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Bird Species Diversity, Richness and Evenness Across Multiple Habitats in Nyerere National Park

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Abstract

This study examined bird species diversity, richness and evenness across multiple habitats within Msolwa area, Nyerere National Park. The area comprised of six major habitat categories, forest, woodland, wooded grassland, grassland, bushland and river line, which were defined basing on the visible attribute (height, lifeform and species composition) and ecological features of the habitat. Three line transects each with a length of 4km were established in every surveyed habitat. Sixteen point counts, each with 100-meter radius were established along a single transect at 250m intervals. All bird species seen and heard within the 100m diameter were observed and recorded. In total, 3,219 individuals of birds, comprising 266 species belonging to 21 orders and 67 families were recorded over the six distinct habitats. Woodland habitat had the highest individual number of birds 1993 with highest species richness 36.56. Forest habitat showed the least 16 number of individual birds with lowest species richness 1.44. The Shannon-Winner Index of diversity H', was used to calculate diversity of bird species, where highest diversity of bird species was observed in woodland H'=4.883 followed by Grassland H'=3.924 and the least was forest habitat with H'=1.515. The diversity of bird species varied significantly due to variations in adaptation ability of different bird species in the surveyed habitat. This study highlights gaps in our knowledge on diversity of bird species across multiple habitats and suggests that habitat transition and connectivity is a more important determinant of avian species richness and community structure.

Keywords: Bird diversity; Habitats; Resource availability; Species richness

Background Information

Protected Areas (Pas) are areas set aside by the government for the preservation of natural ecosystems to protect endangered species and provide opportunities for recreation [1]. They contribute to the local community's livelihood improvement in terms of employment opportunities and social services provision [2]. Additionally, PAs generate governmental revenue through nature-based tourism activities [3]. Beyond their economic contributions, PAs play a significant role in conserving biodiversity, and provide habitats for numerous species including mammals, Microbes, plants, avian and insects each of which fulfill an ecological role essential for ecosystem balance and co-existence [4].

In Namibia, about 13.8% of the country's land area is retained as Protected Areas for conservation of biodiversity, however, conservation management policies remained focused on active manipulation of the size and movement of mammal population [5]. This is due to significant contribution PAs offers in conserving wild animals and more the endemic species [5]. In South Africa, Conservation activities have been promoted for quit a long period with Kruger National Park being the major key area for conservation. The park is home to 14% of the country's terrestrial bird species, residing over an array of habitats [6]. The presence of multiple habitats promotes a high diversity of bird species over the park. However, illegal human activities (collection of fuel, grazing) and habitat fragmentation has been affecting negatively the diversity and distribution of bird species at Kruger National Park [6].

Tanzania is rich in biodiversity and is home of ionic species including lions, cheetah, black rhinoceros, elephants as well as bird species just to mention a few of them. Approximately 44% of Tanzania land is allocated for protection with varying conservation statuses including National Parks, Game Reserves, Marine Parks,

Forest Reserves, Wildlife Management Areas and Conservation Areas [7]. They serve as valuable areas for research activities in ecology, evolution and conservation activities. Different habitats of various vegetation cover within the area, are essential for daily requirements of wild animals, however habitat loss and poaching activities threatens their life, leading to decline in their number [8].

Nyerere National Park located in Eastern part of Tanzania, which of recently upgraded from Game Reserve in the year 2019, provides a broad array of habitats that offer unique ecological conditions to support diverse wild populations. Among these, the avian group stands out occupying a diverse of habitats that provides shelter for canopy-dwelling species, while grasslands and wetlands attract ground-nesting birds and waterfowls, [9] respectively. While numerous studies have explored the role of single habitat types in avian diversity, few have explored multiple habitats within the same ecosystem. For example, in their studies Rajpar [10] and Li et al. [11], assessed Riverine Forest as a significant habitat harboring a wide range of bird species. These studies suggest that further research is necessary to investigate the core determinants of avian diversity within the ecosystems. Another study by Basile, (2021) assessed the abundance, species richness and diversity of forest bird assemblages. This study suggests that a simple singular habitat structure cannot represent viable species composition of the whole ecosystem, hence the need to investigate richness, abundance and diversity of bird species across multiple habitats in the same ecosystem. This will adversely allow researchers to assess the ecological preferences of bird species and identify key habitats that are vital for their conservation. The approach, furthermore, helps to inform park management strategies aimed at preserving avian biodiversity.

This study therefore bridged the knowledge gap by analyzing how bird species diversity, richness and composition vary across different habitat types in Nyerere National Park specifically at Msolwa area. The study predicted that there is equal distribution of bird species diversity across the surveyed habitats. Firstly, the study aimed at exploring species diversity, richness and evenness of various habitats in the same ecosystem. Secondly, to explore which habitat type and composition predict a high bird diversity. The results ultimately provide insights into habitat specific conservation needs. Furthermore, by analyzing these differences, the study contributes to a deeper understanding of habitats' importance in avian conservation and park management.

