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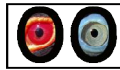
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POPULATION DENSITIES OF WOODLAND BIRD SPECIES AT THE PRETORIA NATIONAL BOTANICAL GARDEN

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Introduction

The aims of the study were to determine the structure of the bird community (that is the relative abundance of each species present) in semi-natural woodland and grassland at the Pretoria National Botanical Garden and to contrast it with that of the suburban environment of Groenkloof, Pretoria.

Methods

Line transect counts were made on 50 occasions during visits to the Pretoria National Botanical Garden between December 2007 and October 2011. Visits were made during all months of the year. Each transect was approximately 4 km long and each count was completed in approximately 1 hour. Estimates of population densities in birds per 100 ha were derived from the counts using the methods described for a similar study in Groenkloof, Pretoria (Parker 2012).

Study area

The Pretoria National Botanical Garden S25° 44' E28° 16' occupies approximately 120 ha of land in the east of Pretoria. A rocky ridge occupies about one third of the area, and the rest is fairly flat. It is watered by a stream and several ornamental ponds.

Results of this study are compared with those for the suburban environment of Groenkloof, Pretoria, which lies approximately 10 km to the south west.

Vegetation

Approximately one third of the garden is covered by cultivated lawns and flower beds, consisting mainly of alien species. The remainder consists of natural woodland, scrub and grassland.

Results

The species observed at the Botanic Garden fall into three groups when their densities are compared to those in the suburban environment of Groenkloof. The first group clearly occur at lower densities in the Botanic Garden than in Groenkloof (Table 1). These include three alien species – Rock Dove (Feral Pigeon) *Columba livia*, House Sparrow *Passer domesticus* and Common Myna *Acridotheres tristis* – and a number of common garden birds, including Laughing Dove *Streptopelia senegalensis*, Red-eyed Dove *Streptopelia semitorquata*, Cape Turtle Dove *Streptopelia capicola*, Hadedda Ibis *Bostrychia hagedash*, Grey Go-away-bird *Corythaixoides concolor*, Cape Sparrow *Passer melanurus* and Karoo Thrush *Turdus smithi*. Somewhat surprisingly, they also include African Olive Pigeon *Columba arquatrix*, African Green-Pigeon *Treron calva* and Brown-hooded Kingfisher *Halcyon albiventris*.

The second group consists of species for which there is little or no difference between the densities at the Botanic Garden and in Groenkloof (Table 2). These include the Dark-capped Bulbul *Pycnonotus tricolor* and Southern Masked Weaver *Ploceus velatus*.



The third group consists of those which occur at higher density in the Botanic Garden than in Groenkloof (Table 3). These include species which are associated with natural grassland and savanna – including Tawny-flanked Prinia *Prinia subflava*, Crowned Lapwing *Vanellus coronatus* and Neddicky *Cisticola fulvicapilla*, as well as some small arboreal insectivores – Chinspot Batis *Batis molitor*, Long-billed Crombec *Sylvietta rufescens* and Bar-throated Apalis *Apalis thoracica*).

Seasonality

For most species, the pattern of seasonal changes in observed density was indistinguishable from that reported for the suburban environment of Groenkloof, Pretoria (Parker 2012). Figures 1a and b and Figures 2a and b illustrate that for the Cape White-eye *Zosterops virens* and Common Fiscal *Lanius collaris* respectively, there is a remarkably close correspondence between the seasonal fluctuations for each site.

