

## Supplementary Information

### Seasonality habitat type and locality influenced

Sulaiman I Muhammad, Rosli Ramli and Amy Y Then

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### Appendix S1: Number of individual bird species recorded during dry and wet seasons in Dutse, Nigeria

Species	Dry	Rainy	Total	Black-shouldered Kite ( <i>Elanus caeruleus</i> )	7	6	13	Fine-spotted Woodpecker ( <i>Campethera punctuligera</i> )	2		2
Abyssinian Roller ( <i>Coracias abyssinicus</i> )	46	18	64	Blue-naped Mousebird ( <i>Urocolius macrourus</i> )	5		5	Fork-tailed Drongo ( <i>Dicrurus adsimilis</i> )	19	1	20
African Cuckoo ( <i>Cuculus gularis</i> )	1	3	4	Brown Babbler ( <i>Turdoides plebejus</i> )	340	119	459	Four-banded Sandgrouse ( <i>Pterocles quadricinctus</i> )		2	2
African Golden Oriole ( <i>Oriolus auratus</i> )	1	5	6	Bruce's Green Pigeon ( <i>Treron waalia</i> )	20	12	32	Gabar Goshawk ( <i>Micronisus gabar</i> )	24	2	26
African Grey Hornbill ( <i>Tockus nasutus</i> )	34	38	72	Cattle Egret ( <i>Bubulcus ibis</i> )	217	160	377	Grasshopper Buzzard ( <i>Butastur rufipennis</i> )	1		1
African Harrier Hawk ( <i>Polyboroides typus</i> )	1		1	Chestnut-backed Sparrow Lark ( <i>Eremopterix leucotis</i> )	25		25	Great Reed Warbler ( <i>Acrocephalus arundinaceus</i> )		1	1
African Palm Swift ( <i>Cypsiurus parvus</i> )	98	59	157	Chestnut-bellied Starling ( <i>Lamprotornis pulcher</i> )	1070	627	1697	Great Spotted Cuckoo ( <i>Clamator glandarius</i> )	1		1
African Scops Owl ( <i>Otus senegalensis</i> )		2	2	Chestnut-crowned Sparrow-weaver ( <i>Plocepasser superciliosus</i> )	2		2	Greater Blue-eared Starling ( <i>Lamprotornis chalybaeus</i> )	471	187	658
African Silverbill ( <i>Euodice cantans</i> )	64	47	111	Common Bulbul ( <i>Pycnonotus barbatus</i> )	102	23	125	Greater Honeyguide ( <i>Indicator indicator</i> )	2	2	4
African Swallow-tailed Kite ( <i>Chelictinia riocourii</i> )	1		1	Common Kestrel ( <i>Falco tinnunculus</i> )	1	7	8	Green Wood-hoopoe ( <i>Phoeniculus purpureus</i> )	101	65	166
African Thrush ( <i>Turdus pelios</i> )		5	5	Common Redstart ( <i>Phoenicurus phoenicurus</i> )	15		15	Green-backed Heron ( <i>Butorides striata</i> )	5		5
Bearded Barbet ( <i>Pogonornis dubius</i> )	38	43	81	Common Whitethroat ( <i>Sylvia communis</i> )	183		183	Green-winged Pytilia ( <i>Pytilia melba</i> )	7	3	10
Beaudouin's Snake Eagle ( <i>Circaetus beaudouini</i> )	4	1	5	Crested Lark ( <i>Galerida cristata</i> )	56	24	80	Grey Kestrel ( <i>Falco ardosiaceus</i> )	2	5	7
Beautiful Sunbird ( <i>Cinnyris pulchellus</i> )	4	73	77	Cut-throat Finch ( <i>Amadina fasciata</i> )	106	6	112	Grey Woodpecker ( <i>Mesopicos goertae</i> )	10	9	19
Black Kite ( <i>Milvus migrans</i> )	1	1	2	Dark Chanting Goshawk ( <i>Melierax metabates</i> )	2	1	3	Grey-backed Camaroptera ( <i>Camaroptera brachyura</i> )	106	49	155
Black Scrub Robin ( <i>Cercotrichas podobe</i> )	4		4	Desert Cisticola ( <i>Cisticola aridulus</i> )	4		4	Hoopoe ( <i>Upupa epops</i> )	4	3	7
Black-backed Cisticola ( <i>Cisticola eximius</i> )	3		3	Double-spurred Francolin ( <i>Pternistis bicalcaratus</i> )		3	3	House Sparrow ( <i>Passer domesticus</i> )	2		2
Black-crowned Tchagra ( <i>Tchagra senegalus</i> )	28	22	50	Eastern Olivaceous Warbler ( <i>Iduna pallida</i> )	13		13	Lanner Falcon ( <i>Falco biarmicus</i> )	2		2
Black-headed Heron ( <i>Ardea melanocephala</i> )		1	1	Ethiopian Swallow ( <i>Hirundo aethiopica</i> )		4	4	Laughing Dove ( <i>Streptopelia senegalensis</i> )	338	183	521
Black-headed Lapwing ( <i>Vanellus tectus</i> )	121	17	138					Lesser Whitethroat ( <i>Sylvia</i>	1		1

