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# Birds of Katima Mulilo town, Zambezi Region, Namibia

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## Abstract

Large river valleys are usually characterized by high level of biodiversity, avian diversity. In Namibia, two towns are located in such valleys: Rundu on Okavango and Katima Mulilo on Zambezi. To date, no quantitative studies on any components of biodiversity have been conducted in those towns. In January-May 2013, a total of 36 days were spent on quantitative studies of birds in Katima Mulilo town. The line transect and territory mapping methods were used in this study. A total of 122 resident (breeding), 9 visitors and 9 Palearctic migrants were recorded. The group of dominant species was composed of the following four species: Grey-headed Sparrow, Black-eyed Bulbul, Laughing Dove, and Blue Waxbill. They comprised together 42.5% of all birds. The group of subdominant species included: Rock Dove, Pied Crow, Cape Turtle-Dove, Red-eyed Dove, Southern Masked Weaver, Burchell's Starling and Mourning Dove. Together they comprised 18.7%. The remaining 112 species comprised 38.8%. The most numerous feeding guilds were granivores (51.3%), frugivores and insectivores (each with c. 20%). Most birds (61.3%) nested in trees and shrubs. Katima Mulilo is probably the only town in whole southern Africa, where all four *Streptopelia*-doves are common species: Laughing, Cape Turtle, Red-eyed, and Mourning Dove. The only sparrow, which occurs in Katima Mulilo, is the Grey-headed Sparrow. Of special interest is the occurrence of dozen or so species which do not occur in other towns in Namibia, such as African Fish Eagle, Broad-billed Roller, Schalow's Lorie, Trumpeter Hornbill, among others.

**Keywords:** urban ecology, avian communities, *Streptopelia*, *Passer*, *Eurystomus glaucurus*, *Tauraco schalowi*, *Bycanistes buccinator*.

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# 1 Introduction

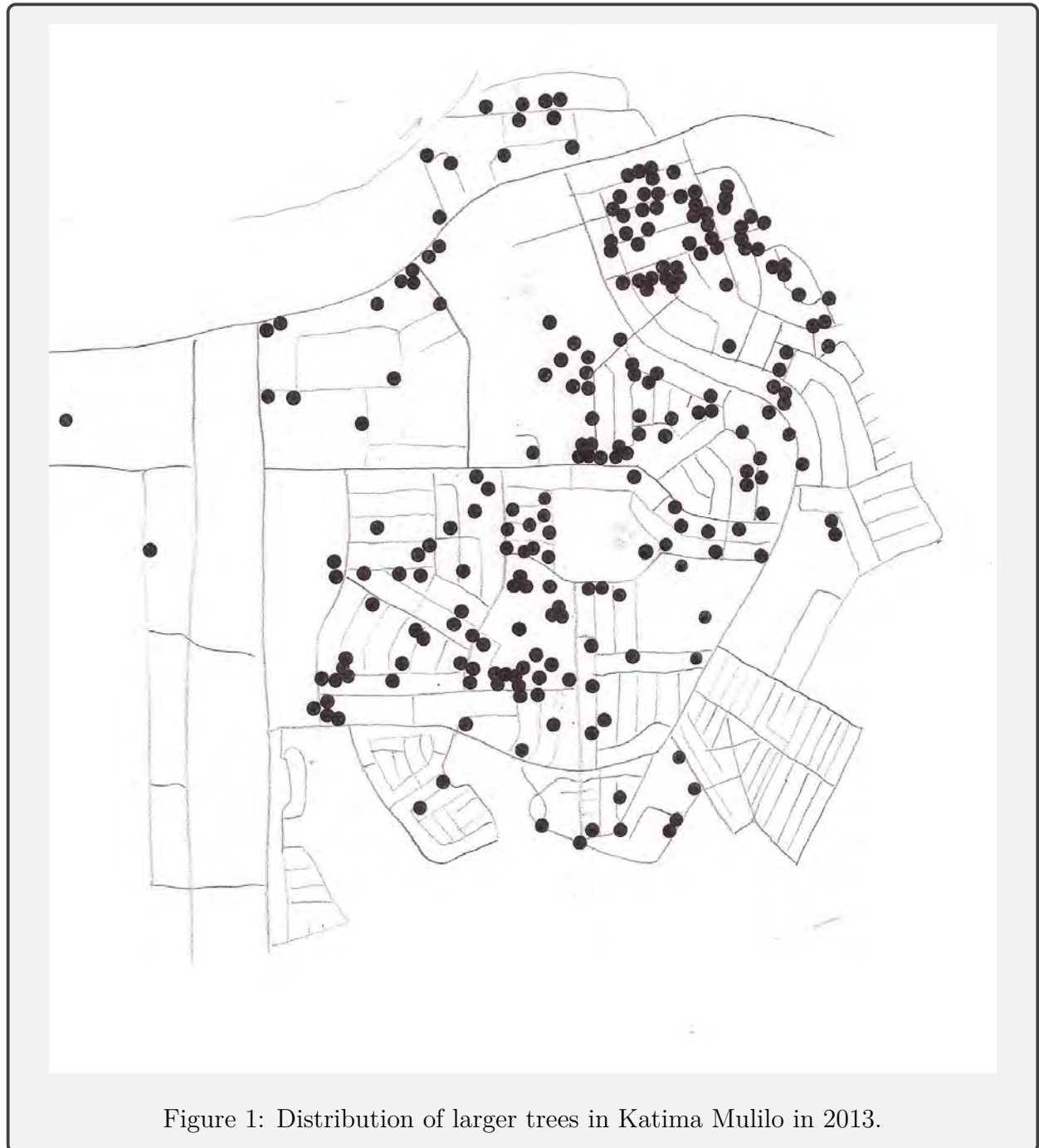
Large river valleys are usually characterized by high level of biodiversity. It is especially true in regard to avian diversity. Partly it is because such places are abundant of large trees and shrubs preferred by most bird species for feeding and nesting sites. All over the world, towns and cities are often located in such valleys, what makes biodiversity studies especially important (for example human-wildlife conflicts, wildlife conservation, environmental education, adaptations, competition, bioindicators) and relatively easy to conduct.

However, in Namibia only two towns are located in river valleys: Rundu on Okavango River, and Katima Malilo on Zambezi River. To date, no quantitative studies on any components of biodiversity have been conducted in those towns. This is also true with regard to birdlife (Kopij 2014a), which is usually well-documented in such habitats. Information on birds living in urbanized habitats may be useful not only for a better understanding of bird adaptations for living in human-modified habitats, but is also valuable for tourist agencies, as birds often attract high attention of eco-tourists. Such data can also comprise a strong tool in environmental education, encouraging children to observe, cherish, and in consequence, to protect birds, their environment, and, indeed, the whole nature.

Table 1: Time expenditure in the study, from 27th January 2013 to 23rd March 2013.

