

## Distribution and Population Densities of Less Common Granivorous Birds in Zambezi Riparian Forest, NE Namibia

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### Abstract

A territory mapping method has been employed in 2015 to assess the population densities of 12 less common granivorous species breeding in a riparian forest on Zambezi River near Katima Mulilo, NE Namibia. The forest, c. 400 ha in surface area, was partly transformed to human settlements and arable grounds. Population densities (pairs per 100 ha) were assessed for the following species: *Dendroperdix sephaena* – 4.0, *Pternistes adspersus* – 0.5, *P. swainsonii* – 0.5, *Ploceus xanthopterus* – 1.3, *P. xanthops* – 0.5, *Amblyospiza albifrons* – 1.5, *Euplectes axillaris* – 0.5, *E. orix* – 0.5, *Lonchura cucullata* – 0.5, *Lagonosticta nitidula* – 0.3, *Vidua chalybeata* – 0.8, *V. macroura* – 0.3. Many granivorous species avoid nesting in riparian forest, others reach relatively low densities, and only few can be classified as common.

**Keywords:** population densities, habitat selection, riparian forest.

### 1. INTRODUCTION

In terms of biomass granivorous birds are by far the most important feeding guild of birds both in urbanized environment, in farmlands and in some biomes such as grasslands and savanna (Kopij 2006, 2019, 2020, 2021). In sub-Saharan Africa, the group is well represented by more than 300 species dominated by orders such as game fowl (Galliformes), doves (Columbiformes), and among passerines (Passeriformes) by such families like Alaudidae, Ploceidae, Estrildidae, Viduidae, Passeridae, and Fringillidae (Fry et al., 1982-2004; Hockey et al., 2005).

In the forest biome of Africa, granivorous birds are, however, much less numerous. Sandgrouse, larks and sparrows usually do not occur in forests at all. There is, however, scarcity of data on their population densities (Fry et al., 1982-2004; Hockey et al., 2005) in riparian forests, usually highly preferred by many bird species, population densities of granivorous birds have not been investigated so far. This paper provides such data for less common species.

### 2. STUDY AREA

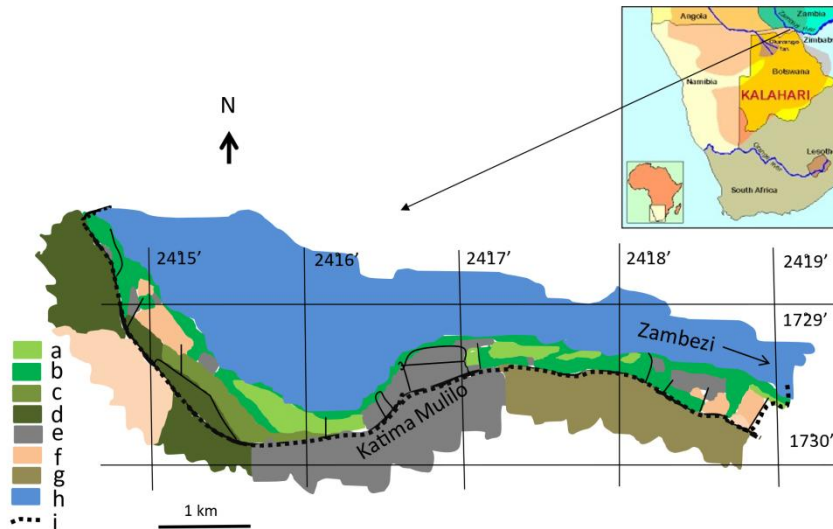
The study area was located in the Zambezi Valley near Katima Mulilo in the Zambezi Region, NE Namibia (Fig. 1). The study area comprised a forest stretching between the river and the international road from Zambia through Katima Mulilo to Botswana (Ngoma Bridge), laying on the left bank between the bridge and the Zambezi River lodge. It is 7 km long and 300-700 m wide ( $x = c. 500$  m). The approximate surface area of the study area is therefore c. 400 ha.

The natural vegetation is classified as Riparian Zambezi Forest (Mendelsohn et al., 2009). It is composed of large trees such as 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 *Acacia nigrescens*, Makalani Palm *Hyphaene petersiana*, Manketti *Schinziophyton rautanenii*, Marula *Sclerocarya birrea*, Mopane *Colophospermum mopane*, Pod Mahogany *Azelaia quanzensis*, Silver Cluster-leaf *Terminalia sericea*, Sausage Tree *Kigelia africana*, Sycomore Fig *Ficus sycomorus*, White Bauhinia *Bauhinia petersiana*, Zambezi Teak *Baikiaea plurijuga* (Fig. 2-5).