<i>curruca</i> )				<i>platura</i> )				Village Indigobird ( <i>Vidua chalybeata</i> )	47	50	97
Little Swift ( <i>Apus affinis</i> )	1	7	8	Red-billed Firefinch ( <i>Lagonosticta senegala</i> )	40	19	59	Village Weaver ( <i>Ploceus cucullatus</i> )	136	38	174
Little Weaver ( <i>Ploceus luteolus</i> )	57	66	123	Red-billed Quelea ( <i>Quelea quelea</i> )	118		118	Vinaceous Dove ( <i>Streptopelia vinacea</i> )	112	130	242
Lizard Buzzard ( <i>Kaupifalco monogrammicus</i> )		7	7	Red-cheeked Cordon-bleu ( <i>Uraeginthus bengalus</i> )	230	93	323	Western Bonelli's Warbler ( <i>Phylloscopus bonelli</i> )	6		6
Long-billed Pipit ( <i>Anthus similis</i> )	2		2	Red-necked Buzzard ( <i>Buteo auguralis</i> )		2	2	Western Grey Plantain-Eater ( <i>Crinifer piscator</i> )	11	5	16
Long-tailed Glossy Starling ( <i>Lamprotornis caudatus</i> )	335	251	586	Red-necked Falcon ( <i>Falco chicquera</i> )	1	1	2	Western Marsh Harrier ( <i>Circus aeruginosus</i> )	1		1
Montagu's Harrier ( <i>Circus pygargus</i> )	2		2	Rose-ringed Parakeet ( <i>Psittacula krameri</i> )	475	354	829	White helmetshrike ( <i>Prionops plumatus</i> )	19	2	21
Mosque Swallow ( <i>Cecropis senegalensis</i> )		1	1	Rufous Scrub Robin ( <i>Cercotrichas podobe</i> )	9		9	White-billed Buffalo Weaver ( <i>Bubalornis albirostris</i> )	1472	910	2382
Namaqua Dove ( <i>Oena capensis</i> )	14	3	17	Rufous-crowned Roller ( <i>Coracias naevius</i> )	6	17	23	White-headed Barbet ( <i>Lybius leucocephalus</i> )	2		2
Northern Anteater Chat ( <i>Myrmecocichla aethiops</i> )	16	9	25	Sahel Paradise Whydah ( <i>Vidua orientalis</i> )	4	21	25	White-rumped Seedeater ( <i>Crithagra Leucopygia</i> )	348	49	397
Northern Black Flycatcher ( <i>Melaenornis edolioides</i> )	1	14	15	Scarlet-chested Sunbird ( <i>Chalcomitra senegalensis</i> )	41	11	52	Wood Warbler ( <i>Phylloscopus sibilatrix</i> )	5		5
Northern Crombec ( <i>Sylvietta brachyura</i> )		1	1	Senegal Coucal ( <i>Centropus senegalensis</i> )	16	30	46	Woodchat Shrike ( <i>Lanius senator</i> )	5		5
Northern Grey-headed Sparrow ( <i>Passer griseus</i> )	235	381	616	Senegal Eremomela ( <i>Eremomela pusilla</i> )	6	3	9	Yellow-crowned Bishop ( <i>Euplectes afer</i> )		4	4
Northern Red Bishop ( <i>Euplectes franciscanus</i> )	16	156	172	Senegal Parrot ( <i>Poicephalus senegalus</i> )	80	67	147	Yellow Wagtail ( <i>Motacilla flava</i> )		2	2
Northern Red-billed Hornbill ( <i>Tockus erythrorhynchus</i> )	83	66	149	Shikra ( <i>Accipiter badius</i> )		4	4	Yellow-billed Oxpecker ( <i>Buphagus africanus</i> )	17	17	34
Northern Wheatear <i>Oenanthe oenanthe</i>	45		45	Speckle-fronted Weaver ( <i>Sporopipes frontalis</i> )	121	110	231	Yellow-billed Shrike ( <i>Corvinella corvina</i> )	59	59	118
Orange-cheeked Waxbill ( <i>Estrilda melpoda</i> )	2	8	10	Speckled Pigeon ( <i>Columba guinea</i> )	61	28	89	Yellow-crowned Gonolek ( <i>Laniarius barbarus</i> )	19	16	35
Pallid Harrier ( <i>Circus macrourus</i> )	1		1	Squacco Heron ( <i>Ardeola ralloides</i> )	1		1	Yellow-fronted Tinkerbird ( <i>Pogoniulus chrysoconus</i> )	19	2	21
Pearl-spotted Owlet ( <i>Glaucidium perlatum</i> )	3	1	4	Subalpine Warbler ( <i>Sylvia cantillans</i> )	1		1	Zebra Waxbill ( <i>Amandava subflava</i> )		8	8
Piapiac ( <i>Ptilostomus afer</i> )	87	86	173	Sudan Golden Sparrow ( <i>Passer luteus</i> )	1		1	Zitting Cisticola ( <i>Cisticola juncidis</i> )	3	136	139
Pied Crow ( <i>Corvus albus</i> )		1	1	Tawny-flanked Prinia ( <i>Prinia subflava</i> )	74	99	173	<b>TOTAL</b>	<b>8407</b>	<b>5239</b>	<b>13646</b>
Purple Glossy Starling ( <i>Lamprotornis purpureus</i> )	146	45	191	Vieillot's Barbet ( <i>Lybius vieilloti</i> )		1	1				
Purple Heron ( <i>Ardea purpurea</i> )	1		1								
Pygmy Sunbird ( <i>Anthodiaeta</i>	79	9	88								