Date	Time	Minutes	Date	Time	Minutes
27.01.2013	07.15-10.15	120	24.03.2013	06.15-08.30	135
27.01.2013	17.15-20.15	180	29.03.2013	07.30-08.30	60
28.01.2013	05.55-08.00	125	30.03.2013	06.45-08.45	120
31.01.2013	06.15-08.15	120	02.04.2013	06.50-08.50	120
01.02.2013	06.15-08.00	105	03.04.2013	06.30-08.30	110
06.02.2013	17.45-19.00	75	05.04.2013	06.40-08.40	120
09.02.2013	07.30-09.00	90	06.04.2013	06.30-08.50	140
09.02.2013	17.30-18.30	60	26.04.2013	08.20-09.50	90
10.02.2013	06.45-09.45	120	27.04.2013	07.10-09.30	140
16.02.2013	06.20-08.20	120	28.04.2013	07.20-09.00	100
17.02.2013	07.00-08.00	60	04.05.2013	07.45-09.30	45
21.02.2013	06.15-07.40	95	05.05.2013	07.30-09.30	120
23.02.2013	07.00-09.00	120	07.05.2013	07.40-09.10	90
24.02.2013	06.30-08.20	110	08.05.2013	07.15-09.30	135
10.03.2013	07.10-09.10	120	09.05.2013	08.15-09.45	90
10.03.2013	17.40-18.40	60	11.05.2013	07.45-09.35	60
16.03.2013	06.40-09.10	150	12.05.2013	07.10-08.40	90
16.03.2013	17.40-18.40	60	18.05.2013	08.10-10.00	120
17.03.2013	06.15-08.35	140	25.05.2013	08.00-10.00	120
23.03.2013	06.25-08.25	120	26.05.2013	08.10-09.30	20

The aim of this study was to investigate the avian diversity in Katima Mulilo. Each bird species recorded in the town was assigned to three categories: resident (breeding), visitor



or Palearctic (European) migrant. For each species its relative abundance and dominance was determined. For less common resident species also distribution of their territories in the town is presented.

## 2 Methods

Studies were conducted from January to May 2013. The line transect method in American version (without belts) have been employed to quantify the whole avian assemblage (Bibby et al. 1992). Transects were designed along roads and paths. All transects were surveyed on monthly basis from January to May 2013. So, counts were conducted four times on each transect. In total, 40 expeditions in 36 days (35 mornings and 5 evenings) were organized, with a total of 4175 min., i.e. 70 hours devoted for counts (Table 1).

For the less common species, the territory mapping method was used alternatively. The whole study area was covered 4-times, once in each of the following months: February, March, April and May. A bird showing breeding behaviour (nest-building, occupied nest, chicks begged for food), was regarded as territorial, as was also a singing male, or a bird showing territorial behavior. Such birds recorded at least twice in the same site were assumed as breeding, i.e. territorial (cf. Bibby et al. 1992). Observations were aided with 10×50 binoculars.

For each species recorded, the number of breeding pairs, dominance and index of relative abundance are given. Dominance is expressed as the percentage proportion of resident pairs of a given species to the total number of all breeding pairs of all species recorded. The index of relative abundance is calculated as the percentage of the number of resident pairs of a given species in relation to the number of breeding pairs of the most numerous species (Bibby et al. 1992).

The total number of pairs is presented in two ways: 1) as the maximal number of pairs recorded in any of the five study month (recommended in line transect method; by Bibby et al. 1992; 2) as the sums of maximal numbers recorded in each month (Table 2).

Dominant species is defined here as comprising at least 5% of the total number of all breeding pairs; while subdominant that comprising 2.0-4.9% of that total (Bibby et al. 1992). The nomenclature of bird species follows that of Hockey et al. (2005). Both common and scientific names of all bird species recorded are listed in Table 2 and 3.

## 3 Study area

Studies were conducted in Katima Mulilo town, within boundaries as shown in Fig. 1. It is located in the far north-eastern part of Namibia, in the Zambezi River Valley. The natural vegetation in the town is partly Kalahari Woodland and Mopane Savanna, and partly the Zambezi Forest. However now, only small remnants of this vegetation remained, mostly on

Table 2: Resident (breeding) birds in Katima Mulilo in 2013. Dominant and subdominant species are indicated in bold case. *N* - number of potentially breeding pairs, Dom. Dominance. Dominant and subdominant species are indicated with bold case.