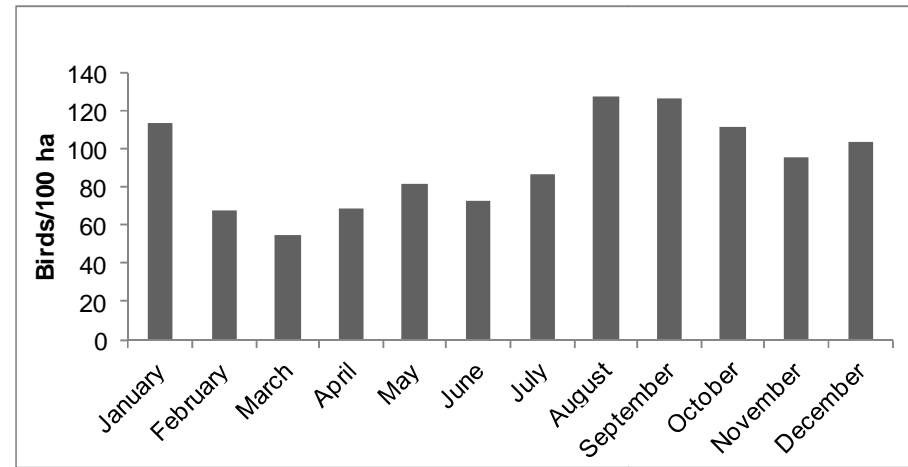


Fig 1b – Seasonality of the Cape White-eye in Groenkloof

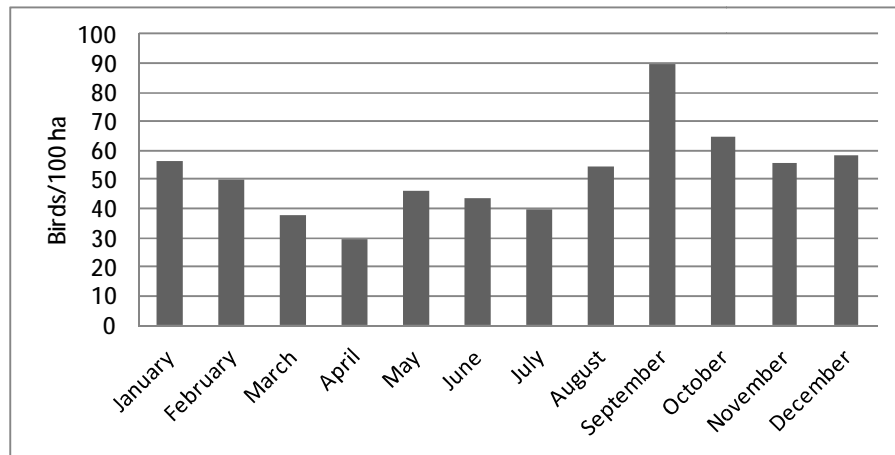


Fig 1a – Seasonality of the Cape White-eye in the study area

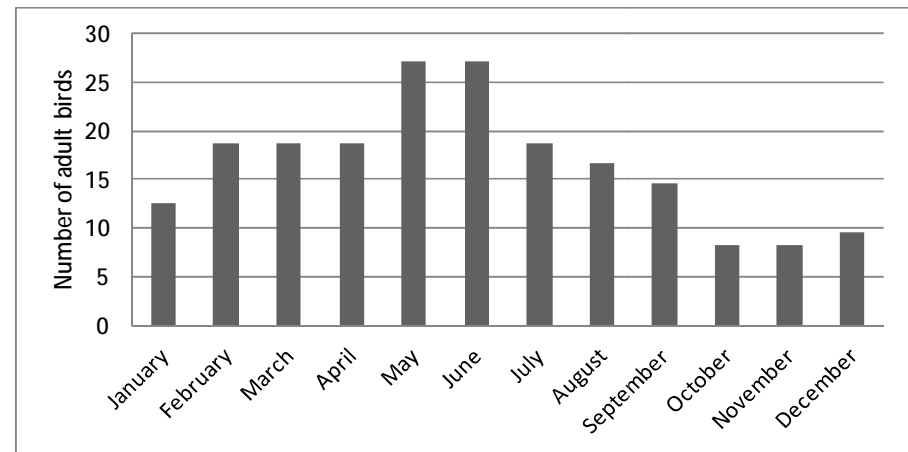


Fig 2a – Seasonality of the Common Fiscal in the study area

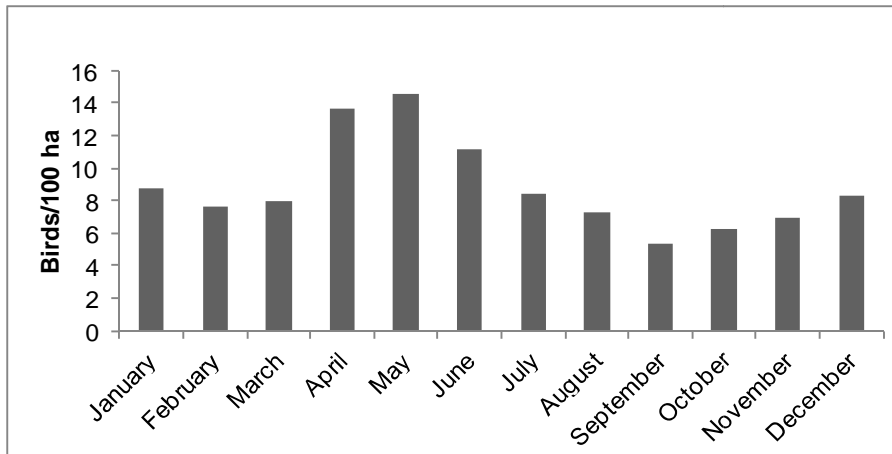


Fig 2b – Seasonality of the Common Fiscal in Groenkloof

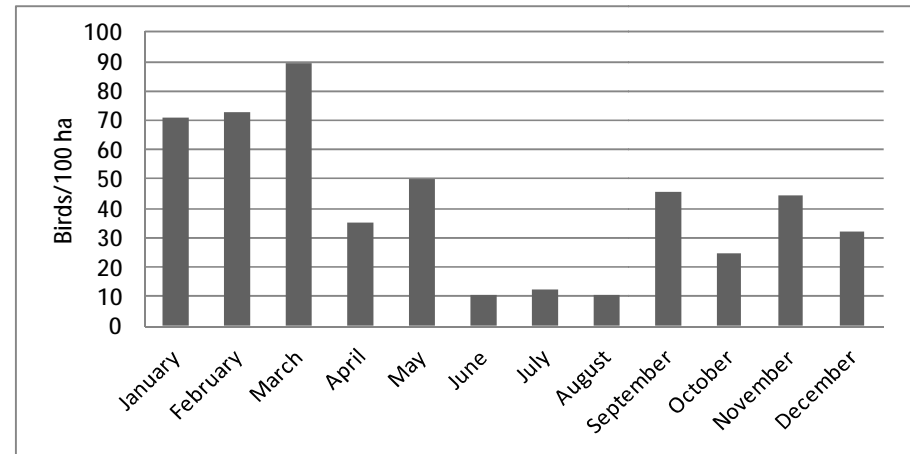


Fig 3a – Seasonality of the Bronze Mannikin in the study area

There are, however, two species for which the pattern of seasonality is quite different for the Botanic Garden compared to suburban Groenkloof. The Bronze Mannikin *Spermestes cucullatus* shows a sharp winter decrease in numbers in the Botanic Garden, and a simultaneous increase in suburban Groenkloof (Figures 3a and b). This suggests that birds in natural and semi-natural areas near the city take refuge in the suburbs during winter (presumably in response to food shortages).

Figures 4a and b show that while the Common Myna *Acridotheres tristis* appears to be sedentary in suburban Groenkloof, there is considerable seasonal fluctuation in numbers at the Botanic Garden. This suggests that the Botanic Garden lies outside of the core breeding habitat and the late winter spike in numbers may represent post-breeding dispersal.