Material and Method

Description of the study area

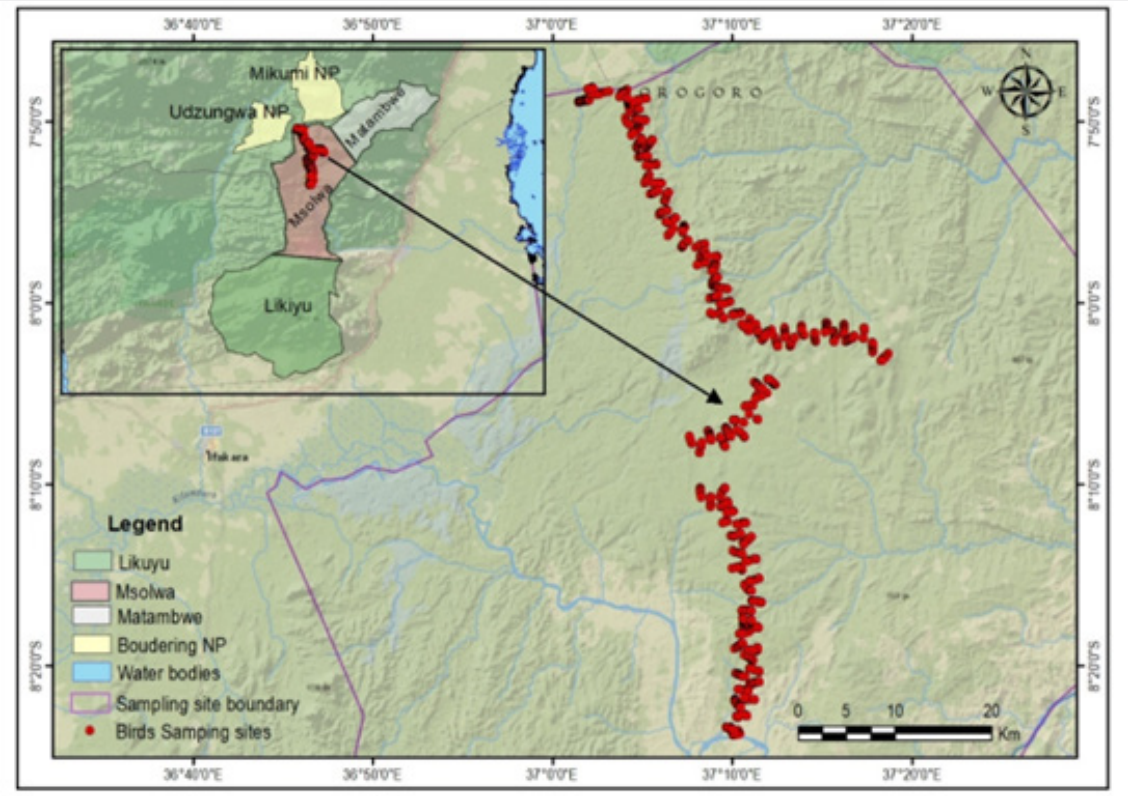

Figure 1: A study map showing Msolwa area part of Nyerere National Park.

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This survey was conducted in the Msolwa area part of Nyerere National Park (NNP), which of recently was upgraded from Selous Game Reserve. It is the largest Park in Africa located between 7.75° and 10.5° southern and 36.0° and 38.7° Eastern Zone of Tanzania covering an area of over 30,000 square kilometers with relative undisturbed ecological and biological disturbances (Figure 1). Msolwa area exhibit 100-400m altitude with soil texture varying from sandy to different loams which supports the growth of miombo woodland, and Combretum thickets [12]. Msolwa area transverses different habitats mainly forest, woodland, shrubland, grassland, water bodies, and other land cover including bare land and burnt area. Additionally, the area has bimodal rainfall season and the short rainfall in November and December ranging between 750 and 1300 millimeters. The Park is home of several wild animals including Savanna Elephants *(Loxodonta Africana)*, African Cape Buffalo *(Syncerus caffer)*, Lion *(Panthera leo)* and African Wild dogs *(Lycaon pictus)*, however few studies documents on the bird species [13].

Data collection

Three transects of four-kilometer length were established in each surveyed habitat within Msolwa area part of Nyerere National Park. The study area comprised of six major habitat categories, Forest, woodland, wooded grassland, Grassland, bushland and river line habitats, which were defined basing on the visible attribute (height, lifeform and species composition) and ecological features of the habitat [14]. Each transect line produced sixteen-point count at an interval of 250 meters to minimize the risk of double count making a total of 48 point counts per surveyed habitat.

To every introduced point-count, all birds seen and heard within 100m-diameter were identified and recorded in 10min duration following previous study [15]. Limiting counts to a 100m-diameter helps to reduce the differences in detectability of birds among habitat types due to vegetation structure and minimizes biases and errors in species identification and distance estimate [16]. Observations were carried out during early morning (0700-0900 hours) and late afternoon (1600-1800hours) when birds were active with the aid of field guidebook and binocular [17]. Several parameters were recorded in a standardized sheet including GPS Coordinates, time, habitat type, date, individual bird species and their actual number.