Species English name	Species Latin name	N. pairs recorded in month					Max. from any month			Total from all months		
		I	II	III	IV	V	N	Dom.	Index	N	Dom.	Index
African Black Tit	<i>Parus niger</i>	0	0	1	1	0	1	0.06	0.40	2	0.04	0.01
African Emerald Cuckoo	<i>Chrysococcyx cupreus</i>	1	0	0	1	1	1	0.06	0.40	3	0.06	0.01
African Finfoot	<i>Podica senegalensis</i>	1	0	0	0	0	1	0.06	0.40	1	0.02	0.00
African Fish Eagle	<i>Haliaeetus vocifer</i>	0	0	0	0	1	1	0.06	0.40	1	0.02	0.00
African Golden Oriole	<i>Oriolus auratus</i>	2	8	9	6	5	9	0.55	3.60	30	0.61	0.08
African Green Pigeon	<i>Treron calvus</i>	1	2	1	0	0	2	0.12	0.80	47	0.08	0.01
African Harrier-Hawk	<i>Polyboides typus</i>	0	0	1	0	0	1	0.06	0.40	1	0.02	0.00
African Jacana	<i>Actophilornis africanus</i>	0	0	1	0	0	1	0.06	0.40	1	0.02	0.00
African Palm Swift	<i>Cypsiurus parvus</i>	1	0	0	0	1	1	0.06	0.40	2	0.04	0.01
African Paradise-Flycatcher	<i>Terpsiphone viridis</i>	3	5	1	0	0	5	0.30	2.00	9	0.18	0.02
African Pied Wagtail	<i>Motacilla aguimp</i>	0	0	4	2	2	4	0.24	1.60	8	0.16	0.02
African Yellow White-eye	<i>Zosterops senegalensis</i>	0	1	0	0	1	1	0.06	0.40	2	0.04	0.01
Amethyst Sunbird	<i>Chalcomitra amethystina</i>	0	2	0	0	0	2	0.12	0.80	2	0.04	0.01
Arrow-marked Babbler	<i>Turdoides jardinerii</i>	3	5	12	7	13	13	0.79	5.20	40	0.82	0.11
Barn Owl	<i>Tyto alba</i>	0	0	0	0	2	2	0.12	0.80	2	0.04	0.01
Black-backed Puffback	<i>Dryoscopus cubla</i>	2	12	4	0	2	12	0.73	4.80	20	0.41	0.05
Black-chested Prinia	<i>Prinia flavicans</i>	9	30	16	4	6	30	1.83	12.00	65	1.33	0.18
Black-collared Barbet	<i>Lybius torquatus</i>	5	16	9	11	13	16	0.98	6.40	54	1.10	0.15
Black-eyed Bulbul	<i>Pycnonotus tricolor</i>	85	172	116	130	179	179	10.91	71.60	682	13.92	1.84
Black-throated Canary	<i>Crithagra atrogularis</i>	2	9	0	0	1	9	0.55	3.60	12	0.24	0.03
Blue Waxbill	<i>Uraeginthus angolensis</i>	34	88	126	123	106	126	7.68	50.40	477	9.73	1.29
Bradfield's Hornbill	<i>Tockus bradfieldi</i>	0	0	0	0	1	1	0.06	0.40	1	0.02	0.00
Broad-billed Roller	<i>Eurystomus glaucurus</i>	1	3	1	0	0	3	0.18	1.20	5	0.10	0.01
Bronze Mannikin	<i>Spermestes cucullata</i>	2	4	1	7	3	7	0.43	2.80	17	0.35	0.05
Brown Firefinch	<i>Lagonosticta nitidula</i>	1	0	2	0	0	2	0.12	0.80	3	0.06	0.01
Brown-crowned Tchagra	<i>Tchagra australis</i>	0	0	0	1	0	1	0.06	0.40	1	0.02	0.00
Brubru	<i>Nilaus afer</i>	0	0	0	3	5	5	0.30	2.00	8	0.16	0.02
Burchell's Starling	<i>Lamprotornis australis</i>	12	23	20	27	36	36	2.19	14.40	118	2.41	0.32
Cape Glossy Starling	<i>Lamprotornis nitens</i>	6	6	3	8	17	17	1.04	6.80	40	0.82	0.11
Cape Reed Warbler	<i>Acrocephalus gracilirostris</i>	0	1	1	0	0	1	0.06	0.40	2	0.04	0.01
Cape Turtle-Dove	<i>Streptopelia capicola</i>	23	0	34	28	44	44	2.68	17.60	129	2.63	0.35
Cape Wagtail	<i>Motacilla capensis</i>	0	1	0	0	0	1	0.06	0.40	1	0.02	0.00
Cardinal Woodpecker	<i>Dendropicos fuscescens</i>	1	1	2	3	4	4	0.24	1.60	11	0.22	0.03
Centropus sp.	<i>Centropus sp.</i>	3	1	0	0	0	3	0.18	1.20	4	0.08	0.01
Cinnyris sp.	<i>Cinnyris sp.</i>	0	9	0	0	0	9	0.55	3.60	9	0.18	0.02
Collared Sunbird	<i>Hedypnea collaris</i>	0	1	0	0	0	1	0.06	0.40	1	0.02	0.00
Common Moorhen	<i>Gallinula chloropus</i>	0	0	2	0	0	2	0.12	0.80	2	0.04	0.01
Common Scimitarbill	<i>Rhinopomastus cyanomelas</i>	1	0	0	0	0	1	0.06	0.40	1	0.02	0.00
Coppery-tailed Coucal	<i>Centropus cupreicaudatus</i>	0	1	0	1	0	1	0.06	0.40	2	0.04	0.01
Crested Barbet	<i>Trachyphonus vaillantii</i>	1	1	1	1	0	1	0.06	0.40	4	0.08	0.01
Crimson-breasted Shrike	<i>Lanioturdus atrococcineus</i>	0	0	2	0	0	2	0.12	0.80	2	0.04	0.01
Diederick Cuckoo	<i>Chrysococcyx caprius</i>	5	12	2	0	0	12	0.73	4.80	19	0.39	0.05
Emerald-spotted Dove	<i>Turtur chalcospilos</i>	9	16	9	5	2	16	0.98	6.40	41	0.84	0.11
Fork-tailed Drongo	<i>Dicrurus adsimilis</i>	24	48	45	24	29	24	1.46	9.60	170	3.47	0.46
Gabar Goshawk	<i>Melierax gabar</i>	1	1	0	4	5	5	0.30	2.00	11	0.22	0.03
Golden Weaver	<i>Ploceus xanthopus</i>	4	3	0	0	0	4	0.24	1.60	7	0.14	0.02
Golden-tailed Woodpecker	<i>Campethera abingoni</i>	0	1	1	1	0	1	0.06	0.40	3	0.06	0.01
Greater Honeyguide	<i>Indicator indicator</i>	0	1	2	0	0	2	0.12	0.80	3	0.06	0.01
Green Wood-Hoopoe	<i>Phoeniculus purpureus</i>	7	26	8	7	3	26	1.58	10.40	51	1.04	0.14
Green-backed Heron	<i>Butorides striatus</i>	0	0	0	0	1	1	0.06	0.40	1	0.02	0.00
Grey Hornbill	<i>Tockus nasutus</i>	0	1	6	5	7	7	0.43	2.80	19	0.39	0.05
Grey Lorie	<i>Corythaixoides concolor</i>	0	7	12	6	9	12	0.73	4.80	34	0.69	0.09
Grey-backed Camaroptera	<i>Camaroptera brevicaudata</i>	0	0	1	1	1	1	0.06	0.40	3	0.06	0.01
Grey-headed Bush-Shrike	<i>Malaconotus blanchoti</i>	0	0	1	0	0	1	0.06	0.40	1	0.02	0.00
Grey-headed Kingfisher	<i>Halcyon leucocephala</i>	7	3	0	0	1	7	0.43	2.80	11	0.22	0.03
Grey-headed Sparrow	<i>Passer diffusus</i>	60	250	186	161	100	250	15.23	100.00	757	15.45	2.04
Hamerkop	<i>Scopus umbretta</i>	0	2	1	1	2	2	0.12	0.80	6	0.12	0.02
Helmeted Guineafowl	<i>Numida meleagris</i>	0	0	1	0	0	2	0.12	0.80	1	0.02	0.00
Jacobin Cuckoo	<i>Clamator jacobinus</i>	1	7	0	0	1	7	0.43	2.80	9	0.18	0.02
Kalahari Scrub-Robin	<i>Cercotrichas paena</i>	0	0	1	1	5	5	0.30	2.00	7	0.14	0.02
Lanner Falcon	<i>Falco biarmicus</i>	0	1	0	0	0	1	0.06	0.40	1	0.02	0.00
Laughing Dove	<i>Streptopelia senegalensis</i>	47	117	143	130	142	143	8.71	57.20	579	11.82	1.56
Lesser Jacana	<i>Microparra capensis</i>	3	0	0	0	0	3	0.18	1.20	3	0.06	0.01
Lesser Striped Swallow	<i>Hirundo abyssinica</i>	0	0	0	0	1	1	0.06	0.40	1	0.02	0.00
Lilac-breasted Roller	<i>Coracias caudatus</i>	2	3	6	17	24	24	1.46	9.60	52	1.06	0.14
Little Bee-eater	<i>Mrops pusillus</i>	1	8	4	2	1	8	0.49	3.20	16	0.33	0.04
Little Grebe	<i>Tachybaptus ruficollis</i>	1	0	2	0	07	2	0.12	0.80	3	0.06	0.01
Little Sparrowhawk	<i>Accipiter minullus</i>	1	1	0	1	1	1	0.06	0.40	4	0.08	0.01
Little Swift	<i>Apus affinis</i>	0	8	3	0	0	8	0.49	3.20	11	0.22	0.03
Lizard Buzzard	<i>Kaupifalco monogrammicus</i>	0	0	0	0	1	1	0.06	0.40	1	0.02	0.00
Long-billed Crombec	<i>Sylvietta rufescens</i>	8	2	3	4	2	4	0.24	1.60	19	0.39	0.05
Long-tailed Shrike	<i>Corvinella melanoleuca</i>	0	1	1	1	3	3	0.18	1.20	6	0.12	0.02

