

Supplementary Information

Urban bird trends in a rapidly growing tropical city

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Appendix S1: Examples of selected species classed as showing positive, negative and varied trends over time.

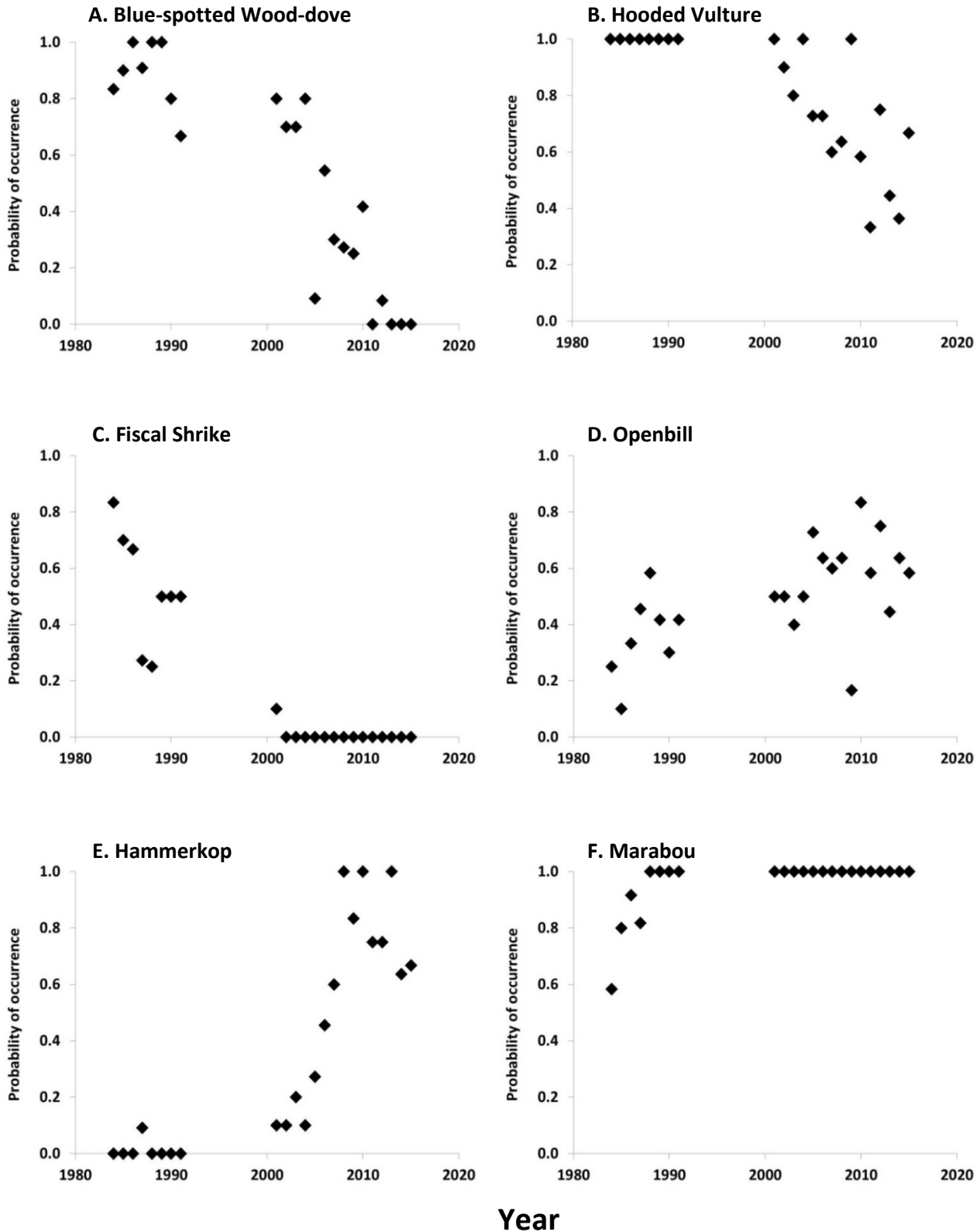


Figure A1: The probability of occurrence expressed as the number of months present as a proportion of the number of months surveyed per year for selected species representative of typical patterns of change in occurrence over time: A-C represent general declines, where B and C are significant period*year interactions; D-F represent general increases, where E and F are significant period*year interactions.

