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Bird conservation in Africa - the contributions of the Ibadan Bird Club

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Bird conservation in Africa - the contributions of the Ibadan Bird Club

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Summary

The Ibadan Bird Club has met 19 times at monthly intervals between February 2016 and August 2017, and 264 people (155 male and 109 female) have registered as members. During this period, the club has successfully built local capacity in bird conservation, and 111 bird species, distributed in 39 families, have been documented in an urban Important Bird Area, south-western Nigeria. The findings of this citizen science initiative are essential for conservation purposes.

Introduction

Conservation efforts produce remarkable results when stakeholders (landowners, indigenes, visitors, organizations and authorities) are involved in activities (Awoyemi *et al.* 2018). The stakeholders can contribute through citizen science, which is the collection of ecological data by members of the general public and non-specialists as part of scientific projects (Dickinson *et al.* 2012). This has been successful worldwide, especially in Australia (Tulloch *et al.* 2013), Europe (Silvertown, 2009) and North America (Dickinson *et al.* 2012), where enthusiasts, volunteers and nature lovers contribute data via bird and nature clubs. In some parts of Africa, citizen scientists now contribute data to bird atlas projects, which aim to map the distribution of birds in the continent (Hulbert, 2016; Ivande *et al.* 2017). The African Bird Club has taken this initiative by funding the establishment of bird clubs in Africa, notably the Ibadan Bird Club (IBC) (Demey, 2015).

The IBC was started on 5 March 2014 by the Nigerian Conservation Foundation in partnership with the Department of Wildlife and Ecotourism Management, University of Ibadan, and the Forest Project at the International Institute of Tropical Agriculture (IITA), Ibadan, Nigeria (Demey, 2015). The aim was to build local capacity and enhance the conservation of birds in the Ibadan area. On 13 February 2016, the club was re-launched, so that it could be coordinated by the IITA Forest Unit as an activity of the A. G. Leventis-funded Ornithological Monitoring

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Project 2015-2017 (Figs. 1-3). The contributions of the club to bird conservation from then until August 2017 are presented here.



Figure 1: Re-launch of IBC, IITA, Ibadan, Nigeria, 13 February 2016 (Photo credit: Babajide Agboola)

Methods

Study area

The activities of the IBC since its re-launch have been carried out within the IITA campus, Ibadan (7° 29' N, 03° 54' E; Fig. 4). The approx. 1000 ha campus is located in the transition zone between savannah and rainforest, and experiences two distinct seasons: wet (April-September) and dry (October-March) (Neuenschwander *et al.* 2015). The campus has different kinds of habitats (forests, wetlands, farmlands and gardens) and supports over 270 species of birds, which are either Afro-tropical residents or migratory (Ezealor, 2001; Adeyanju *et al.* 2014). The approx. 360 ha forest reserve within the campus is dominated by native trees such as *Antiaris toxicaria*, *Ceiba pentandra*, *Daniellia ogea* and *Melicia excelsa* (Manu *et al.* 2005). It also holds 67 bird species that are restricted to the Guinea-Congo Forest Biome, qualifying it as an Important Bird Area (IBA) (Ezealor, 2001). It is our understanding that this is the only IBA in Nigeria located in a major conurbation, justifying the need for capacity building at the local level. The campus also contains a large reservoir, several lakes and a number of fishponds which constitute important habitats for waterbirds while crops such as banana, cassava, cowpea, maize, plantain, rice and yam are cultivated in the research farm.

Data collection

The IBC has no badging but there is a unique structure that produces results. Typically an invitation, which contains a striking photo taken by a member, is sent at least 3 days before the new meeting date, which is fixed on the last Saturday of every month at 16h00 - 18h00. All levels



Figure 2: Palm-nut Vulture *Gypohierax angolensis* drinking water by the lake during IBC re-launch, 13 February 2016 (Photo credit: Andreas Gisel).