Data analysis

The IUCN Red List was used to determine conservation status of detected bird species [18]. Data was cleaned using Microsoft Excel software. Shannon-Winner Index of diversity H', was used to calculate the diversity of species across the surveyed habitats as well as diversity values by using PAST (Version 4.03). Abundance of species in the three habitats was assessed as the total number of birds recorded on a particular site (Total count per site). Distribution of species in the study sites was recorded as presence or absence of each species, determined by evenness. Relative abundance of species in the study sites was computed as number of respective species per total number of species in the respective habitat, i.e., the proportional of individual species relative to the total number of species in a site. One-way ANOVA was used to determine if there is significant difference between at least two habitats in terms of diversity, while Turkey post-Hoc test finalized which specific pairs of habitats differ. We used ($P<0.5$) for measuring statistical significance value.

Results

Species composition

A total of 3,219 individual birds comprising of 266 species, belonging to 21 orders and 67 families, were recorded across the six major habitats. The dominant family in the study area was Cisticolidae, constituting 13% of the total species followed by Bucerotidae (7%), Estrildidae (5%) and Accipitridae (5%). Order Passeriformes constituted 68% of all the species observed, with the highest number of observations across the six habitats, followed by Coraciiformes and the least was Trogoniformes with 0.13% of all species observed. A series of species categorized in different IUCN status were recorded including one individual specie White-backed Vulture (*Gyps africanus*) categorized as a Critical Endangered species in the study area, Marabou Stork (*Leptoptilos crumenifer)* as Vulnerable and the rest are categorized as Least Concerned by International Union for Conservation of Nature (IUCN) (Table 1).

Table 1: IUCN conservation status of bird individuals observed during survey.

IUCN Conservation Status	Number of Species	Proportion (%)
Critical endangered (CE)	1	0.5
Vulnerable	1	0.5
Least Concerned	3,217	99
Total individual species	**3,219**	**100**

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Species relative abundance and distribution

The most abundant species in riverine habitat was Zanzibar Red Bishop (*Euplectes nigroventris*) with the highest Index of Relative Abundance (IRA) of 16.57%. Black-bellied starling (*Notopholia corusca*) was the most abundant specie in grassland and bushland habitats with IRA of 24.67%, where else in woodland and forest habitat, Rattling Cisticola (*Cisticola Chiniana*) was the most abundant specie with IRA of 5.17%. Twenty-one (21) species had the lowest IRA of 0.27% each across the surveyed habitats.

Species diversity and richness

The overall species richness of birds was highest in woodland habitat (24.88), followed by grassland (12), riverine (11.59), bushland (10.36), wooded grassland (7.264) and the lowest species richness was observed in forest habitat (1.443) (Table 2). Species diversity varied significantly across the selected habitats ($P < 0.005$). Woodland and Grassland habitats hosted highest diversity of avian group (H'= 4.447), (H'=3.924) respectfully followed by Riverine (H'=3.49), wooded grassland habitats (H'=3.232), Bushland habitat (H'=2.71) and the lowest species diversity was observed in forest habitat (H'=1.515) as illustrated under (Figure 2). Bird species were evenly distributed across the surveyed habitats with the exception of forest habitat (Table 2). Diversity of bird species varied significantly between various habitats, Forest habitat varied significantly with bushland habitat $P<0.05$, Riverine habitat varied significantly with Grassland habitat $P<0.05$, wooded grassland habitat varied significantly with grassland habitat and lastly was woodland habitat which varied significantly with grassland habitat ($P<0.05$).

Table 2: Overall structural properties of bird species for six habitats.

	Bushland	Forest	Grassland	Riverine	Wooded Grassland	Woodland
Individuals count	437	16	225	385	163	1993
Shannon-Wiener (H')	2.71	1.51 5	3.924	3.49	3.232	4.447
Evenness	0.2349	0.9103	0.7664	0.4684	0.6668	0.4493
Richness	10.36	1.443	12	11.59	7.264	24.88

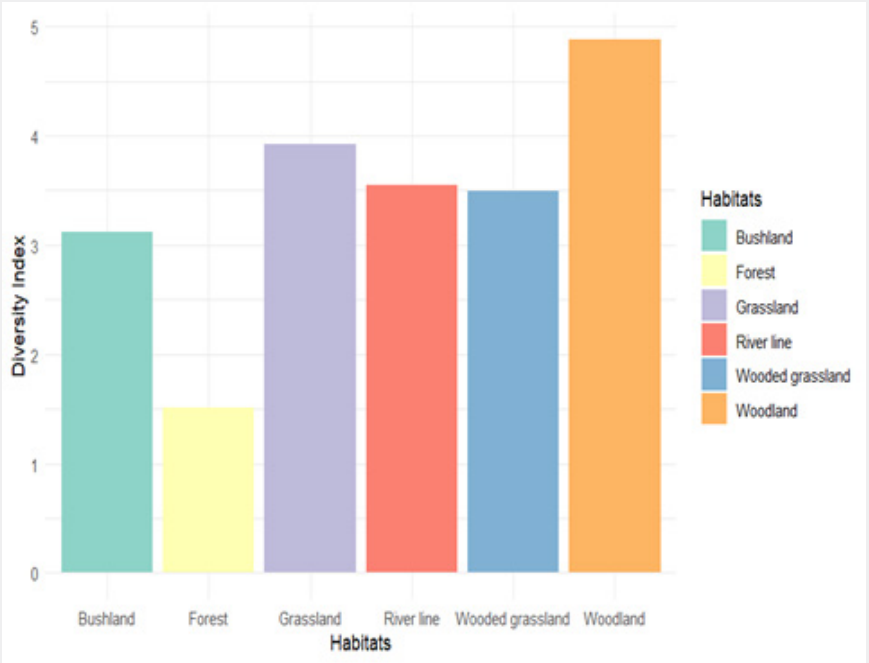

Figure 2: Diversity index in every surveyed habitat.