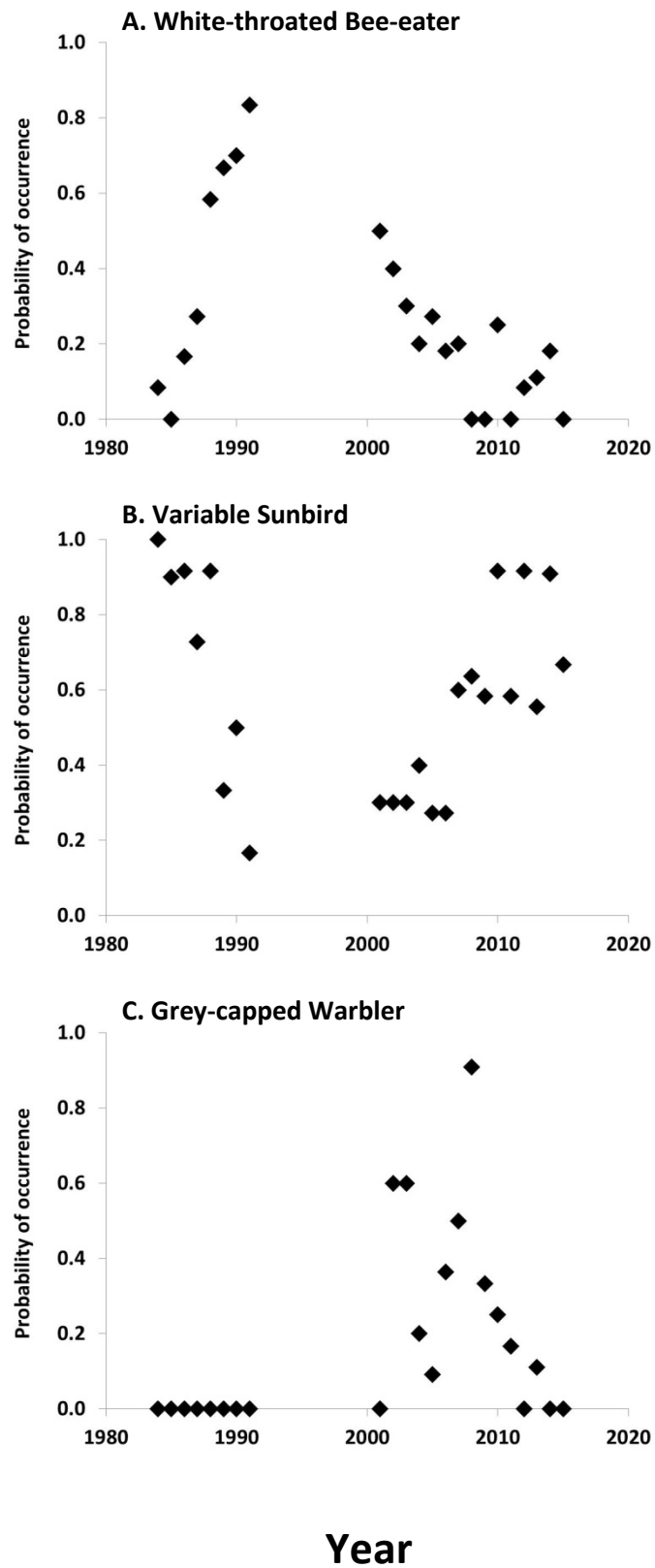


Figure A2: The probability of occurrence expressed as the number of months present as a proportion of the number of months surveyed per year for selected species that were classed as showing varied trends. Each species showed significant interactions between year and period, and showed clearly contrasting trends: A increase-decrease, B decrease-increase, C absent-decrease.

Appendix S2: A summary of trends over the two periods (early = 1984 to 1991; late = 2001 to 2015) for the 83 most frequently occurring species (present on at least 10% of monthly visits over the whole period). Diet is classified as predominantly frugivorous (F), granivorous (G), insectivorous (I), nectivorous (N), omnivorous (O), or carnivorous, divided into predators (P) and scavengers (S). Frequency is calculated as the number of months present as a proportion of the total months surveyed (n = 254) over the whole study period. General trends for the whole period were defined as described in the text.

Table A1: A summary of trends in the probability of occurrence of species (based on results from logistic regression) showing no significant interaction, hence trends are expressed over the whole study period (1984 to 2015). NS indicates no significant trend over time.