Figure 3: Wood Sandpiper *Tringa glareola* foraging in the IITA main reservoir during IBC re-launch, 13 February 2016 (Photo credit: Arvind Khebudkar)

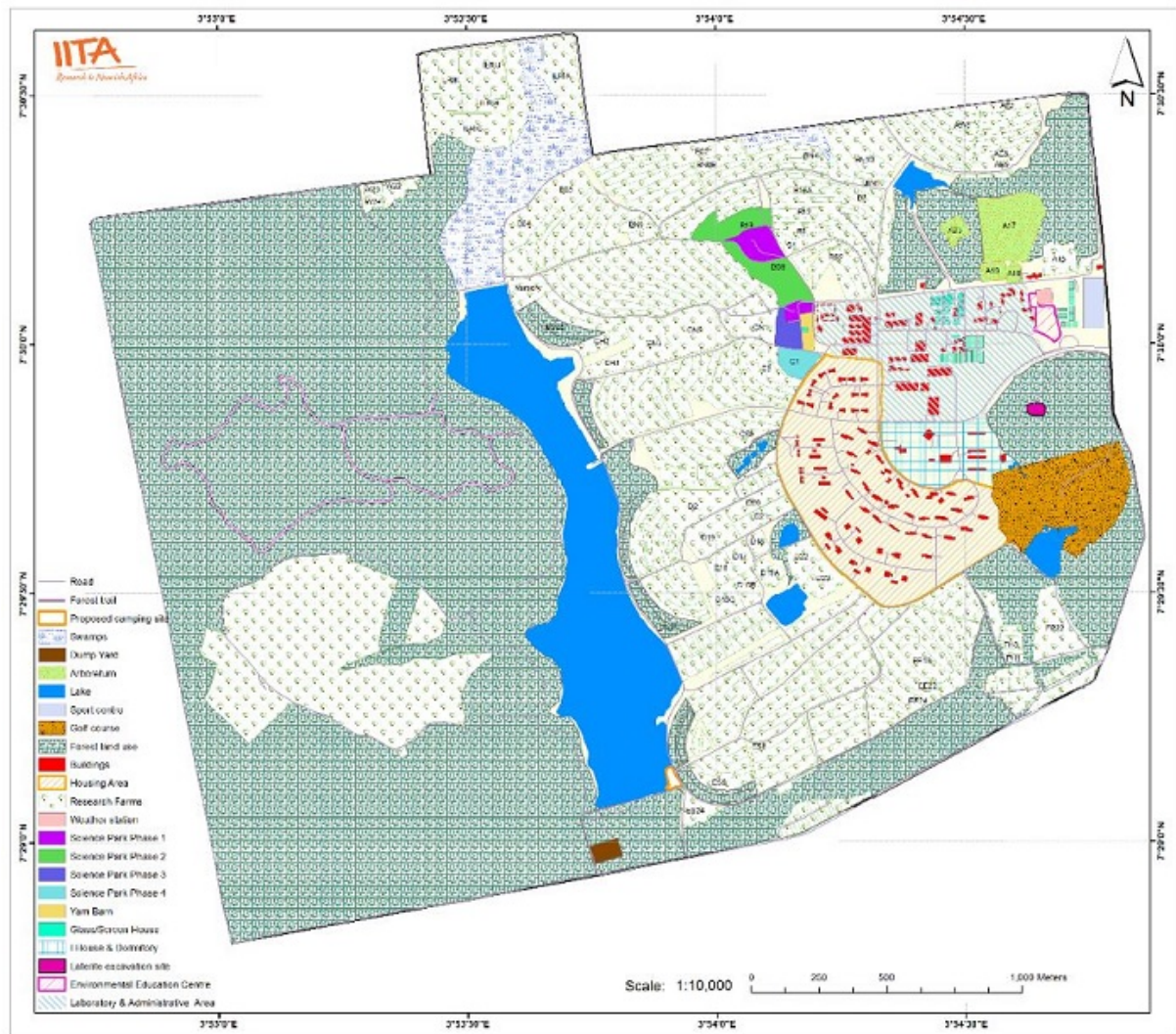


Figure 4: Map of the IITA campus, Ibadan, Nigeria, May 2016 (Image credit: GIS Unit, IITA)