## Appendix S2: Number of individual bird species across woodland and shrubland habitats in Dutse, Nigeria

Species	Shrub land	Wood land	Grand Total	<i>pulchellus</i> Black Kite ( <i>Milvus migrans</i> )			<i>superciliosus</i> Common Bulbul ( <i>Pycnonotus</i>		
Abyssinian Roller ( <i>Coracias abyssinicus</i> )	18	46	64	Black Scrub Robin ( <i>Cercotrichas podobe</i> )	2	2	<i>barbatus</i> )	125	125
African Cuckoo ( <i>Cuculus gularis</i> )	2	2	4	Black-backed Cisticola ( <i>Cisticola eximius</i> )	3	3	Common Kestrel ( <i>Falco tinnunculus</i> )	8	8
African Golden Oriole ( <i>Oriolus auratus</i> )		6	6	Black-crowned Tchagra ( <i>Tchagra senegalus</i> )	47	3	Common Redstart ( <i>Phoenicurus phoenicurus</i> )	4	11
African Grey Hornbill ( <i>Tockus nasutus</i> )	14	58	72	Black-headed Heron ( <i>Ardea melanocephala</i> )		1	Common Whitethroat ( <i>Sylvia communis</i> )	118	65
African Harrier Hawk ( <i>Polyboroides typus</i> )		1	1	Black-headed Lapwing ( <i>Vanellus tectus</i> )	32	106	Crested Lark ( <i>Galerida cristata</i> )	43	37
African Palm Swift ( <i>Cypsiurus parvus</i> )	15	132	157	Black-shouldered Kite ( <i>Elanus caeruleus</i> )	5	8	Cut-throat Finch ( <i>Amadina fasciata</i> )	2	110
African Scops Owl ( <i>Otus senegalensis</i> )		2	2	Blue-naped Mousebird ( <i>Urocolius macrourus</i> )	5	5	Dark Chanting Goshawk ( <i>Melierax metabates</i> )	1	2
African Silverbill ( <i>Euodice cantans</i> )	11	100	111	Brown Babbler ( <i>Turdoides plebejus</i> )	20	439	Desert Cisticola ( <i>Cisticola aridulus</i> )		4
African Swallow-tailed Kite ( <i>Chelictinia riocourii</i> )		1	1	Bruce's Green Pigeon ( <i>Treron waalia</i> )		32	Double-spurred Francolin ( <i>Pternistis bicalcaratus</i> )	3	3
African Thrush ( <i>Turdus pelios</i> )		5	5	Cattle Egret ( <i>Bubulcus ibis</i> )	100	277	Eastern Olivaceous Warbler ( <i>Iduna pallida</i> )		13
Bearded Barbet ( <i>Pogonornis dubius</i> )	4	77	81	Chestnut-backed Sparrow Lark ( <i>Eremopterix leucotis</i> )		25	Ethiopian Swallow ( <i>Hirundo aethiopica</i> )	4	4
Beaudouin's Snake Eagle ( <i>Circaetus beaudouini</i> )		5	5	Chestnut-bellied Starling ( <i>Lamprotornis pulcher</i> )	299	1398	Fine-spotted Woodpecker ( <i>Campethera punctuligera</i> )	2	2
Beautiful Sunbird ( <i>Cinnyris</i>	10	67	77	Chestnut-crowned Sparrow-weaver ( <i>Plocepasser</i>	2	2	Fork-tailed Drongo ( <i>Dicrurus adsimilis</i> )	8	12

