks in the 1970s and during 2018–2022. In addition, all species recorded in all weeks in both periods were omitted, as these results provide no information on trends. The adjusted results (referred to below as the "reduced set") should improve the value of the conclusions.

A note on identification

It should be borne in mind that, prior to the publication of Ali & Ripley's (1983) *Pictorial Guide to the Birds of the Indian Subcontinent* (followed shortly afterwards by a shower of field guides), there was no one volume that would help with the identification of all species likely to be seen around Delhi. Whistler's (1949) *Popular Handbook of Indian Birds* and Salim Ali's (1961) *A Book of Indian Birds* covered most, but not all, of the species. The *Handbook of Birds of India and Pakistan* began to appear in 1968, but the vital passerine volumes did not begin to appear until 1971. In any case, the series was not very useful for field work. As a result of this deficiency, along with the use of cumbersome cameras and slow colour film, identification of difficult species at a distance was frequently impossible. Fortunately, the tricky and diverse genus *Phylloscopus* was covered by a small private publication (Alexander 1969) and by a volume in the BTO *Identification for Ringers* series (Williamson 1967). The latter was especially helpful for identifying warblers trapped incidentally while mist-netting for babblers. My lists include all species identified, whether trapped or seen at a distance. The possibility that this resulted in an over-representation of skulking and hard-to-identify species (e.g., Plain Leaf-warbler *Phylloscopus neglectus*, Booted Warbler *Iduna caligata*, Eastern Orphean Warbler *Curruca crassirostris*) compared with recent observational records needs to be considered. Because of the split between Red-breasted and Taiga Flycatchers (*Ficedula parva*, *F. albicilla*) since the 1970s, I combined records for the two species after 2018 for comparison with records from the 1970s.

Results

Omitting waterbirds, I recorded 151 species in my Ridge study area during 1971–74, including 34 species seen every week and 19 seen in only a single week (Appendix 1 in Zenodo). The reduced dataset, excluding rare species and those occurring every week, included 116 species. Excluding waterbirds, the eBird records for zones North (716 lists) and South (10,687 lists) included 202 species. Nine species recorded in the 1970s were not recorded during 2018–2022: Black Bulbul *Hypsipetes leucocephalus* (recorded in four weeks but all in the same winter), Buff-barred Warbler *Phylloscopus pulcher* (two weeks), Common Whitethroat *Curruca communis* (two weeks), Grey-necked Bunting *Emberiza buchannani* (six weeks), Large Cuckooshrike *Coracina macei* (one week), Plain Leaf Warbler (four weeks), Rufous-tailed Scrub Robin *Cercotrichas galactotes* (four weeks), Savanna Nightjar *Caprimulgus affinis* (three weeks), and Thick-billed Flowerpecker *Dicaeum agile* (five weeks). The two records each of Common Whitethroat and Rufous-tailed Scrub Robin were in consecutive weeks and in both cases may have involved the same bird. For both of these species, as well as Plain Leaf Warbler, records were based on birds trapped in mist-nets: they might well have been overlooked otherwise.

Comparison with North Zone eBird records from 2018–2022

In the North Zone (92 species recorded), seven species qualified as Probable Increase: Bank Myna *Acridotheres ginginianus*, Booted Eagle *Hieraaetus pennatus*, Indian Grey Hornbill *Ocyceros birostris*, Large-billed Crow *Corvus macrorhynchos*, White Wagtail *Motacilla alba*, White-browed Wagtail *M. maderaspatensis*, and Yellow-footed Green-Pigeon *Treron phoenicoptera*; and 13 as Possible Increase (Table 2). Fourteen species were classified as Probable Decrease, none of which were recorded in the North Zone in 2018–2022: Bay-backed Shrike *Lanius vittatus*, Baya Weaver *Ploceus philippinus*, Black-winged Kite *Elanus caeruleus*, Eastern Orphean Warbler, Eurasian Wryneck *Jynx torquilla*, Grey Wagtail *Motacilla cinerea*, Indian Nightjar *Caprimulgus asiaticus*, Long-tailed Minivet *Pericrocotus ethologus*, Great Grey Shrike *Lanius excubitor*, Tawny Eagle *Aquila rapax*, Western Crowned Warbler *Phylloscopus occipitalis*, White-capped Bunting *Emberiza stewarti*, White-eyed Buzzard *Butastur teesa*, and White-rumped Vulture *Gyps bengalensis*. Twenty-one species were classified as Possible Decrease and thirty-seven species were classified as Stable (Table 2).