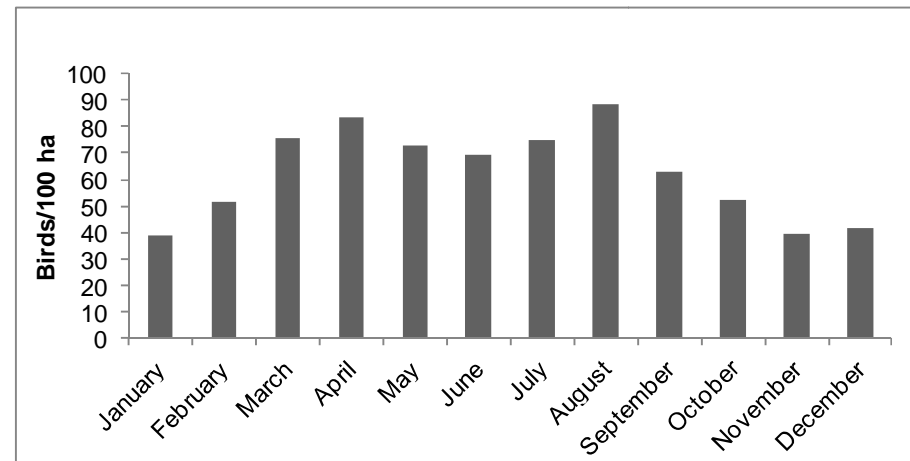


Fig 3b – Seasonality of the Bronze Mannikin in Groenkloof

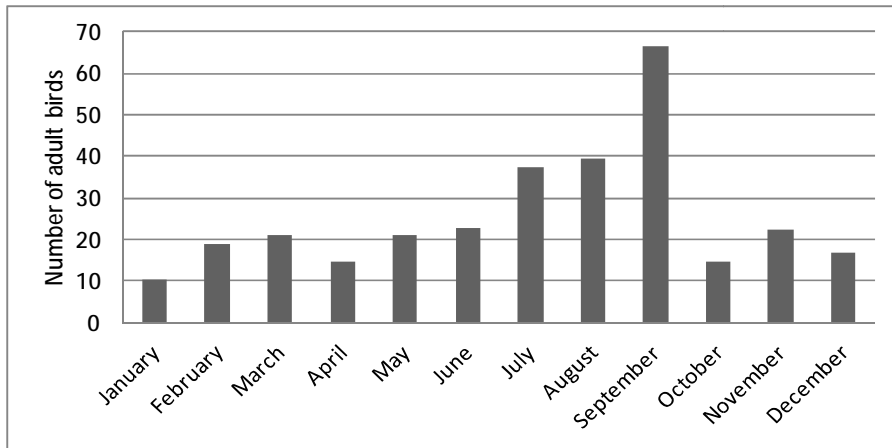


Fig 4a – Seasonality of the Common Myna in the study area

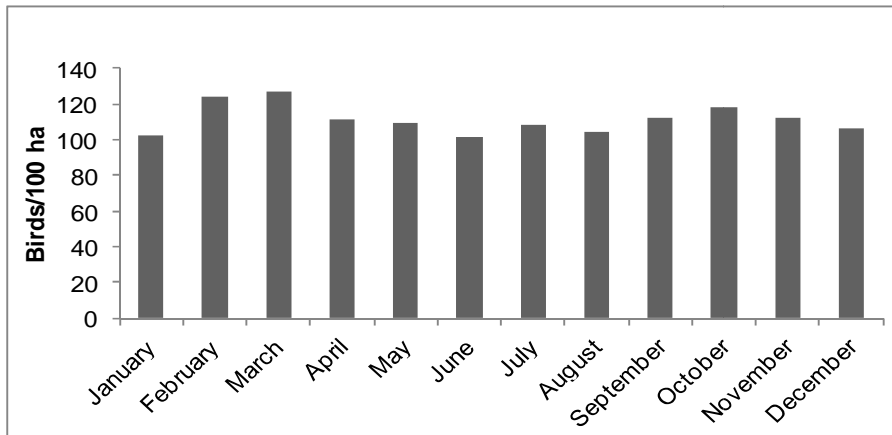


Fig 4b – Seasonality of the Common Myna in Groenkloof

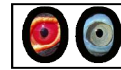
The structure of the bird community in the study area

An estimate of the number of birds of each species present on a typical day in October or April follows in Table 4. In all cases, the actual number is expected to be larger than the estimate.

Discussion

A study by Van Rensburg *et al.* (2009) classified bird species in and around Pretoria as "urban exploiters", "suburban adaptors" and "urban avoiders" (following the terminology of Blair (1996)), based on the observed densities at a number of urban, suburban and semi-natural sites. Because of the site selection criteria used by Van Rensburg *et al.* ("sites were selected to ensure 100 m visibility in 270° and were therefore biased towards visually open locations"), the sites representing semi-natural habitats in that study were substantially more open and less wooded than the more natural parts of the Botanic Garden. If the "urban avoiders" of that study are renamed "grassland urban avoiders", and the list of species which occur at higher density in the Botanic Garden than in the suburban environment in this study (Table 3) are named "woodland urban avoiders", then the two studies can be seen as complementary. Table 1 then largely represents "urban exploiters" and Table 2 largely represents "suburban adaptors".