Four-banded Sandgrouse ( <i>Pterocles quadricinctus</i> )	2		2	Lanner Falcon ( <i>Falco</i> <i>biarmicus</i> )		2	2	Northern Red Bishop ( <i>Euplectes franciscanus</i> )	16	156	172
Gabar Goshawk ( <i>Micronisus</i> <i>gabar</i> )	5	21	26	Laughing Dove ( <i>Streptopelia</i> <i>senegalensis</i> )	88	433	521	Northern Red-billed Hornbill ( <i>Tockus erythrorhynchus</i> )	16	133	149
Grasshopper Buzzard ( <i>Butastur rufipennis</i> )		1	1	Lesser Whitethroat ( <i>Sylvia</i> <i>curruca</i> )		1	1	Northern Wheatear <i>Oenanthe</i> <i>oenanthe</i>	26	19	45
Great Reed Warbler ( <i>Acrocephalus arundinaceus</i> )	1		1	Little Swift ( <i>Apus affinis</i> )	2	6	8	Orange-cheeked Waxbill ( <i>Estrilda melpoda</i> )	8	2	10
Great Spotted Cuckoo ( <i>Clamator glandarius</i> )		1	1	Little Weaver ( <i>Ploceus</i> <i>luteolus</i> )	24	99	123	Pallid Harrier ( <i>Circus</i> <i>macrourus</i> )		1	1
Greater Blue-eared Starling ( <i>Lamprotornis chalybaeus</i> )	58	600	658	Lizard Buzzard ( <i>Kaupifalco</i> <i>monogrammicus</i> )	1	6	7	Pearl-spotted Owlet ( <i>Glaucidium perlatum</i> )		4	4
Greater Honeyguide ( <i>Indicator indicator</i> )	2	2	4	Long-billed Pipit ( <i>Anthus</i> <i>similis</i> )		2	2	Piapiac ( <i>Ptilostomus afer</i> )	13	160	173
Green Wood-hoopoe ( <i>Phoeniculus purpureus</i> )	19	147	166	Long-tailed Glossy Starling ( <i>Lamprotornis caudatus</i> )	51	535	586	Pied Crow ( <i>Corvus albus</i> )		1	1
Green-backed Heron ( <i>Butorides striata</i> )		5	5	Montagu's Harrier ( <i>Circus</i> <i>pygargus</i> )	1	1	2	Purple Glossy Starling ( <i>Lamprotornis purpureus</i> )		191	191
Green-winged Pytilia ( <i>Pytilia</i> <i>melba</i> )	8	2	10	Mosque Swallow ( <i>Cecropis</i> <i>senegalensis</i> )	1		1	Purple Heron ( <i>Ardea</i> <i>purpurea</i> )		1	1
Grey Kestrel ( <i>Falco</i> <i>ardosiaceus</i> )		7	7	Namaqua Dove ( <i>Oena</i> <i>capensis</i> )	11	6	17	Pygmy Sunbird ( <i>Anthodiaeta</i> <i>platura</i> )	12	76	88
Grey Woodpecker ( <i>Mesopicos</i> <i>goertae</i> )	3	16	19	Northern Anteater Chat ( <i>Myrmecocichla aethiops</i> )	1	24	25	Red-billed Firefinch ( <i>Lagonosticta senegala</i> )	3	56	59
Grey-backed Camaroptera ( <i>Camaroptera brachyura</i> )	102	53	155	Northern Black Flycatcher ( <i>Melaenornis edoloides</i> )	5	10	15	Red-billed Quelea ( <i>Quelea</i> <i>quelea</i> )		118	118
Hoopoe ( <i>Upupa epops</i> )	2	5	7	Northern Crombec ( <i>Sylvietta</i> <i>brachyura</i> )	1		1	Red-cheeked Cordon-bleu ( <i>Uraeginthus bengalus</i> )	15	308	323
House Sparrow ( <i>Passer</i> <i>domesticus</i> )		2	2	Northern Grey-headed Sparrow ( <i>Passer griseus</i> )	68	548	616	Red-necked Buzzard ( <i>Buteo</i> <i>auguralis</i> )		2	2