Table 2. Numbers of species in different trend categories, according to North Zone and South Zone comparisons.

	North Zone	South Zone
Probable Decrease	26	9
Possible Decrease	21	13
Stable	30	46
Possible Increase	13	18
Probable Increase	8	22
Total	98	108

The fourteen species not recorded in the North Zone in 2018–2022 were recorded in a mean of 47% of the weeks in the 1970s, and it seems very likely that all of these species decreased in the study area. These decreases may be attributed to local changes specific to the 1970s study area or to wider regional changes.

Comparison with South Zone eBird records from 2018–2022

In the South zone (108 species), 40 species qualified as increasing, 46 as Stable, and 22 as decreasing, of which nine were classified as Probable Decrease: Eastern Orphean Warbler, Indian Nightjar, Long-tailed Minivet, Rufous-fronted Prinia *Prinia buchanani*, Small Minivet *Pericrocotus cinnamomeus*, Great Grey Shrike, Tawny Eagle, Western Crowned Warbler, and White-rumped Vulture. Among the four species recorded in the 1970s but not during 2018–2022, the Indian Nightjar was recorded in eight weeks in the 1970s, the Great Grey Shrike in seven weeks, the Tawny Eagle in five weeks and the White-rumped Vulture in all weeks.

Seven species that were recorded in the South Zone in more than 10% of the weeks during 2018–2022 were not recorded in 1971–1974: Black Francolin *F. francolinus*, Booted Eagle, Cinereous Tit *Parus cinereus*, Paddyfield Pipit *Anthus rufulus*, White-browed Wagtail, Wire-tailed Swallow *Hirundo smithii*, and Yellow-wattled Lapwing *Vanellus malabaricus*. Some of these may simply not have had suitable habitat within the restricted area of the 1970s study (e.g., Black Francolin, Paddyfield Pipit, White-browed Wagtail, Wire-tailed Swallow). However, Booted Eagle and Cinereous Tit certainly had suitable habitat available, and their absence in the 1970s probably indicates subsequent range increases. Some other species observed in the later period were not recorded in the 1970s but were omitted from the analysis because none were detected in >10% of the weeks.

Comparison between the North and South zones

Thirty-seven species showed trends concordant for the North and South zones (17 increasing and 20 decreasing), while only four showed trends that differed between the two zones (increasing in one zone, decreasing in the other zone): Baya Weaver, Blue-tailed Bee-eater *Merops philippinus*, Common Hawk Cuckoo *Hierococcyx varius*, and Siberian Stonechat *Saxicola maurus*. Twenty-four species were classified as Stable in both zones.

Among the 20 species showing concordant decreases, five were arboreal, while ten were scrub or ground dwellers. In contrast, among the species showing concordant increases, nine were arboreal, while only two were scrub or ground dwellers (Table 3, a; Fisher exact $P = 0.02$[1]). The decreasing species comprises 12 residents, six winter visitors, one summer visitor, and one passage migrant. The increases included 14 residents, one winter visitor, and one passage migrant (Fig. 2, b; not statistically significant, $P > 0.1$).

Comparison with trends in the State of Indian Birds Report (SoIB)

Among 12 species classified as increasing in both zones (including Possible and Probable Increases, Table 4), two were listed in the SoIB as declining nationally (Bank Myna, White Wagtail), four as stable (Booted Eagle, Coppersmith Barbet *Psilopogon haemacephalus*, Large-billed Crow, Oriental Magpie Robin *Copsychus saularis*), and three as increasing (Brown-headed Barbet *Psilopogon zeylanicus*, Indian Grey Hornbill, Yellow-fronted Green Pigeon). National trends were not given by the SoIB for the other three (White-browed Wagtail, Asian Pied Starling *Gracupica contra*, Spotted Owlet *Athene brama*).