Some "grassland urban avoiders" included by Van Rensburg *et al.* (2009) and not observed at the Botanic garden include Pied Starling *Spreo bicolor*, African Pipit *Anthus cinnamomeus* and African Quail-finch *Ortygospiza atricollis*. Some species identified as "woodland urban avoiders" in this study and not included by van Rensburg *et al.* (2009) include Neddicky *Cisticola fulvicapilla*, Chinspot Batis *Batis molitor*, Long-billed Crombec *Sylvietta rufescens* and Bar-throated Apalis *Apalis thoracica*. The Dark-capped Bulbul *Pycnonotus tricolor* was found to be an "urban exploiter" when compared to grassland



semi-natural sites (van Rensburg et al. 2009), but becomes a "suburban adaptor" (Table 2) when compared to semi-natural woodland in this study.

It must be born in mind that the differences in density of species between the Botanic Garden and the suburb of Groenkloof may in some cases be unrelated to the presence or otherwise of residential development. For example, the more regular presence of the Brown-hooded Kingfisher *Halcyon albiventris* in Groenkloof than in the Botanic Garden is probably related to the presence of suitable earth banks for nesting. The identification of species in Table 1 to Table 3 as respectively "urban exploiters", "suburban adaptors" and "woodland urban avoiders" is therefore only approximate.

Table 1 – Species which occur at higher density in the suburban habitat of Groenkloof than in the Botanic Garden

Species		Density in the study area (Adult birds/100 ha)	Density in Groenkloof (Adult birds/100 ha)
African Olive-Pigeon	<i>Columba arquatrix</i>	<1	15
Rock Dove	<i>Columba livia</i>	5	153
African Green-Pigeon	<i>Treron calva</i>	<1	7
Cape Weaver	<i>Ploceus capensis</i>	<1	6
Village Weaver	<i>Ploceus cucullatus</i>	1	15
Brown-hooded Kingfisher	<i>Halcyon albiventris</i>	<1	4
Red-collared Widow	<i>Euplectes ardens</i>	1	10
House Sparrow	<i>Passer domesticus</i>	3	18
Pin-tailed Whydah	<i>Vidua macroura</i>	<1	2
Karoo Thrush	<i>Turdus smithi</i>	20	114
Black-headed Oriole	<i>Oriolus larvatus</i>	1	6
Cut-throat Finch	<i>Amadina fasciata</i>	2	7
Amethyst Sunbird	<i>Nectarinia amethystina</i>	4	18
Common Myna	<i>Acridotheres tristis</i>	25	111
Red-winged Starling	<i>Onychognathus morio</i>	3	12
Hadedda Ibis	<i>Bostrychia hagedash</i>	27	100
African Hoopoe	<i>Upupa africana</i>	3	10
Cape Sparrow	<i>Passer melanurus</i>	28	97
Yellow-fronted Canary	<i>Serinus mozambicus</i>	3	9
European Bee-eater	<i>Merops apiaster</i>	7	21
Laughing Dove	<i>Streptopelia senegalensis</i>	57	180
African Palm Swift	<i>Cypsiurus parvus</i>	9	27
Rock Martin	<i>Hirundo fuligula</i>	2	5
Southern Grey-headed Sparrow	<i>Passer diffusus</i>	14	37



Species		Density in the study area (Adult birds/100 ha)	Density in Groenkloof (Adult birds/100 ha)
Red-eyed Dove	<i>Streptopelia semitorquata</i>	57	146
Speckled Mousebird	<i>Colius striatus</i>	22	45
Cape White-eye	<i>Zosterops capensis</i>	52	92
Speckled Pigeon	<i>Columba guinea</i>	18	40
Grey Go-away Bird	<i>Corythaixoides concolor</i>	35	74
Cape Turtle-Dove	<i>Streptopelia capicola</i>	35	57
Bronze Mannikin	<i>Spermestes cucullata</i>	41	63

Table 2 – Species which occur at similar density in the Botanic Garden and the suburban habitat in Groenkloof

Species		Density in the study area (Adult birds/100 ha)	Density in Groenkloof (Adult birds/100 ha)
Common Waxbill	<i>Estrilda astrild</i>	1	2
Red-throated Wryneck	<i>Jynx ruficollis</i>	2	3
Green Wood-Hoopoe	<i>Phoeniculus purpureus</i>	5	9
Greater-striped Swallow	<i>Hirundo Cucullata</i>	12	18
Grey-headed Bush-shrike	<i>Malaconotus blanchoti</i>	1	1
Thick-billed Weaver	<i>Amblospiza albifrons</i>	21	27
African Grey Hornbill	<i>Tockus nasutus</i>	4	5
White-rumped Swift	<i>Apus caffer</i>	8	10
Klaas's Cuckoo	<i>Chrysococcyx klaas</i>	1	1
Black-collared Barbet	<i>Lybius torquatus</i>	21	32
Black-throated Canary	<i>Serinus atrogularis</i>	4	5
Streaky-headed Seed-eater	<i>Serinus gularis</i>	20	20