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Discussion

Species composition

The study recorded a total of 3,219 individual birds comprising of 266 species, belonging to 21 orders and 67 families. The common specie was Black bellied starling *(Notopholia corusca)* which was observed in every surveyed habitat, while White-backed Vulture (*Gyps africanus*) and Marabou Stork (*Leptoptilos crumenifer)* were rarely found in the study site. The dominant family in the study area was Cisticolidae constituting 13% of the total species. The family had highest number of bird species due to composition of a wider range of bird species feeding on variety of guilds [19].

Species diversity and richness

Diversity of the recorded bird species varied significantly across the surveyed habitats due to variation in vegetation structure. This corresponds to the findings of Okosodo et al. [20] whose results suggested that variation in vegetation composition brings about differences in food availability, which attracts a diverse of bird species resulting in different bird species composition. Diversification of food materials at woodland habitats enhance a number of bird species which then affected positively diversity of bird species [21]. Mature trees are valuable food sources for diverse bird species in protected areas [19]. Their presence attracts several bird species, which then initiates high species richness. The presence of shelter in woodland habitat attracts canopy-dwelling species, which ultimately affect positively bird species richness [22].

Woodland habitats have also demonstrated high species richness and diversity in past studies [21] Basile (2021), suggest that increase of broadleaf in the existing Woodland habitats usually boost the abundance, richness and diversity of bird species. These broadleaves decrease isolation level within bird species, thus enhance structural connectivity and finally favoring majority of species. Furthermore, the habitat is an important home for one among the most critical endangered species in the world, White-backed Vulture (*Gyps africanus*). The species prefer woodland with trees for roosting and nesting as well as habitats frequented by large mammal [23].

Tall grassland and shrub land habitats increased bird species richness, evenness and distribution [22]. A past study indicated that successful breeding of bird species increases significantly with grassland size thus affecting positively species richness as well as diversity over an area [21]. Similarly, the results of this study showed that grassland and habitats affected positively bird species richness and evenness when compared to riverine habitats and negatively when compared with woodland habitats [2]. Grassland habitats always provide herbaceous cover for nesting, foraging as well as providing cover for bird species during winter and migration seasons thus affecting positively species bird richness hence high diversity [24].

Previous studies Zhou [25] and Tu [26] Indicate that aquatic habitats have higher species richness contrary to this study which urges that riverine habitats attracts unique bird community which affects negatively the overall richness and diversity of bird diversity when compared to grassland and woodland habitats. This means that, bird communities in riverine habitat are dominated by a certain species specifically water loving species and for this study we are directly referring to Zanzibar Red Bishop (*Euplectes nigroventris*) [27]. Aquatic bird species will always associate with aquatic animals for easy acquiring food materials including insects and worms (Shrusthi, 2016). Though the riverine habitats supported promising diversity and species richness of bird species in the ecosystem, it is worth mentioning that the habitat is crucial for survival of Marabou stork (*Leptoptilos crumenifferus*), one among the Vulnerable species in which if their habitats are lost they will ultimately be subjected to extinction risk [28].

Interestingly, forest habitat had the lowest species richness as well as diversity. This is due to the accumulation of generalists' bird species, which finally affects negative diversity, and richness of bird species. Our result suggests that closed habitat, i.e. (Forest habitat) acts as a local environmental filter restricting the occurrence of large birds, e.g., Ground feeding insectivores thus affecting negatively the diversity and richness of bird species. Similarly, study conducted by Lee et al. [11], suggest that, assemblage of bird species at particular forest habitat is significantly correlated with assemblage of tree species. If there are few tree species accumulated at the same area formulating forest habitat, then it is obvious that the bird attracted will be of the same species thus affecting diversity and richness of bird species negatively [29-35].

Conclusion and Recommendation

Conclusively, the study provides insight information on the importance of multiple habitats in promoting conservation of avifauna in the PAs. The study suggests that mature trees formulating woodland habitat which is important characteristics for promoting species diversity and richness. The habitats provide daily needs of the bird species (nesting area, cover, food and shelter), thus attracting variety of bird species as the result, it affects positively diversity and richness of the respective areas. Additionally, the study recommends that more conservation efforts should be invested in protection of these habitats, which are very essential for avian assemblage. This will ultimately contribute to promoting avifauna tourism. Though some studies reveal grassland and bushland habitats as essential habitats for promoting both higher bird species diversity and richness contrary to this study, we recommend further research to be conducted in the same area based on wet and dry seasons.

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Appendix: List of Bird species observed during the survey.