The forest is interlaced with pans covered with grass and sedges flooded almost on yearly basis. About ¼ of the land is converted into arable grounds and built-up areas, but large trees usually remain even in these converted areas (Fig. 1-5).

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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.



**Fig 1.** The study area: Zambezi forest in NE Namibia. Explanations: a – grassland (flooded area), b – Zambezi riparian forest, c – *Colophospermum mopane* forest, d – Kalahari Woodland, e – built-up areas, f – arable grounds, g – township (rural area), h – Zambezi river, I – border of the study area.



**Fig 2-5.** The study area.

2 (upper left): the riparian forest

3 (upper right): built-up area within the riparian forest

4 (lower left): Kalahari woodland with a grassy flooded area

5 (lower right): arable grounds within the riparian forest

### 3. METHODS

All granivorous bird species were objects of this study, except for a few most common ones, namely the Grey-headed Sparrow *Passer diffusus*, Southern Masked Weaver *Ploceus velatus*, Common

Waxbill *Estrilda astrild*, Blue Waxbill *Uraeginthus angolensis*, Red-billed Firefinch *Lagonosticta senegala* and the following dove species (Columbidae): Laughing Dove *Streptopelia senegalensis*, Cape Turtle Dove *Streptopelia capicola*, Red-eyed Dove *Streptopelia semitorquata* and African Mourning Dove *Streptopelia decipiens*.

A territory mapping method (Bibby et al., 2012) has been employed to assess the population densities of these species. The study area was divided into six sections. Birds were counted in each of the sections in one morning. So, six mornings were devoted to cover the whole study area. One complete survey was achieved in each of the following months of 2015: August, September, October and November. During each count all birds seen or heard were plotted on the map 1: 500. Special attention was paid to birds showing territorial behaviour or breeding display. Also records of two or three simultaneously calling males were important in interpreting the results.

A bird or a pair recorded at the same site at least in two out of the four months was interpreted as a residential/breeding/territorial pair (following Bibby et al., 2012). In the case of polygamous species, special attention was paid to count both males and females and their nests.

Population densities are expressed as the number of breeding pairs per 100 ha, and as the number of breeding pairs per 10 km of the river course. The nomenclature of birds follow that of Hockey et al. (2005).

#### **4. RESULTS AND DISCUSSION**

Population density was estimated for 12 granivorous species (Table 1, Fig. 6-9). Game fowl were represented by three species. The most numerous were the Crested Francolin *Dendroperdix sephaena*, breeding in a density of 4 pairs per 100 ha. Two other, namely, the Red-billed Spurfowl *Pternistes adspersus* and Swainson's Spurfowl *Pternistes swainsonii* were much less numerous, with only two pairs of each species breeding in the study area (Table 1). These two species appeared to be localized. The former one was found only in one site on the river bank, while the latter one was found close to arable grounds (Fig. 6).