of age, interest and experience are encouraged, and membership is free. Member attendance is noted and feedback is given in the form of short reports sent after each meeting while the members interact online via the club's Facebook Group Page. Since the main focus of the club is capacity building, the coordinators (authors) normally stop at regular intervals to explain some aspects of avian ecology and the relevance of environmental education and citizen science to biodiversity conservation. The junior members of the club (IBC Juniors) are given high priority, and engaged in activities such as quizzes, debates, drawing contests, mist-netting and presentations in scientific workshops, in addition to birdwatching. In order to consolidate the knowledge gained during the meetings, club members are invited to workshops organised by the IITA Forest Unit Ornithological Monitoring Project on topics such as IBAs, Spring Alive and the World Migratory Bird Day.

Data were collected from February 2016 to August 2017 during meetings of the IBC. During this time, 19 meetings were held but data from 18 meetings (equally distributed between dry and wet seasons) were used in analysing our biological data as rain did not allow for a complete survey in June 2017 and the record was excluded. Therefore a total of 36 hours was spent during the meetings (survey). On arrival at the meeting venue, new members were normally introduced to the basics of birdwatching and use of equipment. Visits were then made to the three main habitats in the study area (farmland, forest and wetland), with each habitat receiving an equal number of visits (N=6). Line transects, measuring approx. 1.5 km were used to record all birds seen or heard during each walk (Bibby *et al.* 2000), though no fixed radius was set. There was no obvious change in vegetation during the data collection, therefore we did not measure vegetation variables but described the visited habitats as above. Consequently, we predicted that changes in bird encounter rate would be influenced mainly by habitat and season.

Data analyses

We calculated encounter rate as the number of species recorded per 2-hour survey (Guilherme, 2014), which was our response variable. We then graphically explored our dataset, and tested its normality using Shapiro-Wilk normality test: $W = 0.654$, $p < 0.001$. As this was not normally distributed even after transformation, we used Poisson Logistic Regression to test the difference in encounter rate between habitats and seasons in R statistical Software (R Development Core Team, 2013).

Furthermore, the species' local abundance was estimated using this formula: $(T_i/T_n) \times 100$; where T_i = number of transects along which a species was recorded, and T_n = the total number of transects surveyed (Asefu, 2015). We then classified species as common (observed on >75% of transects), frequent (observed on 50-74% of transects), uncommon (observed on 25-49% of transects) or rare (observed on <25% of transects) following Asefu (2015). We also assigned species to one of 3 major habitats (Redman *et al.* 2009; Borrow & Demey 2010): (1) aquatic species (wetlands, lakes and marshes); (2) forest species (closed forest); and (3) open habitat species (farmlands with scattered trees and grassland).

Results

Our sociological data reveal that 264 people have registered as members of the IBC since its re-launch. Among these were 155 male (59%), 109 female (41%) and 27 juniors under the age of 12 years (10%). The club has been consistent in its activities, and an average of 31 members attends the monthly meetings.

Biologically, 111 bird species belonging to 39 families were recorded during the survey; their relative frequency, status, biomes and habitat requirements are listed in Appendix 1. Among these were 21 species restricted to the Guinea-Congo Forests Biome, 1 species restricted to the

Sudan-Guinea Savannah Biome, 7 Palearctic migrants and 16 Intra-African migrants, while the rest were resident (Appendix 1). This diversity of birds may be attributed to the different kinds of habitats found within the study area, which allows birds to exploit them differently. For instance, all the 21 species restricted to the Guinea-Congo Forests Biome were recorded within the forest reserve, the yellow-billed shrike (restricted to the Sudan-Guinea Savannah Biome) was recorded only in farmlands, while the palaeartic and Intra-African migrants mainly utilized farmlands and wetlands. Poisson Logistic Regression shows that bird encounter rate significantly differs between habitats and seasons (Table 1; Fig. 5).

Table 1: Summary statistics of the differences in bird encounter rate between habitats and seasons February 2016 - August 2017. Farmland and dry season were set as the intercept in the model (Encounter Rate \sim Habitat x Season, Family = Poisson).