Species		Density in the study area (Adult birds/100 ha)	Density in Groenkloof (Adult birds/100 ha)
Arrow-marked Babbler	<i>Turdoides jardineii</i>	8	9
Fiscal Flycatcher	<i>Sigelus silens</i>	12	13
Cardinal Woodpecker	<i>Dendropicus fuscescens</i>	2	2
Red-faced Mousebird	<i>Urocolius indicus</i>	22	28
African Paradise-Flycatcher	<i>Terpsiphone viridis</i>	4	4
Red-chested Cuckoo	<i>Cuculus solitarius</i>	1	1
Dark-capped Bulbul	<i>Pycnonotus tricolor</i>	132	143
Cape Glossy Starling	<i>Lamprotornis Nitens</i>	11	11
Southern Red Bishop	<i>Euplectes orix</i>	25	24
Crested Barbet	<i>Trachyphonus vaillantii</i>	28	32
Burchell's Coucal	<i>Centropus burchelli</i>	1	1
Southern Masked Weaver	<i>Ploceus velatus</i>	107	88
White-bellied Sunbird	<i>Nectarinia talatala</i>	33	34
Little Swift	<i>Apus affinis</i>	31	23
Cape Robin-Chat	<i>Cossypha caffra</i>	34	25
Black-backed Puffback	<i>Dryoscopus cubla</i>	8	6
Cape Wagtail	<i>Motacilla capensis</i>	7	5
Black-shouldered Kite	<i>Elanus caeruleus</i>	2	1
Southern Boubou	<i>Laniarius ferrugineus</i>	21	12
Didric Cuckoo	<i>Chrysococcyx caprius</i>	4	2
Common fiscal	<i>Lanius collaris</i>	16	9
Willow Warbler	<i>Phylloscopus trochillus</i>	2	1
Woodland Kingfisher	<i>Halcyon senegalensis</i>	<1	1
Brown-backed Honeybird	<i>Prodotiscus regulus</i>	<1	1
Common House Martin	<i>Delichon urbicon</i>	<1	1



Table 3 – Species that occur at higher density in the Botanic Garden than in the suburban habitat in Groenkloof

Species		Density in the study area (Adult birds/100 ha)	Density in Groenkloof (Adult birds/100 ha)
Tawny-flanked Prinia	<i>Prinia subflava</i>	56	26
Orange-breasted Bush-shrike	<i>Telophorus sulfureopectus</i>	3	1
White-throated Swallow	<i>Hirundo albigularis</i>	3	1
Barn Swallow	<i>Hirundo rustica</i>	4	1
Kurrichane thrush	<i>Turdus libonyanus</i>	4	1
Spotted Flycatcher	<i>Muscicapa striata</i>	4	1
Crowned Lapwing	<i>Vanellus coronatus</i>	27	12
Pied crow	<i>Corvus albus</i>	5	1
White-winged Widowbird	<i>Euplectes albonotatus</i>	14	<1
Neddicky	<i>Cisticola fulvicapilla</i>	12	<1
Long-billed Crombec	<i>Sylvietta rufescens</i>	11	<1
Chin-spot Batis	<i>Batis molitor</i>	10	<1
Blue Waxbill	<i>Uraeginthus angolensis</i>	9	<1
Bar-throated Apalis	<i>Apalis thoracica</i>	9	<1
Swainson's Spurfowl	<i>Pternistes swainsonii</i>	6	<1
Red-headed Finch	<i>Amadina erythrocephala</i>	6	<1
Lesser-striped Swallow	<i>Hirundo abyssinica</i>	5	<1
Brown-crowned Tchagra	<i>Tchagra australis</i>	4	<1
White-throated Robin-chat	<i>Cossypha humeralis</i>	4	<1
Black-chested Prinia	<i>Prinia flavicans</i>	4	<1
African Wattled Lapwing	<i>Vanellus senegallus</i>	3	<1
Zitting Cisticola	<i>Cisticola juncidis</i>	3	<1
Rattling Cisticola	<i>Cisticola chinuana</i>	2	<1