Species English name	Species Latin name	N. pairs recorded in month					Max. from any month			Total from all months		
		I	II	III	IV	V	N	Dom.	Index	N	Dom.	Index
Malachite Kingfisher	<i>Alcedo cristata</i>	2	1	0	0	0	2	0.12	0.80	3	0.06	0.01
Marico Flycatcher	<i>Bradornis mariquensis</i>	0	0	0	0	1	1	0.06	0.40	1	0.02	0.00
Marico Sunbird	<i>Cinniris mariquensis</i>	1	15	21	18	9	21	1.28	8.40	64	1.31	0.17
Meyer's Parrot	<i>Poicephalus meyeri</i>	1	4	3	2	6	6	0.37	2.40	16	0.33	0.04
Mourning Dove	<i>Streptopelia decipiens</i>	12	29	17	23	34	34	2.07	13.60	115	2.35	0.31
Namaqua Dove	<i>Oena capensis</i>	0	0	0	1	1	1	0.06	0.40	2	0.04	0.01
Orange-breasted Shrike	<i>Telophorus sulphureopectus</i>	0	0	0	0	3	3	0.18	1.20	3	0.06	0.01
Pale Flycatcher	<i>Bradornis pallidus</i>	1	0	0	0	0	1	0.06	0.40	1	0.02	0.00
Pearl-spotted Owlet	<i>Glaucidium perlatum</i>	0	0	0	0	2	2	0.12	0.80	2	0.04	0.01
Pied Crow	<i>Corvus albus</i>	19	43	48	40	22	48	2.93	19.20	172	3.51	0.46
Pied Kingfisher	<i>Ceryle rudis</i>	4	1	0	0	0	4	0.24	1.60	5	0.10	0.01
Rosy-throated Longclaw	<i>Macronyx amaliae</i>	0	1	0	0	0	1	0.06	0.40	1	0.02	0.00
Purple Roller	<i>Coracias naevius</i>	0	0	0	1	2	2	0.12	0.80	3	0.06	0.01
Rattling Cisticola	<i>Cisticola chiniana</i>	0	1	4	6	21	21	1.28	8.40	32	0.65	0.09
Red-billed Buffalo-Weaver	<i>Bubalornis niger</i>	6	12	16	15	14	16	0.98	6.40	63	1.29	0.17
Red-billed Firefinch	<i>Lagonosticta senegala</i>	0	0	5	2	1	5	0.30	2.00	8	0.16	0.02
Red-breasted Swallow	<i>Hirundo semirufa</i>	0	1	1	0	0	1	0.06	0.40	2	0.04	0.01
Red-chested Cuckoo	<i>Cuculus solitarius</i>	1	0	0	0	0	1	0.06	0.40	1	0.02	0.00
Red-eyed Dove	<i>Streptopelia semitorquata</i>	26	44	41	34	24	44	2.68	17.60	169	3.45	0.46
Red-faced Mousebird	<i>Urocolius indicus</i>	10	23	10	8	10	23	1.40	9.20	61	1.24	0.16
Retz's Helmet-Shrike	<i>Prionops retzii</i>	0	0	0	0	1	1	0.06	0.40	1	0.02	0.00
Rock Dove	<i>Columba livia</i>	0	41	34	60	15	60	3.66	24.00	150	3.06	0.40
Scarlet-chested Sunbird	<i>Chalcomitra senegalensis</i>	0	0	0	0	1	1	0.06	0.40	1	0.02	0.00
Schalow's Tauraco	<i>Tauraco schalowi</i>	0	2	0	1	5	5	0.30	2.00	8	0.16	0.02
Senegal Coucal	<i>Centropus senegalensis</i>	0	2	4	1	6	6	0.37	2.40	13	0.27	0.04
Shikra	<i>Accipiter badius</i>	0	0	1	3	2	3	0.18	1.20	6	0.12	0.02
S. Brown-throated Weaver	<i>Ploceus xanthopterus</i>	0	1	0	0	0	1	0.06	0.40	1	0.02	0.00
Southern Black Flycatcher	<i>Melaenornis pammelaina</i>	1	0	0	0	0	1	0.06	0.40	1	0.02	0.00
Southern Masked Weaver	<i>Ploceus velatus</i>	10	22	4	13	40	40	2.44	16.00	89	1.82	0.24
Southern Red Bishop	<i>Euplectes orix</i>	0	15	0	0	0	15	0.91	6.00	15	0.31	0.04
Tchagra sp.	<i>Tchagra sp.</i>	0	0	0	0	3	3	0.18	1.20	3	0.06	0.01
Terrestrial Bulbul	<i>Phyllastrephus terrestris</i>	3	0	0	0	0	3	0.18	1.20	3	0.06	0.01
Tropical Boubou	<i>Laniarius aethiopicus</i>	2	4	7	1	8	7	0.43	2.80	22	0.45	0.06
Thick-billed Weaver	<i>Amblyospiza albifrons</i>	0	0	1	1	0	1	0.06	0.40	2	0.04	0.01
Village Indigobird	<i>Vidua chalybeata</i>	3	4	5	47	4	5	0.30	2.00	20	0.41	0.05
Violet-backed Starling	<i>Cinnyricinclus leucogaster</i>	0	0	0	3	9	9	0.55	3.60	12	0.24	0.03
Water Thick-knee	<i>Burhinus vermiculatus</i>	0	0	1	0	0	1	0.06	0.40	1	0.02	0.00
White-bellied Sunbird	<i>Cinnyris talatala</i>	0	0	0	2	3	3	0.18	1.20	5	0.10	0.01
White-browed Coucal	<i>Centropus superciliosus</i>	1	1	0	0	2	2	0.12	0.80	4	0.08	0.01
White-browed Robin-Chat	<i>Cossypha heuglini</i>	3	8	21	5	5	21	1.28	8.40	42	0.86	0.11
White-crested Helmet-Shrike	<i>Prionops plumatus</i>	0	0	0	0	1	1	0.06	0.40	1	0.02	0.00
White-faced Duck	<i>Dendrocygna viduata</i>	0	1	2	0	1	1	0.06	0.40	4	0.08	0.01
Wire-tailed Swallow	<i>Hirundo smithii</i>	2	14	7	10	5	14	0.85	5.60	38	0.78	0.10
Woodland Kingfisher	<i>Halcyon senegalensis</i>	0	8	3	1	0	8	0.49	3.20	12	0.24	0.03
Yellow-bellied Apalis	<i>Apalis flavida</i>	17	24	2	0	1	24	1.46	9.60	44	0.90	0.12
Yellow-bellied Greenbul	<i>Chlorocichla flaviventris</i>	0	1	7	9	13	13	0.79	5.20	30	0.61	0.08
Yellow-billed Hornbill	<i>Tockus leucomelas</i>	0	0	0	0	1	1	0.06	0.40	1	0.02	0.00
Yellow-billed Kite	<i>Milvus aegyptius</i>	1	2	1	0	0	2	0.12	0.80	4	0.08	0.01
Yellow-fronted Tinkerbird	<i>Pogoniulus chyroconus</i>	0	0	2	4	6	6	0.37	2.40	12	0.24	0.03
Zitting Cisticola	<i>Cisticola juncidis</i>	0	0	2	0	0	2	0.12	0.80	2	0.04	0.01
Total number of pairs		507	1246	1078	1003	1066	1641	4900				

the banks of Zambezi River.