Among the 19 species that decreased (Probable or Possible) in both zones, four were not classified by SoIB – Black-throated Thrush *Turdus atrogularis*, Brooks's Leaf Warbler *Phylloscopus subviridis*, Eastern Orphean Warbler, and Indian Nightjar, and two were classified as stable – Long-tailed Minivet and Yellow-throated Sparrow *Gymnoris xanthocollis*. The rest were classified in SoIB as declining (Table 4). Given that suitable habitat still exists for all these species in the South Zone and that coverage during 2018–2022 was probably more extensive than that in the 1970s, evidence for a decline deduced on the basis of my results seems likely to be fairly robust. Hence, my results strongly support those given in SoIB. It is likely that trends coinciding with National trends are probably the result of range-wide events.

Trends for the Delhi region in the SoIB are given for a much smaller range of species than for India as a whole. However, those trends that were identified for Delhi were mostly similar to those predicted by my results: Brown-headed Barbet and Indian Grey Hornbill increasing, Bay-backed Shrike, Brown Rock-Chat *Oenanthe fusca*, and Indian Bushlark *Mirafra erythroptera* decreasing. The White-browed Wagtail, which my results suggested had increased, was noted as "rapidly declining". However, my study area, with very little standing water, was probably a poor indicator for the species.

Table 3. Comparisons among different habitat and status groups for numbers of species showing concordant evidence of increase, decrease or remaining stable in both zones: (a) Habitat/feeding style, (b) Status.

a.	Habitat/feeding style					
	Arboreal	Shrubs	Ground	Raptor	Arial	Urban
Decreased	5	8	2	5	0	0
No trend	7	9	7	1	0	0
Increased	9	0	2	2	0	4
Totals	21	17	11	8	0	4
b.	Status					
	Resident	Winter Visitor	Summer Visitor	Passage Migrant		
Decreased	12	6	1	1		
No trend	13	9	0	2		
Increased	14	1	0	2		
Totals	39	16	1	5		

[1] The Fisher Exact test compares the frequency of two categories (e.g., apples and oranges) in two samples (hence a 2x2 table) to determine the probability that the two samples were drawn from the same population. A result where the likelihood of <5% is customarily treated as "statistically significant"

Table 4. Proportion of weeks in which species were recorded in the study area during 1971-1974 (Gaston 1978) and in North and South zones during 2018-2022 (eBird) and the ratios of results in 2018-2022 to 1971-1974. Status and Habitat classifications are also given, as well as trends suggested by Vyas (2019).

Trend codes: 0 = not recorded; s = stable; i = possible increase; ii, probable increase; d = possible decrease; dd = probable decrease, DI = data insufficient.

Status codes: R = resident, WV = winter visitor, SV = summer visitor, PM = passage migrant.

Habitat codes: T = arboreal, S =scrub, G = ground, R = raptor/owl, A = aerial feeder, U = mainly urban.