Parameters	Estimate	Error	z	p
Intercept	0.523	0.096	5.438	<0.001
Habitat (forest)	-0.077	0.135	-0.571	0.568
Habitat (wetland)	0.468	0.123	3.787	<0.001
Season (wet)	0.457	0.116	3.949	<0.001
forest x wet	-0.604	0.190	-3.171	<0.001
wetland x wet	-0.513	0.156	-3.282	<0.001

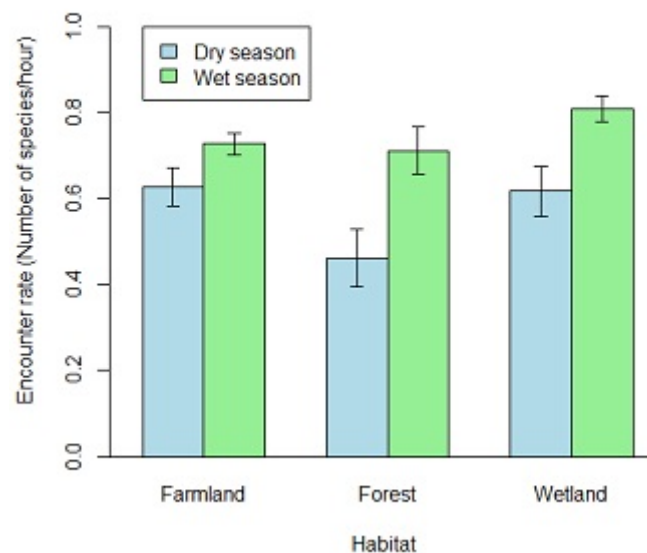


Figure 5: Differences in encounter rate between habitats and seasons

Discussion

Effective conservation of biodiversity largely depends on the involvement of stakeholders. Our findings have revealed that their involvement increases the appreciation of the natural world. If well-engaged, they can also contribute data which are essential for formulating conservation strategies as presented here. The IBC has successfully raised awareness about bird conser-

vation and engaged citizen scientists. The club has attracted the attention of indigenes, visitors/tourists, enthusiasts, professionals, researchers and students, who in turn disseminate the knowledge gained from the club to a wider audience such as colleagues, families and friends. In addition, the influence generated online via the Facebook Group Page is producing positive cascading effects. Worthy of note is the performance of the IBC Juniors whose age averages 9 years. Children learn quickly at tender ages, and we have maximized this opportunity to inculcate environmental and conservation values in them. It is anticipated that both the values and practical skills will provide a worthwhile basis for their contributions to society as citizens of the future.

Given the focus of this study, which is citizen science, our biological data undoubtedly under-estimate bird diversity in the study area (see Adeyanju *et al.* 2014). It is also important to note that we were more interested in the number of species encountered per habitat but the fact that more birds were encountered in a certain habitat does not imply it is richer. In addition, the survey was carried out towards late afternoon, implying that we have missed out on some birds at dawn. Nevertheless, the study has added to the goal of constant monitoring of birds and habitats, and local capacity has been built. In addition, our study has affirmed the ornithological significance of the study area by recording 21 out of the 67 bird species that qualify the IITA Forest Reserve as an IBA (Ezealor, 2001). The yellow-billed shrike *Corvinella corvina*, a species restricted to the Sudan-Guinea Savannah Biome was recorded during our expeditions. Although this is hardly surprising due to the location of the study area in the transition zone between the forest and savannah (Neuenschwander *et al.* 2015), this might also provide a clearer indication of savannah encroachment into the forest zone. By occurring in nearly all the habitat types, three species were the most commonly recorded throughout the survey: red-eyed dove *Streptopelia semitorquata* (18/18), African pied hornbill *Tockus fasciatus* (17/18) and pied crow *Corvus albus* (16/18).