Species	Diet	General trend	Frequency
Cattle Egret <i>Bubuculus ibis</i>	I	NS	0.98
Black-headed Heron <i>Ardea melanocephala</i>	P	Increase	0.38
Open-billed Stork <i>Anastomus lamelligerus</i>	P	Increase	0.50
Palm-nut Vulture <i>Gypohierax angolensis</i>	S	NS	0.28
Harrier Hawk <i>Polyboroides typus</i>	P	NS	0.13
Lizard Buzzard <i>Kaupifalco monogrammicus</i>	P	Increase	0.76
Common Buzzard <i>Buteo buteo</i>	P	NS	0.13
Kestrel <i>Falco tinnunculus</i>	P	Increase	0.37
African Hobby <i>Falco cuvieri</i>	I	Increase	0.27
Green Pigeon <i>Treron calvus</i>	F	NS	0.52
Blue-spotted Wood Dove <i>Turtur afer</i>	G	Decrease	0.52
Laughing Dove <i>Streptopelia senegalensis</i>	G	Increase	0.35
Grey Parrot <i>Psittacus erithacus</i>	F	Increase	0.35
Brown Parrot <i>Poicephalus meyeri</i>	F	NS	0.91
Red-chested Cuckoo <i>Cuculus solitarius</i>	I	Decrease	0.11
Klaas' Cuckoo <i>Chrysococcyx klaas</i>	I	Decrease	0.42
Didric Cuckoo <i>Chrysococcyx caprius</i>	I	NS	0.11
Verreaux's Eagle Owl <i>Bubo lacteus</i>	P	NS	0.14
Little Swift <i>Apus affinis</i>	I	Decrease	0.65
Woodland Kingfisher <i>Halcyon senegalensis</i>	I	NS	0.97
Broad-billed Roller <i>Eurystomus glaucurus</i>	I	NS	0.19
Crowned Hornbill <i>Lophoceros alboterminatus</i>	F	Increase	0.20
Grey Woodpecker <i>Mesopicos goertae</i>	I	Decrease	0.75
Angola Swallow <i>Hirundo angolensis</i>	I	NS	0.15
White-browed Robin Chat <i>Cossypha heuglini</i>	F	NS	0.95
African Thrush <i>Turdus pelios</i>	O	NS	0.94
Pied Crow <i>Corvus albus</i>	O	NS	1.00
Red-faced Cisticola <i>Cisticola erythrops</i>	I	Decrease	0.63
Tawny-flanked Prinia <i>Prinia subflava</i>	I	NS	0.74
Willow Warbler <i>Phylloscopus trochilus</i>	I	Decrease	0.15
Green-throated Sunbird <i>Chalcomitra rubescens</i>	N	Decrease	0.20
Collared Sunbird <i>Anthodiaeta collaris</i>	N	Decrease	0.14
Olive-bellied Sunbird <i>Cinnyris chloropygius</i>	N	Decrease	0.47
Copper Sunbird <i>Cinnyris cupreus</i>	N	Increase	0.17
Black-headed Gonolek <i>Laniarius erythrogaster</i>	I	Decrease	0.64
Black-headed Oriole <i>Oriolus brachyrynchus</i>	I	Decrease	0.10
Drongo <i>Dicrurus adsimilis</i>	I	Decrease	0.47
Splendid Glossy Starling <i>Lamprotornis splendidus</i>	F	Increase	0.84
Black-headed Weaver <i>Ploceus cucullatus</i>	G	Decrease	0.66
Black Bishop <i>Euplectes gierowii</i>	G	Decrease	0.13
Bronze Mannikin <i>Spermestes cucullata</i>	G	Decrease	0.53

Table A2: A summary of trends in the probability of occurrence of species (based on results from logistic regression) showing a significant interaction between period and year (as defined in the text). Stable indicates little variation, either due to almost complete absence ('Stable – scarce') or almost always present ('Stable – common').