The town is well-timbered with both indigenous and exotic trees and shrubs (Fig. 2). Among trees, the most common are fruit trees, such as mangos, papayas, kasavas, lemons and also bananas

Indigenous wild trees include among many others: African Teak *Pterocarpus angolensis*, Albizias *Albizia* spp., Apple Leaves *Lonchocarpus nelsii*, Baobab *Adansonia digitata*, Burkea *Burkea africana*, Combretum *Combretum* spp., Camel-thorn *Acacia erioloba*, Corkwoods *Commiphora* spp., False Mopane *Guibourtia coleospermum*, Jackal Berry *Diospyros mespiliformis*, Knob-thorn *Accacia nigrescens*, Makalani Palm *Hyphaene petersiana*, Manketti *Schinziophyton rautanenii*, Marula *Sclerocarya birrea*, Mopane *Colophospermum mopane*, Pod Mahogany *Azalia quanzensis*, Silver Cluster-leaf *Terminalia sericea*, Sausage Tree *Kigelia africana*, Sycomore Fig *Ficus sycomorus*, White Bauhinia *Bauhinia petersiana*,

Zambezi Teak *Baikiaea plurijuga*.

The most common exotic trees are gums *Eucalyptus spp.*, jacarandas *Jackaranda sp.*, she-oaks *Cassuarina sp.* For birds especially important are older and larger specimens of these trees. For this reason they were mapped as shown in Fig. 1. It should be emphasized that these trees require special protection as they play a vital role in the urban ecology.

The annual temperature for Katima Mulilo is 21°C. Average maximum temperature during the hottest month (September) is 35°C; the average minimum temperature during the coldest month (July) is 3°C. In the most humid month (February) the humidity is 80-90%, and only 10-20% in the least humid month (September). The average annual rainfall is c. 700 mm, the highest in Namibia. Median annual rainfall is 550-600 mm. Most of the rains fall between November and March.

## 4 Results and Discussion

In January-May 2013, a total of 122 resident (breeding), 9 visitors and 9 Palearctic migrants were recorded in Katima Mulilo. The grand total is therefore 140 species. Although the numbers are high, still dozen or so rare and elusive resident species could have passed undetected. Some other species may breed in Katima Muliolo erratically, in some years only, so they have passed unrecorded in 2013. If observations and studies on birds of the town will continue for another few years, the number of visitor species may finally be few times higher than that recorded during the five-month-period in 2013. There is a clear positive relationship between the number of recorded visitor species and the length of study period. For example, in Bloemfontein, South Africa, where studies/observations on birds were conducted over five-year-period, as many as 46 visitors and vagrants were recorded (Kopij 2000, 2014c). To a lesser extend this relationship is also applicable to the Palearctic migrants.

An attempt was made to plot on maps territories of some less common species (Fig. 3-5). Some of the species are shown in Fig. 6-9. Each territory is occupied by a breeding pair. The pair selects first a suitable nesting site, in which a nest is constructed, then eggs are laid and incubated in it, and finally chicks are reared. It takes normally 2-3 months to complete the whole breeding cycle. During the entire cycle both male and female parent remain exclusively in this territory. After the breeding cycle is completed, many bird species still hold the territory, but some other vacate and re-occupy it next year. Few territories can be vacated for several years or forever, if environmental conditions deteriorated in meantime. As can be seen from these maps, the highest density of these species was recorded in well-timbered areas of the town (cf. Fig. 1 with Fig. 3-5).





Figure 2: Habitats in Katima Mulilo: upper left: Zambezi River near the Wooden Bridge; upper right: mixed natural and exotic vegetation along the Zambezi Street; middle left: luxuriant vegetation with *Lonchocarpus violacea* and *Terminalia sericea* on the northern peripheries of the town; middle right: suburbs with mango gardens and the prominent *Hyphaene petersiana* palms; lower left: town centre with kasavas and *Colophospermum mopane* trees; lower right: Well-timbered suburbs in the older part of the town.