Order	Family	Species Tertiary Name	Species Scientific Name	IUCN Status
Accipitriformes	Accipitridae	African Cuckoo-Hawk	*Aviceda cuculoides*	LC
		African Fish Eagle	*Haliaeetus vocifer*	LC
		African Goshawk	*Accipiter tachiro*	LC
		African Harrier-Hawk	*Polyboroides typus*	LC
		African Marsh-Harrier	*Circus ranivorus*	LC
		Bateleur	*Terathopius ecaudatus*	LC
		Brown Snake Eagle	*Circaetus cinereus*	LC
		Dark Chanting Goshawk	*Melierax metabates*	LC
		Little Sparrowhawk	*Accipiter minullus*	LC
		Lizard Buzzard	*Kaupifalco monogrammicus*	LC
		Long-crested Eagle	*Lophaetus occipitalis*	LC
		Palm-nut Vulture	*Gypohierax angolensis*	LC
		White-backed Vulture	*Gyps africanus*	CE
		White-headed Vulture	*Trigonoceps occipitalis*	VU
Anseriformes	Anatidae	Egyptian Goose	*Alopochen aegyptiaca*	LC
Apodiformes	Apodidae	African Palm Swift	*Cypsiurus parvus*	LC
		Bohm's Spinetail	*Neafrapus boehmi*	LC
		African Gray Hornbill	*Lophoceros nasutus*	LC
		Crowned Hornbill	*Lophoceros alboterminatus*	LC
Bucerotiformes	Bucerotidae	Pale-billed Hornbill	*Lophoceros pallidirostris*	LC
		Silvery-cheeked Hornbill	*Bycanistes brevis*	LC
		Southern Ground Hornbill	*Bucorvus leadbeateri*	LC
		Trumpeter Hornbill	*Bycanistes bucinator*	LC
Caprimulgiformes	Caprimulgidae	European Nightjar	*Caprimulgus europaeus*	LC
		Square-tailed Nightjar	*Caprimulgus fossii*	LC
Charadriiformes	Jacanidae	African Jacana	*Actophilornis africanus*	LC
	Laridae	African Skimmer	*Rynchops flavirostris*	LC
	Scolopacidae	Common Sandpiper	*Actitis hypoleucos*	LC
	Charadriidae	Three-banded Plover	*Charadrius tricollaris*	LC
	Burhinidae	Water Thick-knee	*Burhinus vermiculatus*	LC
	Charadriidae	White-crowned Lapwing	*Vanellus albiceps*	LC
		White-headed Lapwing	*Vanellus albiceps*	LC
Ciconiiformes	Ciconiidae	Marabou Stork	*Leptoptilos crumenifer*	VN
Ciconiiformes	Ciconiidae	Woolly-necked Stork	*Ciconia microscelis*	LC
Coliiformes	Coliidae	Blue-naped Mousebird	*Urocolius macrourus*	LC
		African Green Pigeon	*Treron calvus*	LC
		Blue-spotted Wood Dove	*Turtur afer*	LC
		Emerald-spotted Wood Dove	*Turtur chalcospilos*	LC
		Laughing Dove	*Spilopelia senegalensis*	LC

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Columbiformes	Columbidae	Mourning Collared Dove	*Streptopelia decipiens*	LC
		Namaqua Dove	*Oena capensis*	LC
		Red-eyed Dove	*Streptopelia semitorquata*	LC
		Ring-necked Dove	*Streptopelia capicola*	LC
		Tambourine Dove	*Turtur tympanistria*	LC
	Alcedinidae	Brown-hooded Kingfisher	*Halcyon albiventris*	LC
		Pied Kingfisher	*Ceryle rudis*	LC
		Striped Kingfisher	*Halcyon chelicuti*	LC
		Woodland Kingfisher	*Halcyon senegalensis*	LC
	Coraciidae	Abyssinian Roller	*Coracias abyssinicus*	LC
		Broad-billed Roller	*Eurystomus glaucurus*	LC
		European Roller	*Coracias garrulous*	LC
		Racket-tailed Roller	*Coracias spatulatus*	LC
Coraciiformes	Meropidae	Bohm's Bee-eater	*Merops boehmi*	LC
		Blue-cheeked Bee-eater	*Merops persicus*	LC
		European Bee-eater	*Merops apiaster*	LC
		Little Bee-eater	*Merops pusillus*	LC
		Madagascar Bee-eater	*Merops superciliosus*	LC
		Olive Bee-eater	*Merops superciliosus*	LC
		Swallow-tailed Bee-eater	*Merops hirundineus*	LC
		White-fronted Bee-eater	*Merops bullockoides*	LC
	Phoeniculidae	Common Scimitarbill	*Rhinopomastus cyanomelas*	LC
		Green Wood Hoopoe	*Phoeniculus purpureus*	LC
Cuculiformes	Cuculidae	African Cuckoo	*Cercococcyx gularis*	LC
		African Emerald Cuckoo	*Chrysococcyx cupreus*	LC
		Common Cuckoo	*Cuculus canorus*	LC
		Coppery-tailed Coucal	*Centropus cupreicaudus*	LC
		Emerald Cuckoo	*Chrysococcyx cupreus*	LC
		Great Spotted Cuckoo	*Clamator glandarius*	LC
		Green Malkoha	*Ceuthmochares australis*	LC
		Green Yellowbill	*Cuethmochares australis*	LC
		Klaas's Cuckoo	*Chrysococcyx klaas*	LC
		Red-chested Cuckoo	*Cercococcyx solitaries*	LC
		White-browed Coucal	*Centropus superciliosus*	LC
	Numididae	Crested Guineafowl	*Guttera pucherani*	LC
		Helmeted Guineafowl	*Numida meleagris*	LC
Galliformes	Phasianidae	Common Quail	*Coturnix coturnix*	LC
		Crested Francolin	*Dendroperdix sephaena*	LC
		Harlequin Quail	*Coturnix delegorguei*	LC
		Hildebrandt's Spurfowl	*Pternistis hildebrandti*	LC
		Red-necked Francolin	*Pternistis afer*	LC
		Red-necked Spurfowl	*Pternistis afer*	LC