Red-necked Falcon ( <i>Falco chicquera</i> )	2	2		Tawny-flanked Prinia ( <i>Prinia subflava</i> )	105	68	173	( <i>Euplectes afer</i> )			
Rose-ringed Parakeet ( <i>Psittacula krameri</i> )	72	757	829	Vieillot's Barbet ( <i>Lybius vieilloti</i> )	1		1	Yellow Wagtail ( <i>Motacilla flava</i> )		2	2
Rufous Scrub Robin ( <i>Cercotrichas podobe</i> )	6	3	9	Village Indigobird ( <i>Vidua chalybeata</i> )	1	96	97	Yellow-billed Oxpecker ( <i>Buphagus africanus</i> )	4	30	34
Rufous-crowned Roller ( <i>Coracias naevius</i> )	8	15	23	Village Weaver ( <i>Ploceus cucullatus</i> )	28	146	174	Yellow-billed Shrike ( <i>Corvinella corvina</i> )	14	104	118
Sahel Paradise Whydah ( <i>Vidua orientalis</i> )	19	6	25	Vinaceous Dove ( <i>Streptopelia vinacea</i> )	34	208	242	Yellow-crowned Gonolek ( <i>Laniarius barbarus</i> )	12	23	35
Scarlet-chested Sunbird ( <i>Chalcomitra senegalensis</i> )	1	51	52	Western Bonelli's Warbler ( <i>Phylloscopus bonelli</i> )		6	6	Yellow-fronted Tinkerbird ( <i>Pogoniulus chrysoconus</i> )		21	21
Senegal Coucal ( <i>Centropus senegalensis</i> )	12	34	46	Western Grey Plantain-Eater ( <i>Crinifer piscator</i> )		16	16	Zebra Waxbill ( <i>Amandava subflava</i> )	6	2	8
Senegal Eremomela ( <i>Eremomela pusilla</i> )	5	4	9	Western Marsh Harrier ( <i>Circus aeruginosus</i> )		1	1	Zitting Cisticola ( <i>Cisticola juncidis</i> )	77	62	139
Senegal Parrot ( <i>Poicephalus senegalus</i> )		147	147	White helmetshrike ( <i>Prionops plumatus</i> )		21	21	<b>TOTAL</b>	<b>2570</b>	<b>11066</b>	<b>13646</b>
Shikra ( <i>Accipiter badius</i> )	2	2	4	White-billed Buffalo Weaver ( <i>Bubalornis albirostris</i> )	712	1670	2382				
Speckle-fronted Weaver ( <i>Sporopipes frontalis</i> )	65	166	231	White-headed Barbet ( <i>Lybius leucocephalus</i> )		2	2				
Speckled Pigeon ( <i>Columba guinea</i> )	1	88	89	White-rumped Seedeater ( <i>Crithagra Leucopygia</i> )	52	345	397				
Squacco Heron ( <i>Ardeola ralloides</i> )		1	1	Wood Warbler ( <i>Phylloscopus sibilatrix</i> )		5	5				
Subalpine Warbler ( <i>Sylvia cantillans</i> )		1	1	Woodchat Shrike ( <i>Lanius senator</i> )	3	2	5				
Sudan Golden Sparrow ( <i>Passer luteus</i> )		1	1	Yellow-crowned Bishop		4	4				

**Appendix S3:** Bird species richness and diversity as a function of tree and shrub abundance in Dutse, Nigeria

