



NOTES ON BIRDS OF SERONERA AREA, SERENGETI NATIONAL PARK, TANZANIA

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ABSTRACT

The Serengeti Ecosystem is a natural heaven for research and tourism. Such activities have often focused on large mammal species, with minimal regard for birds, even though the park is an Important Bird Area. This study explored bird abundance in the Seronera area of Serengeti National Park, one of the most visited sections of the park. Understanding the variety and abundance of birds in the Seronera area is useful for enhancing tourism. Bird point counts were undertaken in riverine, wooded bushland, and grassland habitats. A total of 99 bird species were observed within a three day visit to the park, with most individuals (38.9%) being Gramnivores. The density of birds was dependent on the habitat type; with the riverine having the greatest density, mostly of the order Galliformes. These findings could be integrated into the tourism planning and marketing for the park so as to diversify tourism activities. Several sections of the Seronera area within the riverine and wooded bushland areas could be designated as birding areas, where guided walks could be undertaken and other activities such as game drives are limited.

INTRODUCTION

East Africa enjoys high diversity of birdlife, with 1,097 bird species in Kenya, 1,046 in Tanzania and 1,008 in Uganda (Zimmerman *et al.* 1999). The rich avifauna of East Africa is due to varying topography, seasonal changes in climate, and the region's positioning as a major

flyway for Palearctic migratory bird species (Pomeroy 1992). East Africa's topography has been shaped by historical geological processes, such as the rift valley formation, which has given rise to diverse habitats, with each habitat having distinct bird populations. These geo-climatic features influence habitat structure and heterogeneity, which are key determinants of bird species richness, diversity and density (Rice *et al.* 1983; Walwert *et al.* 2004; Chettri *et al.* 2005; Nguyen 2007; Tworek 2007; C *et al.* 2011). They are able to support diverse bird populations because of availability of the different ecological niches (Tworek 2007).

There is a trend towards high bird densities in riverine habitats and wetlands, since greater resources are available because of high moisture (Remsen and Parker 1983; Robinson *et al.* 2002; Zakaria *et al.* 2009). The abundant water resources in riverine habitats lead to greater green vegetation biomass, which is correlated with greater avian density (Folse 1982). In open areas such as agricultural fields or grasslands, there tends to be low diversity and low bird species density (Tworek 2007; Azman *et al.* 2011). Sinclair, *et al.* (2002) found that in the Serengeti ecosystem, there were 50% more avian species and 72% more avian abundance than in surrounding agricultural fields, and that insectivores and gramnivores were much less common in agricultural areas. Forests and closed habitats are likely to contain a greater proportion of Insectivorous and Frugivorous birds, due to a larger



concentration of invertebrates and fruit while Carnivorous, Gramnivorous and Omnivorous birds are more numerous in open areas due to the better foraging opportunity allowed by the open area (Chettri *et al.* 2005; Azman *et al.* 2011). Feeding guilds tend to have less effect on bird habitat selection, as the availability of resources is a more significant factor (Rice *et al.* 1983).

The Serengeti National Park is important for its protected status and its heterogeneous landscape, as well as for its endemic bird species, such as the Grey-breasted spurfowl, *Francolinus rufopictus*, and the Magpie shrike, *Urolestes melanoleucus aequatorialis* (Zimmerman *et al.* 1999). As such, the Seronera area of Serengeti National Park could be used for conservation and tourism relating to its rich avifauna. Considering that the Seronera area is a transitional zone for several habitats (ecotones), this study investigated bird abundance and density in the different habitats, with the aim of giving an indication of the potential for birding in the area.

MATERIALS AND METHODS

The Seronera area is located in the heart of Serengeti National Park (Figure 1) and forms an ecotone for the grassland and woodland habitats. Several streams leading into Seronera River form a critical wetland area for birds. The area experiences two rain seasons — the short rains (November to December) and long rains (March to May). The Seronera area receives 500 mm of rain in the southern plains to 1200 mm in the northwest annually, and temperatures vary from 13⁰ C to 27⁰ C. The soil is saline volcanic, with undulating plains interrupted by isolated rocky areas (Sinclair and Arcese 1995). The grasslands are dominated by *Themeda triandra* and *Pennisetum mezianum* grasses. The brushland/shrublands are dominated by several Acacia species such as *Acacia tortilis* and *Acacia gerrandi*, while the riverine habitat consists of palm trees, *Acacia xanthophloea*, Cyperus reeds, *Sporobolus consimilis* grass, and a range of shrubs. The dominant fauna include the African elephant (*Loxodonta Africana*), common wildebeest (*Connochaetes taurinus*), Thompson's gazelle (*Gazella thomsonii*), zebra (*Equus burchelli*), Maasai giraffe (*Giraffa camelopardalis*), lion (*Panthera leo*) and spotted hyena *Crocuta crocuta* (Seymour and Rowen 2011). The Seronera area is highly visited by game viewers due to the high concentration of the plain's game and big cats.