Species	Diet	General trend	Early	Late	Frequency
Hamerkop <i>Scopus umbretta</i>	P	Increase	Stable - scarce	Increase	0.37
Marabou Stork <i>Leptoptilos crumeniferus</i>	S	Increase	Increase	100%	0.96
Hadada <i>Bostrychia hagedash</i>	I	NS	Stable - common	NS	1.00
Yellow-billed Kite <i>Milvus aegyptius</i>	S	NS	Stable - common	Stable - common	1.00
Hooded Vulture <i>Necrosyrtes monachus</i>	S	Decrease	Stable - common	Decrease	0.81
African Goshawk <i>Accipiter tachiro</i>	P	Increase	NS	Increase	0.19
Shikra <i>Accipiter badius</i>	P	Increase	Increase	NS	0.72
Speckled Pigeon <i>Columba guinea</i>	G	Increase	Stable - scarce	Increase	0.54
Feral Pigeon <i>Columba livia domestica</i>	G	Increase	NS	Increase	0.51
Red-eyed Dove <i>Streptopelia semitorquata</i>	G	NS	NS	Stable - common	1.00
Ross's Turaco <i>Musophaga rossae</i>	F	NS	Stable - common	NS	0.84
White-browed Coucal <i>Centropus superciliosus</i>	I	Decrease	NS	Decrease	0.34
Speckled Mousebird <i>Colius striatus</i>	F	Decrease	Decrease	Decrease	0.53
White-throated Bee-eater <i>Merops albicollis</i>	I	Interaction	Increase	Decrease	0.26
Eurasian Bee-Eater <i>Merops apiaster</i>	I	Interaction	Decrease	Increase	0.11
Black and White Casqued Hornbill <i>Bycanistes subcylindricus</i>	O	NS	Stable - common	NS	0.81
Yellow-rumped Tinkerbird <i>Pogoniulus bilineatus</i>	F	Decrease	Stable - common	Decrease	0.41
Yellow-fronted Tinkerbird <i>Pogoniulus chrysoconus</i>	F	Interaction	Decrease	Increase	0.63
Double-toothed Barbet <i>Pogonornis bidentatus</i>	F	Decrease	Decrease	NS	0.84
Grey-backed Camaroptera <i>Camaroptera brachyura</i>	I	NS	Stable - common	NS	0.99
Grey-capped Warbler <i>Eminia lepida</i>	I	Interaction	Stable - scarce	Decrease	0.17
Black Flycatcher <i>Melaenornis edoloides</i>	I	Decrease	Decrease	NS	0.68
Paradise Flycatcher <i>Terpsiphone viridis</i>	I	Interaction	Increase	Decrease	0.57
Black-and-White Shrike-flycatcher <i>Bias musicus</i>	I	Interaction	Increase	Decrease	0.33
Brown-throated Wattle-eye <i>Platysteira cyanea</i>	I	Decrease	NS	Decrease	0.38
Brown Babbler <i>Turdoides plebejus</i>	I	Decrease	Decrease	Stable - scarce	0.11
Green-headed Sunbird <i>Cyanomitra verticalis</i>	N	Decrease	Decrease	Decrease	0.26
Scarlet-chested Sunbird <i>Chalcomitra senegalensis</i>	N	NS	Stable - common	NS	0.98
Mariqua Sunbird <i>Cinnyris mariquensis</i>	N	Decrease	Decrease	NS	0.29

Variable Sunbird <i>Cinnyris venustus</i>	N	Interaction	Decrease	Increase	0.60
Fiscal <i>Lanius collaris</i>	I	Decrease	Decrease	Stable - scarce	0.19
Northern Puffback <i>Dryoscopus gambensis</i>	I	Increase	Increase	NS	0.71
Tropical Boubou <i>Laniarius aethiopicus</i>	I	Increase	Increase	NS	0.44
Ruppell's Long-tailed Glossy Starling <i>Lamprotornis purpuroptera</i>	F	Increase	Increase	NS	0.92
Grey-headed Sparrow <i>Passer griseus</i>	G	NS	Stable - common	Stable - common	0.98
Baglafecht Weaver <i>Ploceus baglafecht</i>	G	Decrease	Decrease	Decrease	0.42
Spectacled Weaver <i>Ploceus ocularis</i>	G	Decrease	Decrease	Decrease	0.22
Grey-headed Negrofinch <i>Nigrita canicapillus</i>	G	Increase	Increase	Stable - scarce	0.20
Red-billed Firefinch <i>Lagonosticta senegala</i>	G	Decrease	Decrease	NS	0.52
Black-crowned Waxbill <i>Estrilda nonnula</i>	G	Decrease	NS	Decrease	0.11
Red-cheeked Cordon Bleu <i>Uraeginthus bengalus</i>	G	Increase	Stable - scarce	Increase	0.15
Yellow-fronted Canary <i>Crithagra mozambica</i>	G	Decrease	NS	Decrease	0.27