Species	North Zone			South Zone			Status	Habitat	Vyas 2019	SoIB
	1970s	2018-22	2018-22/ 1970s	1970s	2018-22	2018-22/ 1970s			Suggested trends	Concordant with National trends?
Black Francolin *Francolinus francolinus*	0.00	0.02	DI	0.00	0.15	99 (ii)	R	G		
Yellow-legged Green Pigeon *Treron phoenicopterus*	0.07	0.78	11.88 (ii)	0.07	1.00	15.14 (ii)	R	T	Stable	Yes
Sirkeer Malkoha *Taccocua leschenaultii*	0.62	0.02	0.03 (d)	0.62	0.64	1.03 (s)	R	S	Stable	Yes
Indian Nightjar *Caprimulgus asiaticus*	0.16	0.00	0 (dd)	0.16	0.00	0 (dd)	SV	S	Small dec.	
Yellow-wattled Lapwing *Vanellus malabaricus*	0.00	0.08	DI	0.00	0.85	99 (ii)	R	G	Small dec.	
Black-winged Kite *Elanus caeruleus*	0.49	0.00	0 (dd)	0.49	0.62	1.27 (s)	R	R	Stable	Yes
Egyptian Vulture *Neophron percnopterus*	1.00	0.12	0.12 (d)	1.00	0.43	0.43 (d)	R	R	Decrease	Yes
Oriental Honey-buzzard *Pernis ptilorhynchus*	0.08	0.06	DI	0.08	0.94	11.11 (ii)	R	R	Stable	
White-rumped Vulture *Gyps bengalensis*	1.00	0.00	0 (dd)	1.00	0.00	0 (dd)	R	R	Big dec.	Yes
Booted Eagle *Hieraaetus pennatus*	0.00	0.10	99 (ii)	0.00	0.58	99 (ii)	R	R		
Tawny Eagle *Aquila rapax*	0.10	0.00	0 (dd)	0.10	0.00	0 (dd)	R	R	Decreased	Yes
White-eyed Buzzard *Butastur teesa*	0.52	0.00	0 (dd)	0.52	0.21	0.4 (d)	R	R	Small dec.	Yes
Spotted Owlet *Athene brama*	0.09	0.18	1.87 (i)	0.09	0.98	10.4 (ii)	R	R	Stable	
Indian Grey Hornbill *Ocyceros birostris*	0.06	0.84	14.90 (ii)	0.06	1.00	17.67 (ii)	R	T	Stable	Yes
Blue-tailed Bee-eater *Merops philippinus*	0.20	0.02	0.10 (d)	0.20	0.45	2.29 (i)	R	S	Small inc.	
Coppersmith Barbet *Psilopogon haemacephalus*	0.23	0.67	2.94 (i)	0.23	1.00	4.42 (i)	R	T	Stable	
Brown-headed Barbet *Psilopogon zeylanicus*	0.32	0.84	2.63 (i)	0.32	1.00	3.12 (i)	R	T	Stable	Yes
Eurasian Wryneck *Jynx torquilla*	0.26	0.00	0 (dd)	0.26	0.19	0.71 (d)	WV	S		
Yellow-crowned Woodpecker *Leiopicus mahrattensis*	1.00	0.10	0.10 (d)	1.00	0.40	0.40 (d)	R	S	Stable	Yes
Small Minivet *Pericrocotus cinnamomeus*	1.00	0.04	0.04 (d)	1.00	0.21	0.21 (dd)	R	T	Stable	Yes
Long-tailed Minivet *Pericrocotus ethologus*	0.21	0.00	0 (dd)	0.21	0.02	0.09 (dd)	WV	T		
Indian Golden Oriole *Oriolus kundoo*	0.12	0.06	0.48 (s)	0.12	0.62	5.08 (ii)	SV	T	Stable	
Bay-backed Shrike *Lanius vittatus*	0.81	0.00	0 (dd)	0.81	0.36	0.44 (d)	R	S	Small dec.	Yes
Long-tailed Shrike *Lanius schach*	1.00	0.14	0.14 (d)	1.00	0.91	0.91 (s)	R	S	Small Inc.	