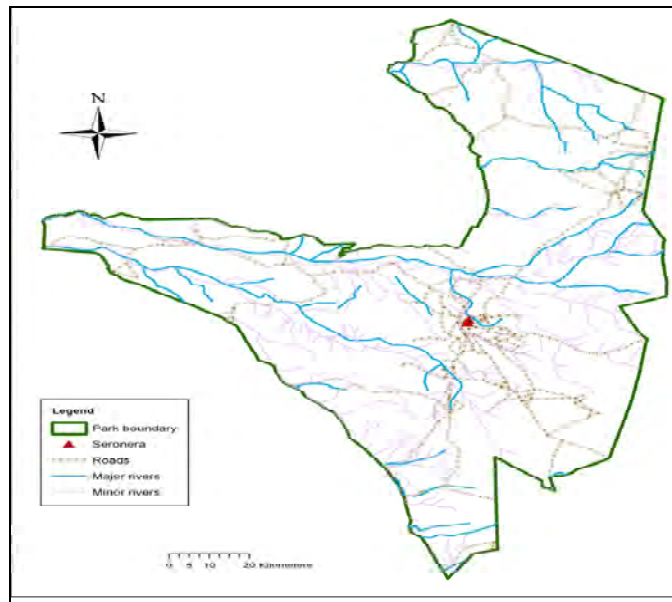


Figure 1: Seronera area, Serengeti National Park

Study Method

A point count method (Pomeroy 1992) was used to assess bird assemblage in three habitats within Seronera area of Serengeti National Park. The habitats included riverine, woodland, and grassland. The point counts were spaced at 250 meters, and bird observations were completed for five minutes at each point. Thirty points systematically located along the main roads were sampled in each habitat. All birds, including those which flew overhead, within a thirty meter radius from the road or river were identified and counted between 6:30 am - 9:00 am.

Data analysis

Chi-squared tests were used to determine relationship between habitat type and bird abundance, and Analysis of Variance (ANOVA) was used to determine whether the number of birds within each plot varied among the three habitats.

RESULTS

A total of 99 bird species were recorded. Out of this, 52 bird species (524 individuals) were recorded during the point surveys and an additional 47 species were sighted during *ad hoc* observations within a two day stay in Seronera area (Table 1).