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Musophagiformes	Musophagidae	Grey Go-away-bird	*Corythaixoides concolor*	LC
		Livingstone's Turaco	*Tauraco livingstonii*	LC
		Purple-crested Turaco	*Gallirex porphyreolophus*	LC
Otidiformes	Otididae	Buff-crested Bustard	*Eupodotis gindiana*	LC
		White-bellied Bustard	*Eupodotis senegalensis*	LC
Passeriformes	Estrildidae	Abyssinian Crimsonwing	*Cryptospiza salvadorii*	LC
	Alaudidae	Flappet Lark	*Mirafra rufocinnamomea*	LC
		Rufous-naped Lark	*Mirafra africana*	LC
	Ardeidae	Dimorphic Egret	*Egretta dimorpha*	LC
		Goliath Heron	*Ardea goliath*	LC
		Great Egret	*Ardea alba*	LC
		Intermediate Egret	*Ardea intermidea*	LC
		Striated Heron	*Butorides striata*	LC
	Buphagidae	Red-billed Oxpecker	*Buphagus erythrorynchus*	LC
	Campephagidae	Black Cuckooshrike	*Campephaga flava*	LC
		White-breasted Cuckooshrike	*Ceblepyris pectoralis*	LC
	Cisticolidae	Black-backed Cisticola	*Cisticola eximius*	LC
		Churring Cisticola	*Cisticola njombe*	LC
		Croaking Cisticola	*Cisticola natalensis*	LC
		Green-backed Camaroptera	*Camaroptera brevicaudata*	LC
		Greencap Eremomela	*Eremomela scotops*	LC
		Green-capped Eremomela	*Eremomela scotops*	LC
		Grey-backed Camaroptera	*Camaroptera brevicaudata*	LC
		Long-tailed Cisticola	*Cisticola angusticauda*	LC
		Miombo Wren-Warbler	*Calamonastes undosus*	LC
		Rattling Cisticola	*Rattling cisticola*	LC
		Red-winged Grey Warbler	*Drymocichla incana*	LC
		Red-winged Prinia	*Heliolais erythropterus*	LC
		Rufous-winged Cisticola	*Cisticola galactotes*	LC
		Short-winged Cisticola	*Cisticola brachypterus*	LC
		Singing Cisticola	*Cisticola cantans*	LC
		Tabora Cisticola	*Cisticola angusticauda*	LC
		Tawny-flanked Prinia	*Prinia subflava*	LC
		White-winged Apalis	*Apalis chariessa*	LC
		Winding Cisticola	*Cisticola marginatus*	LC
		Wing-snapping Cisticola	*Cisticola ayresii*	LC
		Yellow-breasted Apalis	*Apalis flavida*	LC
		Zitting Cisticola	*Cisticola juncidis*	LC
	Corvidae	Indian House Crow	*Corvus splendens*	LC
	Dicruridae	Common Square-tailed Drongo	*Dicrurus ludwigii*	LC
		Fork-tailed Drongo	*Dicrurus adsimilis*	LC
	Emberizidae	Cabanis's Bunting	*Emberiza cabanisi*	LC
		Golden-breasted Bunting	*Emberiza flaviventris*	LC