Table 4. Proportion of weeks in which species were recorded in the study area during 1971-1974 (Gaston 1978) and in North and South zones during 2018-2022 (eBird) and the ratios of results in 2018-2022 to 1971-1974. Status and Habitat classifications are also given, as well as trends suggested by Vyas (2019).
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Species	North Zone			South Zone			Status	Habitat	Vyas 2019	SoIB
	1970s	2018-22	2018-22/ 1970s	1970s	2018-22	2018-22/ 1970s			Suggested trends	Concordant with National trends?
Great Grey Shrike *Lanius excubitor*	0.15	0.00	0 (dd)	0.15	0.00	0 (dd)	R	S	Decreased	Yes
Large-billed Crow *Corvus macrorhynchos*	0.12	0.53	4.32 (ii)	0.12	1.00	8.15 (ii)	R	U	Increased	
Gray-headed Canary-Flycatcher *Culicicapa ceylonensis*	0.04	0.04	DI	0.04	0.32	8.5 (ii)	WV	T		No
Cinereous Tit *Parus cinereus*	0.00	0.02	DI	0.00	0.38	99 (ii)	R	T		
Indian Bushlark *Mirafra erythroptera*	0.58	0.04	0.07 (d)	0.58	0.19	0.33 (d)	R	G	Stable	Yes
Rufous-fronted Prinia *Prinia buchanani*	1.00	0.02	0.02 (d)	1.00	0.11	0.11 (dd)	R	S	Stable	Yes
Dusky Crag-Martin *Ptyonoprogne concolor*	0.02	0.02	DI	0.02	0.51	25.47 (ii)	R	A	Small inc.	No
Wire-tailed Swallow *Hirundo smithii*	0.00	0.06	DI	0.00	0.89	99 (ii)	R	A		
White-eared Bulbul *Pycnonotus leucotis*	1.00	0.08	0.08 (d)	1.00	0.98	0.98 (s)	R	S	Stable	
Brooks's Leaf Warbler *Phylloscopus subviridis*	0.28	0.02	0.07 (d)	0.28	0.09	0.33 (d)	WV	T		
Western Crowned Warbler *Phylloscopus occipitalis*	0.24	0.00	0 (dd)	0.24	0.02	0.08 (dd)	PM	T		Yes
Eastern Orphean Warbler *Curruca crassirostris*	0.25	0.00	0 (dd)	0.25	0.06	0.23 (dd)	WV	S		
Yellow-eyed Babbler *Chrysomma sinense*	1.00	0.02	0.02 (d)	1.00	0.96	0.96 (s)	R	S	Stable	
Asian Pied Starling *Gracupica contra*	0.18	0.51	2.84 (i)	0.18	1.00	5.58 (ii)	R	U	Small inc.	
Bank Myna *Acridotheres ginginianus*	0.01	0.24	24.94 (ii)	0.01	0.98	104 (ii)	R	U	Stable	No
Black-throated Thrush *Turdus atrogularis*	0.27	0.02	0.07 (d)	0.27	0.11	0.41 (d)	WV	T		
Oriental Magpie-Robin *Copsychus saularis*	0.29	0.84	2.88 (i)	0.29	1.00	3.42 (i)	R	T	Small inc.	
Verditer Flycatcher *Eumyias thalassinus*	0.05	0.04	DI	0.05	0.17	3.6 (i)	WV	T		
Brown Rock Chat *Oenanthe fusca*	1.00	0.10	0.10 (d)	1.00	0.85	0.85 (s)	R	G	Stable	No
Baya Weaver *Ploceus philippinus*	0.11	0.00	0 (dd)	0.11	0.32	2.83 (i)	R	S	Stable	
Scaly-breasted Munia *Lonchura punctulata*	0.03	0.08	DI	0.03	0.42	14.67 (ii)	R	S		Yes
Yellow-throated Sparrow *Gymnoris xanthocollis*	0.58	0.10	0.17 (d)	0.58	0.21	0.35 (d)	R	S	Stable	

Table 4. Proportion of weeks in which species were recorded in the study area during 1971-1974 (Gaston 1978) and in North and South zones during 2018-2022 (eBird) and the ratios of results in 2018-2022 to 1971-1974. Status and Habitat classifications are also given, as well as trends suggested by Vyas (2019).
Trend codes: 0 = not recorded; s = stable; i = possible increase; ii, probable increase; d = possible decrease; dd = probable decrease, DI = data insufficient.
Status codes: R = resident, WV = winter visitor, SV = summer visitor, PM = passage migrant.
Habitat codes: T = arboreal, S =scrub, G = ground, R = raptor/owl, A = aerial feeder, U = mainly urban.