Interestingly, more birds were encountered in the wet than dry season in all three habitats (Table 1; Fig. 5). On the one hand, this may be due to the influx of migratory birds at the end of the wet season in August and September as the study area serves as an important wintering ground for Palaearctic migrants. On the other hand, it may be due to the recruitment of new individuals as most Afro-tropical resident birds are known to breed during the wet season when food is plentiful (Elgood *et al.* 1994). As IITA is an agricultural research institute, mechanized farming is carried out within the campus. During two of our bird walks during the wet season, over 50 birds at a time were noted intensively foraging behind tractors as they ploughed in the research fields. This might account for the higher number of birds recorded in this habitat during the wet season. In addition, we also noted that heavy downpours caused some lakes to overflow their banks. While this may appear hazardous, receding water increases the concentration of prey available to birds foraging along water bodies (Cumming *et al.* 2012).

In conclusion, we have provided evidence that environmental education via bird clubs is vital for bird conservation. Our findings from the citizen science data presented here may be the first in Africa and, given the rate at which habitats are lost due to anthropogenic activities, environmental education and citizen science are particularly important now. Although the activities of the IBC were restricted to the IITA campus during this reporting period, plans are underway to replicate activities in other areas around Ibadan. We will also endeavour to get more birdwatching equipment and materials (binoculars, telescopes, cameras, bird song recorders and guidebooks) to better serve the average number of members we expect at monthly meetings.

Acknowledgements

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Appendix

Table 2: Bird species recorded during the monthly meetings of the Ibadan Bird Club held on the IITA campus, Ibadan, Nigeria (February 2016-August 2017). Sequence and taxonomy follow Borrow and Demey, (2010). Relative frequency (Asefa, 2015): C = common; F = frequent; U = uncommon; R = rare. Status (Borrow and Demey, 2010): R = Resident; P = Palearctic migrant; M = Intra-African migrant. Biome (Ezealor, 2001): GCF = Restricted to the Guinea-Congo Forests Biome; SGS = Restricted to the Sudan-Guinea Savannah Biome. Habitat (Redman *et al.* 2009; Borrow and Demey, 2010): AQ = Aquatic; FR = Forest; OH = Open habitat.

Family	English name	Scientific name	Rel. freq.	Status	Biome	Hab.
Phalacrocoracidae	long-tailed cormorant	<i>Phalacrocorax africanus</i>	R	R		AQ
Ardeidae	purple heron	<i>Ardea purpurea</i>	U	P		AQ
	squacco heron	<i>Ardeola ralloides</i>	U	P		AQ
	intermediate egret	<i>Egretta intermedia</i>	U	R		AQ
	little bittern	<i>Ixobrychus minutus</i>	R	P		AQ
	black-headed heron	<i>Ardea melanocephala</i>	U	R		OH
	grey heron	<i>Ardea cinerea</i>	R	P		AQ
	cattle egret	<i>Bubulcus ibis</i>	U	M		OH
	green-backed heron	<i>Butorides striata</i>	R	R		AQ
	great egret	<i>Egretta alba</i>	R	M		AQ
	little egret	<i>Egretta garzetta</i>	R	M		AQ
Threskiornithidae	hadeda ibis	<i>Bostrychia hagedash</i>	R	R		AQ
Anatidae	white-faced whistling duck	<i>Dendrocygna viduata</i>	F	R		AQ
Accipitridae	African harrier hawk	<i>Polyboroides typus</i>	R	R		FR
	African cuckoo hawk	<i>Aviceda cuculoides</i>	R	R		OH

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Table 2 – continued from previous page.