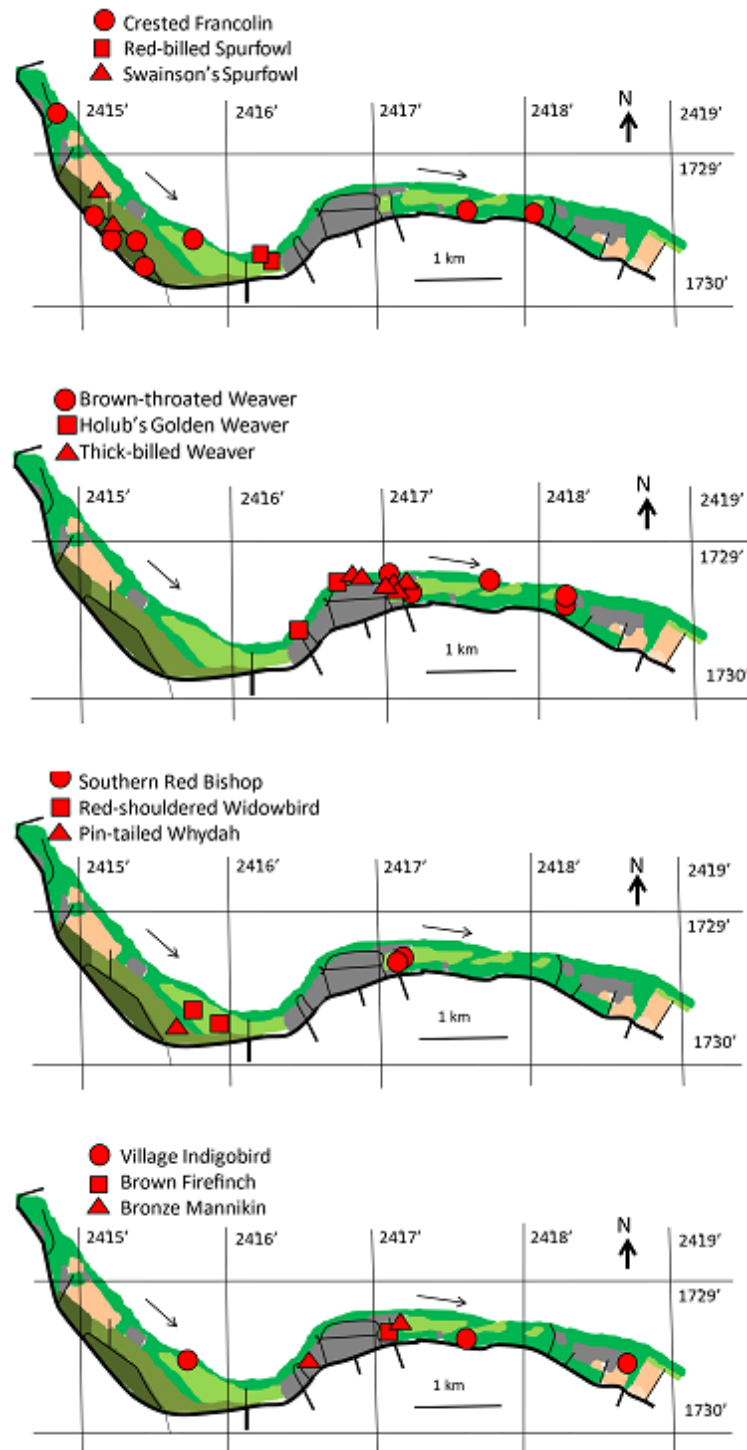
**Table 1.** Population densities of less common granivore species in a Zambezi riparian forest

Species	Number of pairs	Density (pairs/100 ha)	Density (pairs per 10 km)
<b>Phasianidae</b>			
Crested Francolin <i>Dendroperdix sephaena</i>	8	4.0	11.4
Red-billed Francolin <i>Pternistes adspersus</i>	2	0.5	2.9
Swainson's Francolin <i>Pternistes swainsonii</i>	2	0.5	2.9
<b>Ploceidae</b>			
Brown-throated Weaver <i>Ploceus xanthopterus</i>	5	1.3	7.1
Holub's Golden Weaver <i>Ploceus xanthops</i>	2	0.5	2.9
Thick-billed Weaver <i>Amblyospiza albifrons</i>	6	1.5	8.6
Fan-tailed Widow bird <i>Euplectes axillaris</i>	2	0.5	2.9
Southern Red Bishop <i>Euplectes orix</i>	2	0.5	2.9
<b>Estrildidae</b>			
Bronze Mannikin <i>Lonchura cucullata</i>	2	0.5	2.9
Brown Firefinch <i>Lagonosticta nitidula</i>	1	0.3	1.4
<b>Viduidae</b>			
Village Indigobird <i>Vidua chalybeata</i>	3	0.8	4.3
Pin-tailed Whydah <i>Vidua macroura</i>	1	0.3	1.4

It has been shown that the Crested Francolin population density may vary markedly from habitat to habitat, e.g. in Limpopo Province, South Africa, in a broad-leaved woodland it nested in a density of 3.5 pairs per 100 ha, while in a thornveld – 24 pairs per 100 ha (Tarboton et al. 1987). The Red-billed Spurfowl is much more numerous on Zambezi River further down of the study area, where human pressure is much lower (own observ.). Also in the riparian forest on Okavango River and in *Acacia* savanna in Botswana, it was recorded as much more numerous than in this study (Hockey et al. 2005).

The Helmeted Guineafowl *Numida meleagris*, usually so common in other habitats in southern Africa (Tarboton et al., 1987; Hockey et al., 2005; Kopij, 2006) was not recorded as breeding resident in the Zambezi riparian forest. It also does not occur further down on the river; far from the town of Katima

Mulilo (own observ.). However, in the neighbouring Chobe river valley in Botswana, protected as national park, the Helmeted Guineafowl is a very common breeding resident species (own observ). It cannot develop a resident population in the riparian forest in Namibia probably as a result of severe persecution by human, often moving with dogs, and hunting on larger mammals and terrestrial birds in this forest.