Species	North Zone			South Zone			Status	Habitat	Vyas 2019	SoIB
	1970s	2018-22	2018-22/ 1970s	1970s	2018-22	2018-22/ 1970s			Suggested trends	Concordant with National trends?
Grey Wagtail *Motacilla cinerea*	0.51	0.00	0 (dd)	0.51	0.57	1.11 (s)	WV	G		Yes
Western Yellow Wagtail *Motacilla flava*	0.06	0.08	DI	0.06	0.32	5.67 (ii)	WV	G		No
White-browed Wagtail *Motacilla maderaspatensis*	0.00	0.22	99 (ii)	0.00	0.45	99 (ii)	R	G	Stable	
White Wagtail *Motacilla alba*	0.05	0.18	3.74 (ii)	0.05	0.47	10 (ii)	WV	G		No
Paddyfield Pipit *Anthus rufulus*	0.00	0.06	DI	0.00	0.25	99 (ii)	R	G		No
White-capped Bunting *Emberiza stewarti*	0.46	0.00	0 (dd)	0.46	0.25	0.53 (d)	WV	S		

Discussion

Only a relatively small number of eBird lists were available for the North zone, which includes the 1970s study site. Hence, a comparison based solely on this zone, although geographically more appropriate, is potentially less reliable than that for the South Zone. Moreover, during 2018–2022, the most visited locality in the North Zone was Buddha Jayanti Park, an area bordering typical Ridge forests but supporting numerous planted ornamental trees and shrubs, as well as irrigated lawns; hence, this area is not a good ecological equivalent for the rest of the Ridge woodlands. However, a comparison of the proportion of weeks in which species were recorded in the North and South zones, compared to the 1971–1974 records, suggested that the likelihood of a species being recorded in 2018–2022 relative to the likelihood in 1971–1974 (slope of the fitted regressions) was similar in both areas, although the y-axis intercepts differed owing to the difference in sample sizes (Fig. 2).

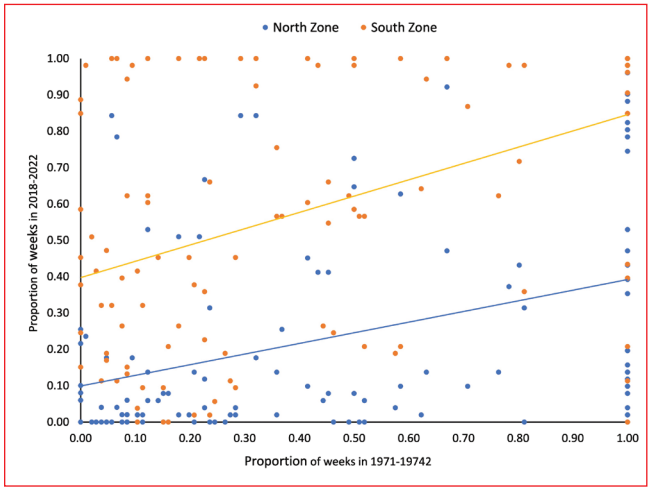

Fig. 2. Comparison of 1971–1974 and recent (2018–2022, North and South zones) proportions of weeks in which species were recorded, including only species recorded in >10% of weeks in at least one dataset.

The differences in sample sizes notwithstanding, it seems safe to assume that the magnitude of the difference between the proportion of weeks recorded in 1971–1974 and the proportions reported by eBird observers during 2018–2022 provides a measure of the likelihood that a given species has changed in abundance. Given that the areas of the North and South Zones have been rapidly urbanising throughout the period since the 1970s, it is not surprising that a substantial fraction of the species show evidence of having diminished in frequency of observations.

The greater likelihood of decline indicated for species of scrub and open ground is probably related to the closure of the canopy over some areas of the ridge, as browsing and firewood collection have decreased. The decrease in sighting frequency for Black-winged Kite, Crested Serpent Eagle *Spilornis cheela*, White-eyed Buzzard, Indian Bushlark, Indian Nightjar, and Indian Thick-knee *Burhinus indicus* and perhaps the Long-tailed and Bay-backed Shrikes, Savannah Nightjar, Grey-necked Bunting, and Sulphur-bellied Warbler *Phylloscopus griseolus* could all be accounted for by loss of open ground, a phenomenon also noted by Vyas (2019).