Family	English name	Scientific name	Rel. freq.	Status	Biome	Hab.
Falconidae	palm-nut vulture	<i>Gypohierax angolensis</i>	R	R		FR
	African goshawk	<i>Accipiter tachiro</i>	R	R		OH
	yellow-billed kite	<i>Milvus aegyptius</i>	F	M		OH
Numididae	lanner falcon	<i>Falco biarmicus</i>	R	R		OH
	grey kestrel	<i>Falco ardosiaceus</i>	R	R		OH
	common kestrel	<i>Falco tinnunculus</i>	U	R		OH
Phasianidae	helmeted guineafowl	<i>Numida meleagris</i>	R	R		OH
Rallidae	double-spurred francolin	<i>Francolinus bicalcaratus</i>	U	R		OH
Jacanidae	African crane	<i>Crex egregia</i>	R	M		AQ
	Allen's gallinule	<i>Porphyrio alleni</i>	R	M		AQ
	black crane	<i>Amaurornis flavirostra</i>	R	R		AQ
	common moorhen	<i>Gallinula chloropus</i>	R	R		AQ
Burhinidae	African jacana	<i>Actophilornis africana</i>	F	R		AQ
Charadriidae	Senegal thicknee	<i>Burhinus senegalensis</i>	R	R		AQ
Scolopacidae	white-headed lapwing	<i>Vanellus albiceps</i>	F	R		AQ
	Forbes's plover	<i>Charadrius forbesi</i>	R	R		AQ
	spur-winged lapwing	<i>Vanellus spinosus</i>	F	R		AQ
Columbidae	wood sandpiper	<i>Tringa glareola</i>	R	P		AQ
	common sandpiper	<i>Actitis hypoleucos</i>	R	P		AQ
Musophagidae	red-eyed dove	<i>Streptopelia semitorquata</i>	C	R		OH
	speckled pigeon	<i>Columba guinea</i>	U	R		OH
	blue-spotted wood dove	<i>Turtur afer</i>	U	R		FR
	African green pigeon	<i>Treron calvus</i>	R	R		FR
Cuculidae	western grey plantain-eater	<i>Crinifer piscator</i>	R	R		OH
	green turaco	<i>Tauraco persa</i>	R	R	GCF	FR
Apodidae	black cuckoo	<i>Cuculus clamosus</i>	R	M		OH
	black-throated coucal	<i>Centropus leucogaster</i>	R	R	GCF	FR
	blue-headed coucal	<i>Centropus monachus</i>	R	R		AQ
	Diederik cuckoo	<i>Chrysococcyx caprius</i>	R	M		OH
	Klaas's cuckoo	<i>Chrysococcyx klaas</i>	R	M		OH
	Senegal coucal	<i>Centropus senegalensis</i>	F	R		OH
	yellowbill	<i>Ceuthmochares aereus</i>	R	R		FR
	Alcedinidae	African palm swift	<i>Cypsiurus parvus</i>	R	R	
little swift		<i>Apus affinis</i>	R	R		OH
mottled spinetail		<i>Telacanthura ussheri</i>	R	R		OH
Meropidae	woodland kingfisher	<i>Halcyon senegalensis</i>	F	M		OH
	malachite kingfisher	<i>Alcedo cristata</i>	R	R		AQ
	blue-breasted kingfisher	<i>Halcyon malimbica</i>	R	R		FR
Coraciidae	white-throated bee-eater	<i>Merops albicollis</i>	R	M		OH
Bucerotidae	broad-billed roller	<i>Eurystomus glaucurus</i>	R	M		OH
Capitonidae	African pied hornbill	<i>Tockus fasciatus</i>	C	R		FR
	African grey hornbill	<i>Tockus nasutus</i>	U	M		OH
Hirundinidae	red-rumped tinkerbird	<i>Pogoniulus atroflavus</i>	R	R	GCF	FR
Motacillidae	lesser striped swallow	<i>Hirundo abyssinica</i>	R	M		OH
	red-rumped swallow	<i>Hirundo daurica</i>	R	M		OH
	Ethiopian swallow	<i>Hirundo aethiopica</i>	R	R		OH
Pycnonotidae	plain-backed pipit	<i>Anthus leucophrys</i>	R	R		OH
	African pied wagtail	<i>Motacilla aguimp</i>	R	R		OH
	yellow-throated longclaw	<i>Macronyx croceus</i>	U	R		OH

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Table 2 – continued from previous page.