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	Erythrocercidae	Livingstone's Flycatcher	*Erythrocercus livingstonei*	LC
Passeriformes	Estrildidae	African Firefinch	*Lagonosticta rubricata*	LC
		Blue Waxbill	*Uraeginthus angolensis*	LC
		Bronze Mannikin	*Lonchura cucullata*	LC
		Common Waxbill	*Estrilda astrild*	LC
		Crimson-rumped Waxbill	*Estrilda rhodopyga*	LC
		Green-winged Pytilia	*Pytilia melba*	LC
		Grey Waxbill	*Estrilda perreini*	LC
		Jameson's Firefinch	*Lagonosticta rhodopareia*	LC
		Locust Finch	*Paludipasser locustella*	LC
		Magpie Mannikin	*Spermestes fringilloides*	LC
		Orange-breasted Waxbill	*Amandava subflava*	LC
		Orange-winged Pytilia	*Pytilia afra*	LC
		Peters' Twinspot	*Hypargos niveoguttatus*	LC
		Red-throated Twinspot	*Hypargos niveoguttatus*	LC
		Southern Cordonbleu	*Uraeginthus angolensis*	LC
	Fringillidae	African Citril	*Serinus citrinelloides*	LC
		Black-eared Seedeater	*Serinus menneli*	LC
		Yellow-fronted Canary	*Crithagra mozambica*	LC
	Hirundinidae	Lesser Striped Swallow	*Cecropis abyssinica*	LC
		Wire-tailed Swallow	*Hirundo smithii*	LC
	Hyliotidae	Yellow-bellied Hyliota	*Hyliota flavigaster*	LC
	Laniidae	Isabelline Shrike	*Lanius isabellinus*	LC
		Red-backed Shrike	*Lanius collurio*	LC
		Red-tailed Shrike	*Lanius isabellinus*	LC
	Leiothrichidae	Arrow-marked Babbler	*Turdoides jardineii*	LC
	Macrosphenidae	Moustached Grass-Warbler	*Melocichla mentalis*	LC
	Malaconotidae	Black-backed Puffback	*Dryoscopus cubla*	LC
		Black-crowned Tchagra	*Tchagra senegala*	LC
		Brown-crowned Tchagra	*Tchagra australis*	LC
		Brubru	*Nilaus afer*	LC
		Chestnut-fronted Helmetshrike	*Prionops scopifrons*	LC
		Ethiopian Boubou	*Laniarius aethiopicus*	LC
		Fulleborn's Boubou	*Laniarius fuelleborni*	LC
		Gorgeous Bushshrike	*Telophorus quadricolor*	LC
		Gray-headed Bushshrike	*Malaconotus blanchoti*	LC
		Grey-headed Bush-shrike	*Malaconotus blanchoti*	LC
		Orange-breasted Bushshrike	*Chlorophoenus sulfureopectus*	LC
		Sulphur-breasted Bushshrike	*Telophorus sulfureopectus*	LC
		Tropical Boubou	*Laniarius aethiopicus*	LC
	Monarchidae	African Crested-Flycatcher	*Trochocercus cyanomelas*	LC
		African Paradise Flycatcher	*Terpsiphone viridis*	LC
		Blue-headed Crested Flycatcher	*Trochocercus nitens*	LC
		Paradise Flycatcher	*Terpsiphone viridis*	LC

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Passeriformes	Motacillidae	African Pied Wagtail	*Motacilla aguimp*	LC
		African Pipit	*Anthus cinnamomeus*	LC
		Fulleborn's Longclaw	*Macronyx fuelleborni*	LC
		Golden Pipit	*Tmetothylacus tenellus*	LC
		Yellow-throated Longclaw	*Macronyx croceus*	LC
	Muscicapidae	African Grey Flycatcher	*Bradornis microrhynchus*	LC
		Arnot's Chat	*Myrmecocichla arnotti*	LC
		Ashy Flycatcher	*Muscicapa caerulescens*	LC
		Bearded Scrub Robin	*Cercotrichas quadrivirgata*	LC
		Collared Flycatcher	*Ficedulla albicollis*	LC
		Collared Palm Thrush	*Cichladusa arquata*	LC
		Grey Tit-Flycatcher	*Fraseria plumbea*	LC
		Miombo Scrub Robin	*Tychaedon barbata*	LC
		RÃ¼ppell's Robinchat	*Cossypha semirufa*	LC
		Red-backed Scrub-Robin	*Cercotrichas leucophrys*	LC
		Ruaha Chat	*Myrmecocichla collaris*	LC
		Southern Black Flycatcher	*Melaenornis pammelaina*	LC
		White-browed Scrub Robin	*Cercotrichas leucophrys*	LC
		White-headed Black-Chat	*Myrmecocichla albifrons*	LC
	Nectariniidae	Collared Sunbird	*Hedydipna collaris*	LC
Passeriformes		Eastern Violet-backed Sunbird	*Anthreptes orientalis*	LC
		Scarlet-chested Sunbird	*Chalcomitra senegalensis*	LC
		Shelley's Sunbird	*Cinnyris shelleyi*	LC
		Violet-breasted Sunbird	*Cinnyris chalcomelas*	LC
		Western Violet-backed Sunbird	*Anthreptes longuemarei*	LC
	Oriolidae	African Black-headed Oriole	*Oriolus larvatus*	LC
		African Golden Oriole	*Oriolus auratus*	LC
		Black-headed Oriole	*Oriolus xanthornus*	LC
		Black-winged Oriole	*Oriolus nigripennis*	LC
		Eastern Black-headed Oriole	*Oriolus larvatus*	LC
		Eurasian Golden Oriole	*Oriolus oriolus*	LC
		Green-headed Oriole	*Oriolus chlorocephalus*	LC
		Western Black-headed Oriole	*Oriolus brachyrynchus*	LC
	Paridae	Cinnamon-breasted Tit	*Melaniparus pallidiventris*	LC
		Miombo Tit	*Melaniparus griseiventris*	LC
		Rufous-bellied Tit	*Melaniparus rufiventris*	LC
		White-bellied Tit	*Melaniparus albiventris*	LC
	Passeridae	Yellow-spotted Petronia	*Gymnoris pyrgita*	LC
		Yellow-throated Bush Sparrow	*Gymnoris superciliaris*	LC
	Phylloscopidae	Willow Warbler	*Phylloscopus trochilus*	LC
		Yellow-throated Woodland Warbler	*Phylloscopus ruficapilla*	LC