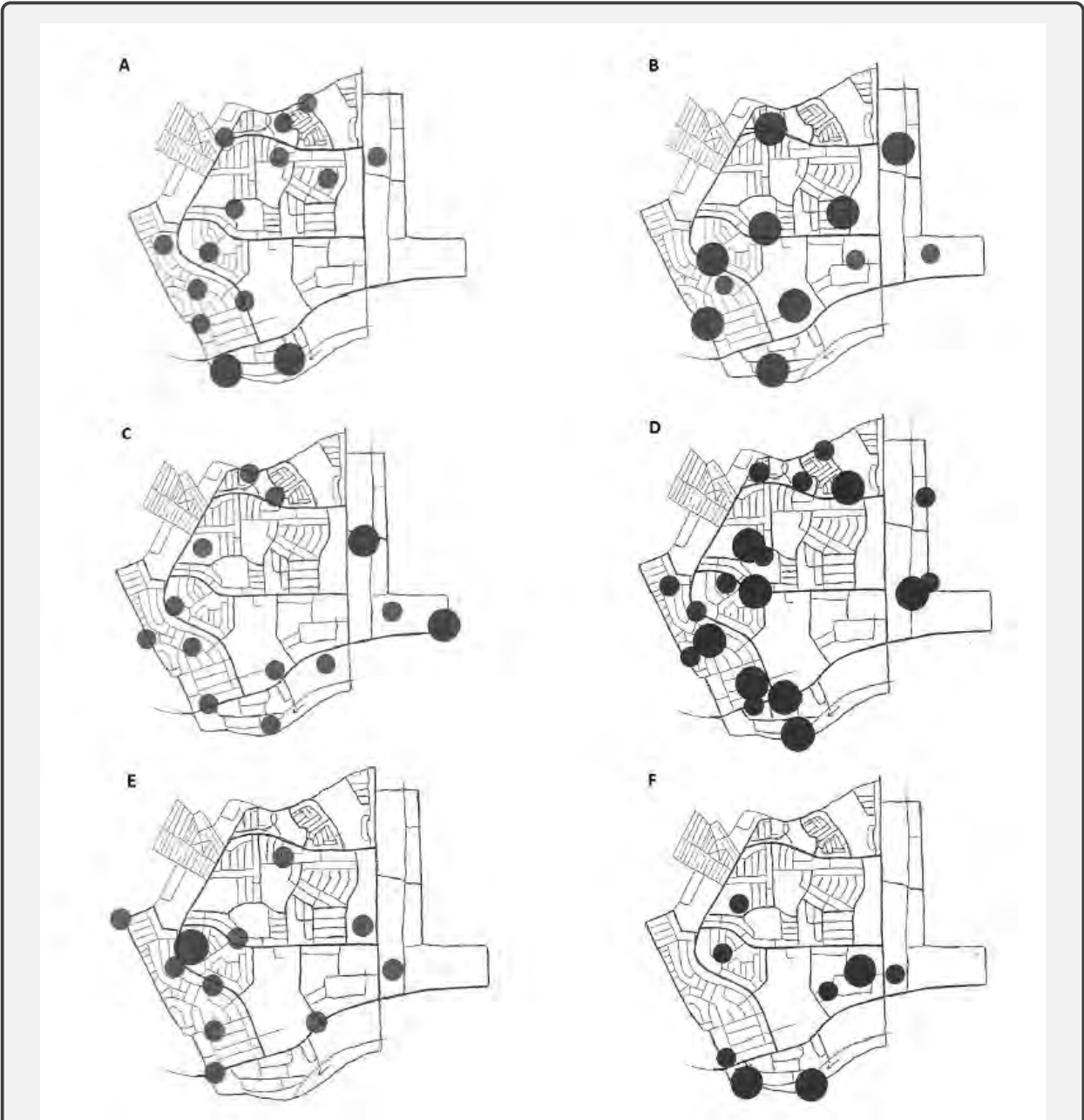
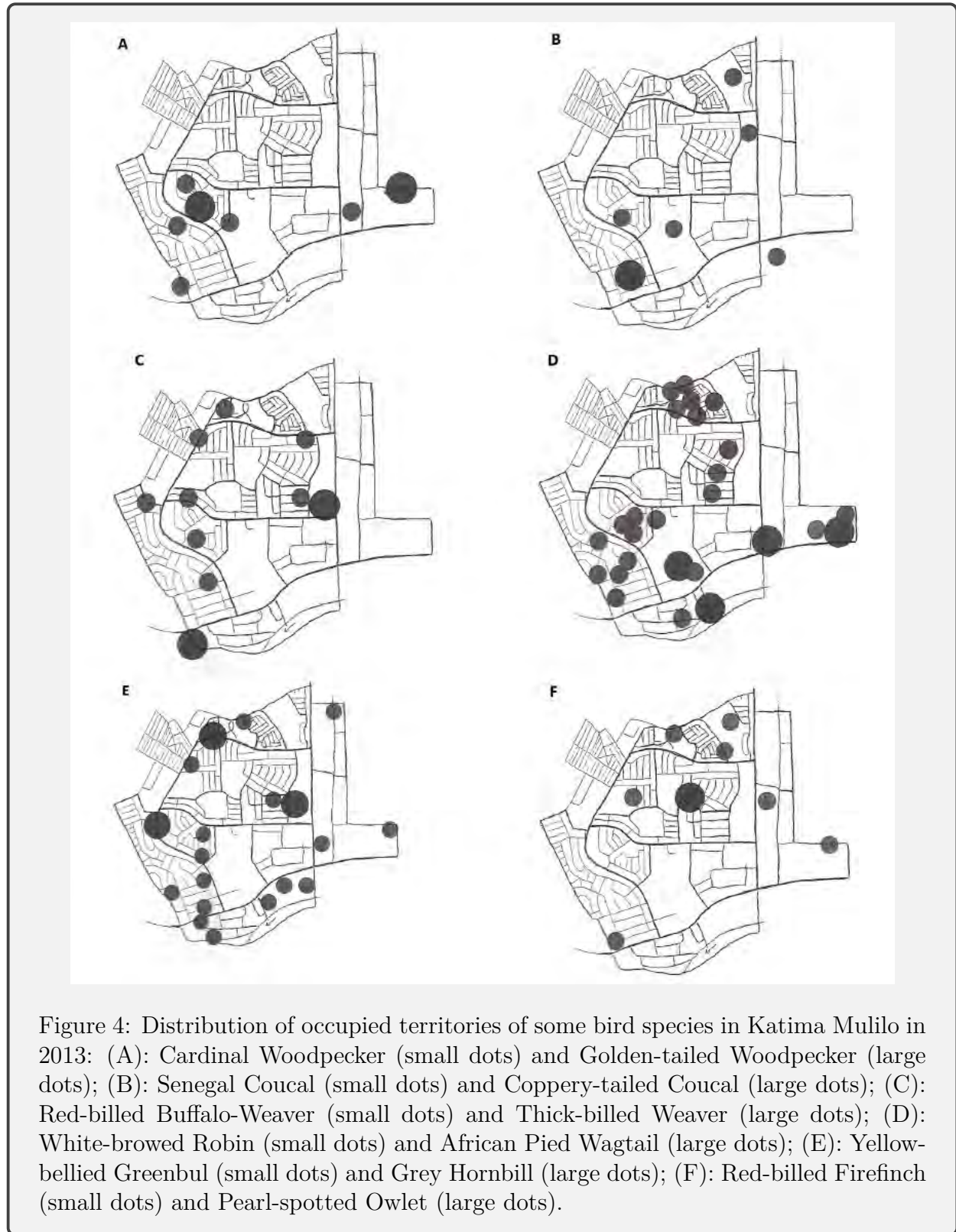


Figure 3: Distribution of occupied territories of some bird species in Katima Mulilo in 2013: (A): Arrow-marked Babbler (small dots) and Collared Sunbird (large dots); (B): Chinspot Batis (small dots) and Green Wood-Hoopoe (large dots); (C): Tropical Boubou (small dots) and Crimson-breasted Shrike (large dots); (D): Grey Lourie (small dots) and Schalow's Tauraco (large dots);(E): Black-collared Barbet (small dots) and Crested Barbet (large dots); (F): Grey-headed Kingfisher (small dots) and Woodland Kingfisher (large dots).