Decreases in species characteristic of dry deciduous forests and scrubs in the Aravalli Hills (e.g., Yellow-crowned Woodpecker *Leiopicus mahrattensis*, Small Minivet, Common Woodshrike *Tephrodornis pondicerianus*, and Yellow-eyed Babbler *Chrysomma sinense*—all seen in every week during the 1970s, but none occurring on more than 6% of recent eBird lists or recorded in more than 25% of weeks, may be related to the clearance of native shrubs from open spaces generally and the gradual transition towards moister conditions in parks and other public spaces, thanks to the provision of artificial watering. The decrease in numbers of Rufous-fronted Prinia, characteristic of

dry scrub, contrasts with the apparently stable numbers of Ashy Prinia *P. socialis*, a species of moister vegetation. Likewise, White-eared Bulbul *Pycnonotus leucotis*, characteristic of dry country, is less frequent in recent records than Red-vented Bulbul *P. cafer*, a more generalist species, while the extension of gardens and parks within the city almost certainly contributed to colonisation by Red-whiskered Bulbul *P. jocosus* in the twentieth century (Ganguli 1975; Harvey et al. 2005). It is tempting to suggest that the reduction in the severity of the dry season through human intervention, noted in the Study Area and Habitat section, has tilted the environment of South Delhi in favour of birds adapted to moist habitats and away from those adapted to strongly seasonal conditions (Vyas 2019).

The possible decrease in the abundance of wintering species, compared to that of residents and summer visitors, might be related to increasing winter temperatures in Northwest India (Jaswal et al. 2014; Kumar et al. 2017; Kedia et al. 2021), allowing short-range migrants originating from the Himalayas (Black Bulbul, Long-tailed Minivet, Brook's Leaf Warbler, Common Rosefinch *Carpodacus erythrinus*), as well as long-distance migrants reaching their southern limit near Delhi (Black-throated Thrush), to remain further north than they did in some winters in the 1970s. The decreases in Eastern Orphean Warbler, Eurasian Wryneck, and White-capped Bunting are more likely to relate to the decrease in dry scrub habitats, as noted for residents. These results could also be affected by the omission of the most common species (those occurring in 100% of weeks in both study periods). However, the existence or extent of any consequent biases cannot be judged from current data.

Conversely, the apparent increase in some arboreal species (Brown-headed and Coppersmith Barbets, Indian Grey Hornbill, Yellow-footed Green Pigeon) may relate to the spread of canopy trees, especially fruiting trees. I am not aware of evidence relating to trends in the size, age, and species composition of trees within the New Delhi district, but many trees have been planted over the past 50 years in parks and gardens, as well as around housing developments and university campuses. Many of these areas were mostly devoid of tree-cover in the early post-independence period. For example, my study site was virtually devoid of trees in a photograph reproduced in Basil-Edwards (1926). A detailed analysis of trends in avian habitats around Delhi would be very useful in this context.

Six of the 20 species identified as possibly having decreased in numbers since the 1970s were also noted by Harvey et al. (2005) as having probably declined since Usha Ganguli's (1975) book (Rufous-fronted Prinia, Great Grey Shrike, Tawny Eagle, White-eyed Buzzard, White-rumped Vulture, and Yellow-throated Sparrow). However, Black-winged Kite, Indian Thick-knee, and Long-tailed Shrike were noted by Harvey et al. (2005) as probably having increased since Ganguli's (1975) book. The other 11 species qualifying as declining in my comparisons were either thought to be stable by Harvey et al. (2005) or they made no comment on trends.

The India-wide decline of White-rumped Vultures since 1990 is well documented (e.g., Prakash et al. 2003). Raptors are an interesting case because most either soar or perch conspicuously, so their presence is difficult to overlook. My analysis suggests that Egyptian Vulture, Tawny Eagle, Black-winged Kite, and White-eyed Buzzard have also declined but that Booted Eagle and Oriental Honey Buzzard have increased. Steppe Eagle may also be rarer now, although the data are less convincing: Harvey et al. (2005) considered it had declined. The decline of Tawny Eagle and White-eyed Buzzard was also evident by the early 2000s. It would be interesting to know what aspect of Booted Eagle ecology has allowed it to increase in the face of decreases by most other large raptors.