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Passeriformes	Platysteiridae	Chinspot Batis	*Batis molitor*	LC
		East Coast Batis	*Batis soror*	LC
		Forest Batis	*Batis mixta*	LC
		Pale Batis	*Batis soror*	LC
	Ploceidae	Black Bishop	*Euplectes gierowii*	LC
		Black-necked Weaver	*Ploceus nigricollis*	LC
		Fan-tailed Widowbird	*Euplectes ardens*	LC
		Kilombero Weaver	*Ploceus burnieri*	LC
		Red-collared Widowbird	*Euplectes ardens*	LC
		Southern Red Bishop	*Euplectes orix*	LC
		Spectacled Weaver	*Ploceus ocularis*	LC
		Village Weaver	*Ploceus cucullatus*	LC
		White-browed Sparrow-Weaver	*Plocepasser mahali*	LC
		Yellow Bishop	*Euplectes capensis*	LC
		Zanzibar Red Bishop	*Euplectes nigroventris*	LC
	Pycnonotidae	Cabanis's Greenbul	*Phyllastrephus cabanisi*	LC
		Common Bulbul	*Pycnonotus barbatus*	LC
		Dodson's Bulbul	*Pycnonotus dodsoni*	LC
		Grey-olive Greenbul	*Phyllastrephus terrestris*	LC
		Shelley's Greenbul	*Arizelocichla masukuensis*	LC
		Yellow-bellied Greenbul	*Chlorocichla flaviventris*	LC
	Remizidae	Grey Penduline Tit	*Anthoscopus caroli*	LC
Passeriformes	Scopidae	Hamerkop	*Scopus umbretta*	LC
	Stenostiridae	African Blue Flycatcher	*Elminia longicauda*	LC
	Sturnidae	Black-bellied Starling	*Notopholia corusca*	LC
		Lesser Blue-eared Starling	*Lamprotornis chloropterus*	LC
		Miombo Blue-eared Starling	*Lamprotornis elisabeth*	LC
		Shelley's Starling	*Lamprotornis shelleyi*	LC
		Violet-backed Starling	*Cinnyricinclus leucogaster*	LC
	Sylviidae	Banded Parisoma	*Curruca boehmi*	LC
		Common Whitethroat	*Curruca communis*	LC
		Northern Crombec	*Sylvietta brochyura*	LC
	Threskiornithidae	Glossy Ibis	*Plegadis falcinellus*	LC
		Hadada Ibis	*Bostrichia hagedash*	LC
	Turdidae	Bare-eyed Thrush	*Turdus tephronotus*	LC
		Kurrichane Thrush	*Turdus libonyana*	LC
	Vangidae	Black-and-white Shrike-flycatcher	*Bias musicus*	LC
		Retz's Helmetshrike	*Prionops retzii*	LC
		Vanga Flycatcher	*Bias musicus*	LC
		White Helmetshrike	*Prionops plumatus*	LC
		White-crested Helmetshrike	*Prionops plumatus*	LC
	Viduidae	Broad-tailed Paradise-Whydah	*Vidua obtusa*	LC
		Pin-tailed Whydah	*Vidua macroura*	LC
		Purple Indigobird	*Vidua purpurascens*	LC
		Village Indigobird	*Vidua chalybeate*	LC

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	Zosteropidae	African Yellow White-eye	*Zosterops senegalensis*	LC
		Northern Yellow White-eye	*Zosterops senegalensis*	LC
		Southern Yellow White-eye	*Zosterops anderssoni*	LC
Piciformes	Indicatoridae	Greater Honeyguide	*Prodotiscus indicator*	LC
		Lesser Honeyguide	*Indicator minor*	LC
		Scaly-throated Honeyguide	*Prodotiscus variegatus*	LC
	Lybiidae	Black-collared Barbet	*Lybius torquatus*	LC
		Crested Barbet	*Trachyphonus vaillantii*	LC
		Moustached Green Tinkerbird	*Pogoniulus leucomystax*	LC
		Red-fronted Tinkerbird	*Pogoniulus pusillus*	LC
		Yellow-rumped Tinkerbird	*Pogoniulus bilineatus*	LC
	Picidae	Bearded Woodpecker	*Dendropicos namaquus*	LC
		Cardinal Woodpecker	*Dendropicos fuscescens*	LC
		Golden-tailed Woodpecker	*Campethera abingoni*	LC
		Nubian Woodpecker	*Campethera nubica*	LC
		Reichenow's Woodpecker	*Campethera scriptoricauda*	LC
		Speckle-throated Woodpecker	*Campethera scriptoricauda*	LC
		Stierling's Woodpecker	*Dendropicos stierlingi*	LC
Psittaciformes	Psittacidae	Brown Parrot	*Poicephalus meyeri*	LC
		Brown-headed Parrot	*Poicephalus cryptoxanthus*	LC
		Meyer's Parrot	*Poicephalus meyeri*	LC
Strigiformes	Strigidae	Abyssinian Owl	*Asio abyssinicus*	LC
		African Barred Owlet	*Glaudicium capense*	LC
		African Wood Owl	*Strix woodfordii*	LC
		Barred Owlet	*Glaudicium capense*	LC
Suliformes	Phalacrocoracidae	Reed Cormorant	*Microcarbo africanus*	LC
Trogoniformes	Trogonidae	Narina Trogon	*Apaloderma narina*	LC

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