Family	English name	Scientific name	Rel. freq.	Status	Biome	Hab.
	common bulbul	<i>Pycnonotus barbatus</i>	F	R		OH
	swamp palm bulbul	<i>Thescelocichla leucopleura</i>	R	R	GCF	FR
	simple leaflove	<i>Chlorocichla simplex</i>	R	R	GCF	FR
	little greenbul	<i>Andropadus virens</i>	R	R		FR
	grey-headed bristlebill	<i>Bleda canicapillus</i>	R	R	GCF	FR
	yellow-whiskered greenbul	<i>Andropadus latirostris</i>	R	R		FR
	western nicator	<i>Nicator chloris</i>	R	R	GCF	FR
Turdidae	African thrush	<i>Turdus pelios</i>	F	R		OH
	whinchat	<i>Saxicola rubetra</i>	R	P		OH
	snowy-crowned robin chat	<i>Cossypha niveicapilla</i>	R	R		OH
Sylviidae	green crombec	<i>Sylvietta virens</i>	R	R	GCF	FR
	red-faced cisticola	<i>Cisticola erythrops</i>	U	R		OH
	short-winged cisticola	<i>Cisticola brachypterus</i>	R	R		OH
	tawny-flanked prinia	<i>Prinia subflava</i>	R	R		OH
	African moustached warbler	<i>Melocichla mentalis</i>	R	R		OH
	grey-backed camaroptera	<i>Camaroptera brachyura</i>	R	R		OH
	olive green camaroptera	<i>Camaroptera chloronota</i>	R	R	GCF	FR
	green hylia	<i>Hylia prasina</i>	R	R	GCF	FR
	croaking cisticola	<i>Cisticola natalensis</i>	R	R		OH
	yellow-browed camaroptera	<i>Camaroptera superciliaris</i>	R	R	GCF	FR
Monarchidae	red-bellied paradise flycatcher	<i>Terpsiphone rufiventer</i>	R	R	GCF	FR
	blue-headed crested flycatcher	<i>Trochocercus nitens</i>	R	R	GCF	FR
Nectarinidae	splendid sunbird	<i>Cinnyris coccinigastrus</i>	U	R		FR
	collared sunbird	<i>Hedydipna colaris</i>	R	R		FR
	green-headed sunbird	<i>Cyanomitra verticalis</i>	R	R		OH
	blue-throated brown sunbird	<i>Cyanomitra cyanolaema</i>	R	R	GCF	FR
	olive sunbird	<i>Cyanomitra olivacea</i>	R	R		FR
	olive-bellied sunbird	<i>Cinnyris chloropygius</i>	R	R		FR
Laniidae	yellow-billed shrike	<i>Corvinella corvina</i>	R	R	SGS	OH
Malaconotidae	tropical boubou	<i>Laniarius aethiopicus</i>	R	R		FR
Oriolidae	black-winged oriole	<i>Oriolus nigripennis</i>	R	R	GCF	FR
Dicuridae	fork-tailed drongo	<i>Dicrurus adsimilis</i>	U	R		OH
	square-tailed drongo	<i>Dicrurus ludwigii</i>	R	R		OH
Corvidae	piebald crow	<i>Corvus albus</i>	C	R		OH
Sturnidae	forest chestnut-winged starling	<i>Onychognathus fulgidus</i>	R	R	GCF	FR
Passeridae	northern grey-headed sparrow	<i>Passer griseus</i>	R	R		OH
Ploceidae	red-headed quelea	<i>Quelea erythrops</i>	R	M		OH
	Vieillot's black weaver	<i>Ploceus nigerrimus</i>	R	R	GCF	FR
	village weaver	<i>Ploceus cucullatus</i>	R	R		OH
	red-headed malimbe	<i>Malimbus rubricollis</i>	U	R	GCF	FR
	red-vented malimbe	<i>Malimbus scutatus</i>	R	R	GCF	FR
	yellow-mantled weaver	<i>Ploceus tricolor</i>	R	R	GCF	FR
	northern red bishop	<i>Euplectes franciscanus</i>	R	R		OH
Estrididae	bronze mannikin	<i>Spermestes cucullatus</i>	F	R		OH
	grey-headed negrofinch	<i>Nigrita canicapillus</i>	R	R	GCF	FR
	orange-cheeked waxbill	<i>Estrilda melpoda</i>	R	R		OH
Viduidae	pin-tailed whydah	<i>Vidua macroura</i>	U	R		OH