I need to stress again that my analysis cannot be taken as definite evidence for trends in individual species beyond the small area where I carried out my study. When compared to generalizations in Anonymous (1967) or in Harvey et al. (2005), it must be kept in mind that those publications dealt with the whole city, including the riverine tract along the Yamuna, whereas my 1970s records refer exclusively to the dry uplands of the Ridge. The enhanced possibility of recording skulking species created by my trapping activities has already been referred to. In addition, in the 1970s, I was often present on the Ridge before sunrise and after sunset, perhaps increasing the likelihood of my hearing nightjars calling compared to the average birder. However, combined with other evidence, I believe that these results are useful in highlighting some trends potentially of concern, some of which may not have been noted hitherto. These results seem to indicate an overall tilt away from dry country species towards species of moister regimes within the Delhi district. Future work with eBird records, as their coverage increases over time, will certainly yield better information on trends in Delhi bird populations.

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The Laughing Gull *Leucophaeus atricilla* from the Chithari estuary, Kasaragod, Kerala, India: An addition to the South Asian avifauna

The Laughing Gull *Leucophaeus atricilla* is a medium-sized gull with a small dark head typical of all *Leucophaeus* genus. It breeds along the Atlantic and Gulf coasts of North America, Caribbean Islands, the Gulf of California, and the Pacific Coast of Mexico (Burger 2020). I report a Laughing Gull with photographs from the Chithari estuary in the Kasaragod district, Kerala, India, which is the first report from South Asia.

On 12 January 2024, at around 1000 h, I visited the estuary (12.33°N, 75.01°E) of the Chithari River, located *c.*5 km north-west of Kanhangad, a small town in the northernmost district of Kasaragod in Kerala. The estuary and the adjoining beach are usually less crowded compared to other similar beaches in the district. On the southern side of the estuary, there are skeletal remains of a once luxuriant mangrove forest. During low tides, large mud flats appear making it an ideal feeding ground for shorebirds like Common Greenshanks *Tringa nebularia* and Eurasian Curlews *Numenius arquata*. Here, a narrow watercourse divides the beach into distinct northern and southern sections.

It was a bright and sunny day with a clear blue sky. The tide was receding and a few fishing boats could be seen not too far from the shore. A large congregation of gulls and terns could be seen resting along northern side of the coastline in the distance, and the site cannot be accessed from the southern side due to the watercourse. This mixed flock included Brown-headed Gulls *Chroicocephalus brunnicephalus*, Lesser Black-backed Gulls *Larus fuscus,* Pallas's Gulls *Ichthyaetus ichthyaetus, Slender-billed Gulls C. genei*, Lesser Crested Terns *Thalasseus bengalensis*, Greater Crested Terns *T. bergii*, and Caspian Terns *Hydroprogne caspia*. Initially, I observed this congregation from a distance of *c.*80 m. One of the gulls among the flock appeared quite unique with distinct features. It was smaller compared to the Brown-headed Gulls, with a slightly longer dark drooping bill and comparatively longer dark legs. Its small head had dark markings as well as dark smudges on its nape and ear coverts. Its upperparts were dark grey with black wing tips. Additionally, there were dark markings on the head. It had dark eyes with distinct eye crescents. Later, disturbed by the presence of a stray dog, a part of the flock relocated to a mud flat on the southern side where it remained for a few minutes until the entire flock took to flight. The gull did not appear to be feeding during the entire duration and once a Brown-headed Gull pecked on its head. Further visits to the estuary during subsequent days did not come up any sighting of this gull.

After studying the photographs **[5–9]**, most features that I observed in the field could be confirmed. A few images taken from the northern side also showed slight grey wash on the neck and breast. The dark back and small size, slightly smaller than Brown-headed Gulls, excluded all regularly occurring gulls, and the only other species with rather similar features was the Franklin's Gull *Leucophaeus pipixcan*. Compared to that species, this bird was longer winged, with a longer and heavier drooping bill and dark legs suggesting a Laughing Gull (Olson 2003). The images were posted in the 'eBird Kerala Editors' WhatsApp group,