**Fig 6-9.** Distribution of breeding pairs of less common granivorous bird species in a Zambezi forest in NE Namibia.

6. Crested Francolin, Red-billed Spurfowl and Swainson's Spurfowl
7. Brown-throated Weaver, Holub's Golden Weaver and Thick and Swainson's Spurfowl
8. Southern Red Bishop, Red-shouldered Weaver and Pin-tailed Whydah
9. Village Indigobird, Brown Firefinch and Bronze Mannikin

Among granivore passerines, four weaver species were recorded in the study area: the Southern Masked Weaver *Ploceus velatus*, Brown-throated Weaver *P. xanthopterus*, Holub's Golden Weaver



*P. xanthops* and Thick-billed Weaver *Amblyospiza albifrons*. The Southern Masked Weaver was common all over the study area, but its population density has not been estimated. The Holub's Golden Weaver was uncommon, nesting in a density of 0.5 pair per 100 ha or 2.9 pairs per 10 km river bank. The Brown-throated Weaver was rather common, nesting in a density of 0.5 pair per 100 ha, or 2.9 pairs per 10 km. However, the nesting pairs were only satellites of a large colony situated in the reeds *Phragmites australis* on a sandy island in the middle of the Zambezi River, c. 50 m from the left bank. The colony numbered c. 50 nests, and it is not included for the density estimation in Table 1. The Thick-billed Weaver nested, on another hand, in two small colonies established in bulrush *Typha capensis* close to the river bank: one with two and the other with four nests (Fig. 7).

There were two *Euplectes*-species from the family Ploceidae nesting in the study area: Southern Red Bishop *E. orix* and Fan-tailed Widowbird *E. axillaris* (Table 1, Fig. 8). They nested, however, in unexpectedly low densities. The Southern Red Bishop is one of the most numerous bird species in some parts of southern Africa (Kopij, 2006), while the Fan-tailed Widowbird was found to breed in a high density on Zambezi River, where banks are densely covered with reed beds (own observ.).

Unexpectedly uncommon were *Vidua* species. Only two of them, the Pin-tailed Whydah *Vidua macroura* (Fig. 9) and the Village Indigo bird *Vidua chalybeate* (Fig. 9) were recorded as breeding in the study area in very low densities. In the neighbouring area, however, two other species were recorded as breeding resident: Shaft-tailed Whydah *V. regia* and Long-tailed Paradise Whydah *V. paradisaea* (own observ.).

The Bronze Mannikin *Lonchura cucullata*, and Brown Firefinch *Logonosticta nitidula* were the only less common members of the family Estrildidae, each one with 1-2 pairs recorded as nesting in this vegetation (Fig. 9). However, in the neighbouring area, five other uncommon estrild species were recorded: Violet-eared Waxbill *Granatina granatina*, Black-faced Waxbill *Estrilda erythronotos*, Jameson's Firefinch *Logonosticta rhodoparaia*, Green-winged Pytilia *Pytilia melba*, and Cut-throat Finch *Amadina fasciata* (own observ.).

The method employed in the present study could underestimate the number of some elusive species, such as Holub's Weaver and Brown Firefinch. Some of the estrild species (e.g. Violet-eared Waxbill, Green-winged Pytilia or Jameson's Firefinch) could even passed undetected, although they were recorded in the neighbouring area. On the other hand, francolins, *Euplectes* and *Vidua* species are conspicuous and quite vocal, so population density estimations of these species may be more accurate than those of the others.

Some species recorded in this study (e.g. Brown-throated Weaver, Southern Red Bishop, Pin-tailed Whydah) were probably polygamous. Population estimation based on counting only males can greatly underestimate their real density. Being aware of this, attention was paid to count not only males (these are more conspicuous and easier to count than females), but also females and their occupied nests. Nevertheless, it would be safer to refer to nesting sites than breeding pairs in the case of these species.

For species which show a tendency to nest close to the river bank, e.g. weavers (Fig. 2). Therefore converting numbers of pairs per 10 km of the river stretch would be perhaps more appropriate way of expressing their population densities. In the Table 1, densities are, therefore, also expressed in this way.

To be concluded, it should be noted that many granivorous species avoid to breed in riparian forest, most of those which were recorded there as breeding, reached usually low densities, and only few species can be classified as common.

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