Species		Density in the study area (Adult birds/100 ha)	Density in Groenkloof (Adult birds/100 ha)
Crimson-breasted Shrike	<i>Laniarius atrococcineus</i>	2	<1
Rufous-naped lark	<i>Mirafra africana</i>	1	<1
Desert Cisticola	<i>Cisticola aridulus</i>	1	<1
White-browed Scrub-robin	<i>Cercotrichas leucophrys</i>	1	<1
Green-winged Pytilia	<i>Pytilia melba</i>	1	<1
Lesser Honeyguide	<i>Indicator minor</i>	1	<1
Cape Grassbird	<i>Sphenoeacus afer</i>	1	<1
Bokmakierie	<i>Telophorus zeylonus</i>	1	<1
Chestnut-vented Tit-babbler	<i>Parisoma subcaeruleum</i>	1	<1
Red-billed Quelea	<i>Quelea quelea</i>	1	<1
Cinnamon-breasted Bunting	<i>Emberiza tahapisi</i>	1	<1

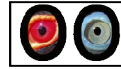
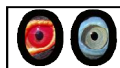


Table 4 – Composition of the avifauna of the Pretoria National Botanical Garden on a typical day in April or October

Species	Number of adult birds
Dark-capped Bulbul	158
Southern Masked Weaver	129
Red-eyed Dove	69
Tawny-flanked Prinia	68
Cape White-eye	63
Laughing Dove	57
Bronze Mannikin	49
Cape Turtle-Dove	42
Grey Go-away-bird	41
Cape Robin-Chat	41
White-bellied Sunbird	40
Little Swift	37
Cape Sparrow	33
Hadeda Ibis	33
Crested Barbet	33
Crowned Lapwing	32
Common Myna	30
Southern Red Bishop	30
Speckled Mousebird	26
Black-collared Barbet	26
Red-faced Mousebird	26
Thick-billed Weaver	25
Southern Boubou	25
Karoo Thrush	24
Speckled Pigeon	22

Species	Number of adult birds
Streaky-headed Canary	20
Common Fiscal	20
Southern Grey-headed Sparrow	16
Neddicky	15
Greater Striped Swallow	14
Fiscal Flycatcher	14
Cape Glossy Starling	14
Long-billed Crombec	13
Chinspot Batis	12
African Palm Swift	11
Spotted Thick-knee	11
Blue Waxbill	11
White-rumped Swift	10
Arrow-marked Babbler	10
Black-backed Puffback	10
Bar-throated Apalis	10
Cape Wagtail	9
European Bee-eater	8
Red-headed Finch	7
Rock Dove	6
Green Wood-Hoopoe	6
Pied Crow	6
Amethyst Sunbird	5
White-throated Robin-chat	5
Grey Hornbill	5
Black-throated Canary	5
Paradise Flycatcher	5



Species	Number of adult birds
Lesser-striped Swallow	5
Brown-crowned Tchagra	5
Black-chested Prinia	5
Barn Swallow	5
Spotted Flycatcher	5
Kurrichane Thrush	5
Didric Cuckoo	4
Zitting Cisticola	4
House Sparrow	3
Red-winged Starling	3
African Hoopoe	3
Yellow-fronted Canary	3
Rattling Cisticola	3
White-throated Swallow	3
Orange-breasted Bush-Shrike	3
Cut-throat Finch	2
Black-headed Oriole	2
Rock Martin	2
Burchell's Coucal	2
Red-throated Wryneck	2
Cardinal Woodpecker	2
Crimson Boubou	2
Black-shouldered Kite	2
Rufous-naped Lark	2
Desert Cisticola	2
Willow Warbler	2
Red-collared Widow	1

Species	Number of adult birds
Common Waxbill	1
Village Weaver	1
White-browed Scrub-robin	1
Klaas's Cuckoo	1
Brown-backed Honeybird	1
Cape Grassbird	1
Bokmakierie	1
Red-billed Quelea	1
Grey-headed Bush-Shrike	1
Red-chested Cuckoo	1
others	5
Total	1,534



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