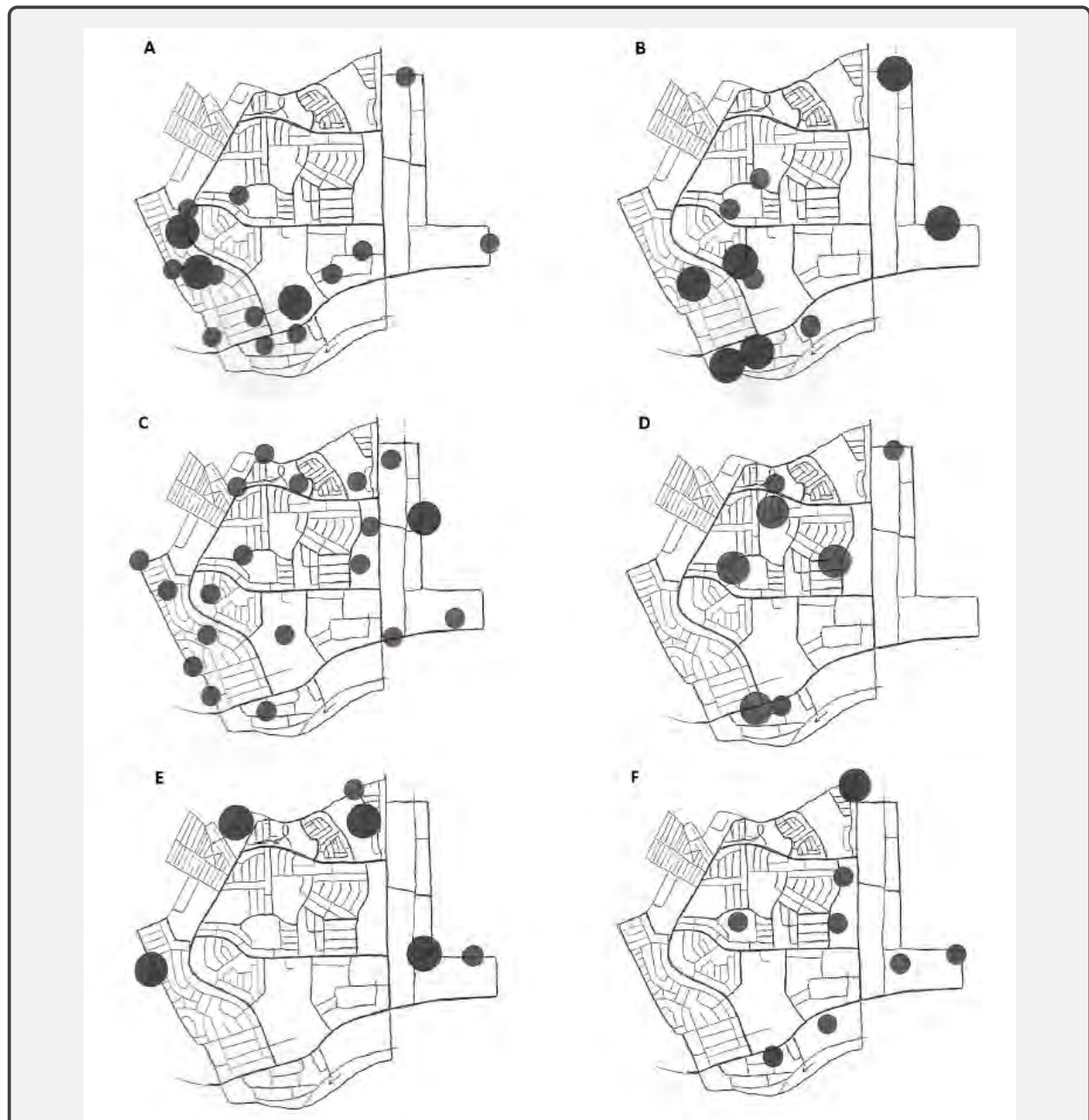


Figure 5: Distribution of occupied territories of some bird species in Katima Mulilo in 2013: (A): African Golden Oriole (small dots) and Black-crowned Tchagra (large dots); (B): Long-billed Crombec (small dots) and Emerald-spotted Dove (large dots); (C): Lilac-breasted Roller (small dots) and Purple Roller (large dots); (D): Black-backed Puffback (small dots) and Brubru (large dots); (E): Lizard Buzzard (small dots) and Gabar Goshawk (large dots); (F): Little Bee-eater (small dots) and Swallow-tailed Bee-eater (large dots).

Table 3: Non-breeding African visitors and Palearctic migrants in Katima Mulilo in 2013. *N* - number of potentially breeding pairs, Dom. Dominance.

Species English name	Species Latin name	N. pairs recorded in month					Max. from any month			Total from all months		
		I	II	III	IV	V	N	Dom.	Index	N	Dom.	Index
<b>African visitors</b>												
Black-headed Heron	<i>Ardea melanocephala</i>	0	0	2	1	3	3	0.5	1.0	6	0.8	1.8
Carmine Bee-eater	<i>Merops nubicoides</i>	0	0	0	0	7	7	1.1	2.3	7	0.9	2.1
Cattle Egret	<i>Bubulcus ibis</i>	3	1	138	13	7	138	21.6	45.4	162	21.5	49.4
Grey Heron	<i>Ardea cinerea</i>	0	0	0	1	0	1	0.2	0.3	1	0.1	0.3
Openbill Stork	<i>Anastomus lamelligerus</i>	304	3	20	1	0	304	47.5	100.0	328	43.6	100.0
Red-billed Quelea	<i>Quelea quelea</i>	0	0	0	5	60	60	9.4	19.7	65	8.6	19.8
Reed Cormorant	<i>Phalacrocorax africanus</i>	2	0	1	1	0	2	0.3	0.7	4	0.5	1.2
Rufous-bellied Heron	<i>Ardeola rufiventris</i>	2	1	0	0	0	2	0.3	0.7	3	0.4	0.9
White-breasted Cormorant	<i>Phalacrocorax lucidus</i>	10	0	0	0	0	10	1.6	3.3	10	1.3	3.0
<b>Total</b>		321	5	161	22	77	527	82.5		586	77.7	
<b>Palearctic migrants</b>												
Barn Swallow	<i>Hirundo rustica</i>	2	3	27	0	0	27	4.2	8.9	32	4.3	9.8
European Bee-eater	<i>Merops apiaster</i>	23	6	7	0	0	23	3.6	7.6	36	4.8	11.0
Great Reed Warbler	<i>Acrocephalus arundinaceus</i>	2	12	2	0	0	12	1.9	3.9	16	2.1	4.9
Marsh Warbler	<i>Acrocephalus palustris</i>	0	22	38	0	0	38	5.9	12.5	60	8.0	18.3
Red-backed Shrike	<i>Lanius collurio</i>	1	1	3	0	0	3	0.5	1.0	5	0.7	1.5
Spotted Flycatcher	<i>Muscicapa striata</i>	1	4	2	1	0	4	0.6	1.3	8	1.1	2.4
Thrush Nightingale	<i>Luscinia luscinia</i>	0	0	1	0	0	1	0.2	0.3	1	0.1	0.3
Willow Warbler	<i>Phylloscopus trochilus</i>	1	4	2	0	0	4	0.6	1.3	7	0.9	2.1
Wood Sandpiper	<i>Tringa glareola</i>	0	0	1	0	0	1	0.2	0.3	1	0.1	0.3
<b>Total</b>		30	52	83	1	0	113	17.7	37.1	166	22.1	50.6
<b>Grand Total</b>		351	57	244	23	77	752	640		752	100.0	

The group of dominant species was composed of the following four species: Grey-headed Sparrow, Black-eyed Bulbul (Fig. 8), Laughing Dove, and Blue Waxbill. They comprised together 42.5% of all birds. The group of subdominant species included: Rock Dove, Pied Crow, Cape Turtle-Dove, Red-eyed Dove, Southern Masked Weaver (Fig. 7), Burchell's Starling and Mourning Dove. Together they comprised 18.7%. The remaining 112 species comprised 38.8%. The dominants and subdominants comprised, therefore, together 61.2%.

Most recorded birds (83.7% of individuals) were from the group of breeding residents, only 2.9% individuals were from the group of Africa non-breeding visitors and vagrants, and 13.4% of individuals were Palearctic migrants (Table 2 and 3).

Relatively common in Katima Mulilo were species such as the Green Wood-hoopoe (Fig. 6), Black-collared Barbet (Fig. 9), Lilac-breasted Roller (Fig. 6), Grey Lorie (Fig. 7), Diederick Cuckoo, Emerald-spotted Dove, Red-faced Mousebird, Arrow-marked Babbler, Red-billed Buffalo Weaver, Cape Glossy Starling, Black-chested Prinia, Marico Sunbird, Rattling Cisticola, Southern Red Bishop, White-browed Robin, Wire-tailed Swallow, Yellow-bellied Apalis and Yellow-bellied Greenbul. At least 10 breeding pairs of each of these species were recorded in Katima Mulilo (Table 2).

Katima Mulilo is probably the only town in the whole southern Africa, where all four *Streptopelia*-doves are common species: Laughing, Cape Turtle, Red-eyed, and Mourning Dove. The proportion among them is as follow: 0.54 : 0.17 : 0.17 : 0.13 ( $n = 265$ ), if the maximal numbers from one of the four months is taken into account, or: 0.59 : 0.13 : 0.17 : 0.12 ( $n = 987$ ) if total numbers from all months are taken into account. *Streptopelia*-doves comprised together 16.2% of all birds. The Mourning Dove is strictly associated with the Palm Trees, while Red-eyed Dove usually with dump situations. Cape Turtle Dove occurs



usually most commonly in clumps of trees, especially those of *Acacia eriloba*. The Laughing Dove was encountered most often in drier habitats.

The only sparrow, which is resident in Katima Mulilo, is the Grey-headed Sparrow. The alien House Sparrow *Passer domesticus*, a dominant species in most other towns of Namibia (Kopij 2014b), has not been recorded in Katima Mulilo at all. Also the White-browed Sparrow-weaver *Plocepasser mahali*, so commonly breeding in Namibian towns (G. Kopij, own observations), has not been recorded in Katima Mulilo. On the other hand, the Red-



billed Buffalo-Weaver has not been recorded in most Namibian towns, but it is a common resident in Katima Mulilo.

Of special interest is the occurrence of species which do not occur in other towns in Namibia, such as African Fish Eagle, Trumpeter Hornbill (Fig. 8), Schalow's Lorie (Fig. 9), Broad-billed Roller, Woodland Kingfisher, Grey-headed Kingfisher, Giant Kingfisher, African Emerald Cuckoo, Grey-headed Bush Shrike, Orange-breasted Shrike, Striped Coucal, Senegal Coucal, Black Coucal, Collared Sunbird, Thick-billed Weaver, Speckled Weaver, Golden Weaver. Some of them are endemic to the Zambezi Region, e.g. Trumpeter Hornbill, Black Coucal and Schalow's Lorie.

Birds nesting in trees and shrubs constituted 61.3% of all resident pairs and 54.8% of all resident species recorded, those nesting in building 20.7% of all pairs and 6.5% of all species. Hole-nesting birds comprised 12.0% of all pairs but as many as 21.8% of all species (Fig. 10A). The granivorous feeding guild was composed of 51.3% of all pairs, but only 20.3%





of all species recorded. The insectivores and frugivores were equally numerous in terms of the number of resident pairs (each with c. 20%), but in terms of the number of species the insectivores were twice more numerous than the frugivores (Fig. 10B).

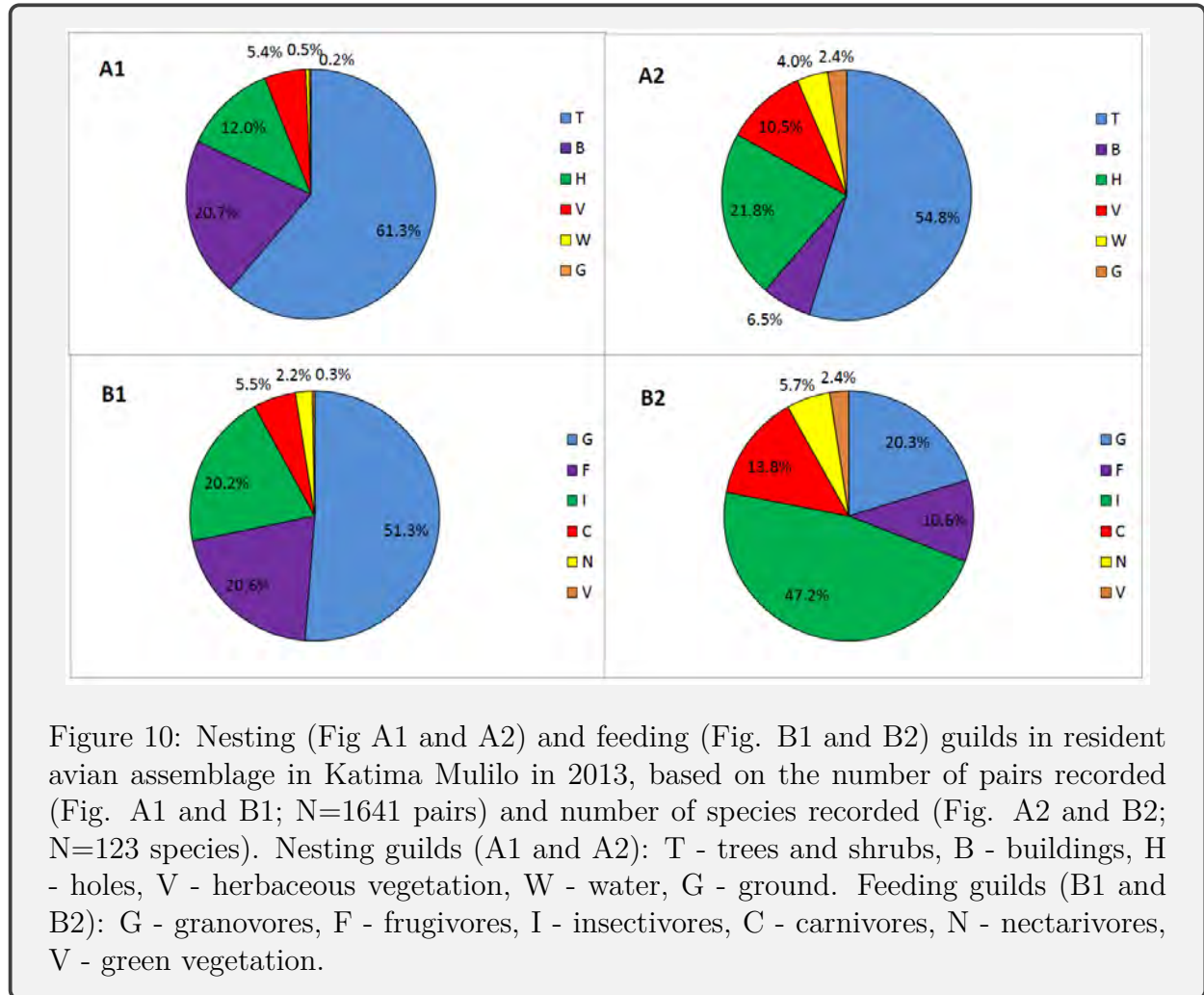
In conclusion, it should be pointed out that since Katima Mulilo town is located in the valley of large river, it has exceptionally high bird diversity. It is one of the richest in





Figure 9: upper left: Schalow's Tauraco; upper right: African Yellow White-eye; lower left: Black-collared Barbet; lower right: Crested Barbet.

avian biodiversity towns in the whole southern African region (cf. Harrison et al. 1997). Furthermore, it probably supports more bird species than any natural habitat of similar area size in Namibia. Since many of the species are rare, endangered and endemic, it makes the town especially attractive ecotourism destination. The birdlife requires therefore our special attention and full protection.



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