Table 1: Checklist of birds of Seronera, Serengeti National Park

Common Name	Family	Scientific name
African firefinch	Estrildidae	<i>Lagonosticta rubricate</i>
African fish eagle	Accipitridae	<i>Haliaeetus vocifer</i>
African jacana	Jacaniidae	<i>Actophilornis africanus</i>
African mourning dove	Columbidae	<i>Streptopelia decipiens</i>
African Orange-bellied parrot	Psittacidae	<i>Poicephalus rufiventris</i>
African white-backed vulture	Accipitridae	<i>Gyps africanus</i>
Amur falcon	Falconidae	<i>Falco amurensis</i>
Bare-faced go-away-bird	Musophagidae	<i>Corythaixoides personatus</i>
Barn swallow	Hirundinidae	<i>Hirundo rustica</i>
Bateleur	Accipitridae	<i>Terathopius ecaudatus</i>
Bearded woodpecker	Picidae	<i>Dendropicos namaquus</i>
Black crane	Rallidae	<i>Amaurornis flavirostris</i>
Black-bellied bustard	Otididae	<i>Eupodotis melanogaster</i>
Black-chested snake eagle	Accipitridae	<i>Circaetus pectoralis</i>
Black-headed heron	Ardeidae	<i>Ardea melanocephala</i>
Black-shouldered kite	Accipitridae	<i>Elanus caeruleus</i>
Blacksmith plover	Charadriidae	<i>Vanellus armatus</i>
Black-winged stilt	Recurvirostridae	<i>Himantopus himantopus</i>
Blue-breasted bee-eater	Meropidae	<i>Merops variegatus</i>
Blue-capped cordon bleu	Estrildidae	<i>Uraeginthus cyanocephalus</i>
Brown parrot	Psittacidae	<i>Poicephalus meyeri</i>
Brown snake eagle	Accipitridae	<i>Circaetus cinereus</i>
Canaries	Fringillidae	<i>Serinus sp.</i>
Cape rook	Corvidae	<i>Corvus capensis</i>
Cattle egret	Ardeidae	<i>Bubulcus ibis</i>
Chestnut-bellied sandgrouse	Pteroclididae	<i>Pterocles exustus</i>
Cinnamon-chested bee-eater	Meropidae	<i>Merops oreobates</i>
Common bulbul	Pycnonotidae	<i>Pycnonotus barbatus</i>
Common drongo	Dicruridae	<i>Dicrurus adsimilis</i>
Common fiscal	Laniidae	<i>Lanius collaris</i>
Common ostrich	Struthionidae	<i>Struthio camelus</i>
Common sandpiper	Scolopacidae	<i>Actitis hypoleucos</i>
Coqui francolin	Phasianidae	<i>Francolinus coqui</i>
Crowned plover	Charadriidae	<i>Vanellus coronatus</i>
D'Arnaud's barbet	Lybiidae	<i>Trachyphonus darnaudii</i>
Egyptian goose	Anatidae	<i>Alopochen aegyptiacus</i>
Eurasian roller	Coraciidae	<i>Coracias garrulous</i>
Fischer's lovebird	Psittaculidae	<i>Agapornis fischeri</i>
Fischer's sparrow-lark	Alaudidae	<i>Eremopterix leucopareia</i>
Green sandpiper	Scolopacidae	<i>Tringa ochropus</i>
Green wood-hoopoe	Phoeniculidae	<i>Phoeniculus purpureus</i>
Grey-backed fiscal	Laniidae	<i>Lanius excubitoroides</i>
Grey-capped social weaver	Ploceidae	<i>Pseudonigrita arnaudi</i>
Grey-headed kingfisher	Halcyonidae	<i>Halcyon leucocephala</i>
Grey-headed sparrow	Passeridae	<i>Passer griseus</i>



Common Name	Family	Scientific name
Hadada ibis	Threskiornithidae	<i>Bostrychia hagedash</i>
Helmeted guineafowl	Numididae	<i>Numida meleagris</i>
Hildebrandt's starling	Phasianidae	<i>Lamprotornis hildebrandti</i>
Hoopoe	Upupidae	<i>Upupa epops</i>
Kittlitz's plover	Charadriidae	<i>Charadrius pecuarius</i>
Kori bustard	Otididae	<i>Ardeotis kori</i>
Lappet-faced vulture	Accipitridae	<i>Torgos tracheliotus</i>
Lesser striped swallow	Hirundinidae	<i>Hirundo smithii</i>
Lilac-breasted roller	Coraciidae	<i>Coracias caudatus</i>
Little bee-eater	Meropidae	<i>Merops pusillus</i>
Long-tailed fiscal	Laniidae	<i>Lanius cabanisi</i>
Magpie shrike	Laniidae	<i>Urolestes melanoleucus</i>
Marabou stork	Ciconiidae	<i>Leptoptilos crumeniferus</i>
Martial eagle	Accipitridae	<i>Polemaetus bellicosus</i>
Mosque swallow	Hirundinidae	<i>Hirundo senegalensis</i>
Northern white-crowned shrike	Laniidae	<i>Eurocephalus rueppelli</i>
Pallid harrier	Accipitridae	<i>Circus macrourus</i>
Pectoral-patch cisticola	Cisticolidae	<i>Cisticola brunnescens</i>
Plain-backed pipit	Motacillidae	<i>Anthus leucophrys</i>
Red-billed buffalo weaver	Ploceidae	<i>Bubalornis niger</i>
Red-billed hornbill	Bucerotidae	<i>Tockus erythrorhynchus</i>
Red-billed oxpecker	Buphagidae	<i>Buphagus erythrorhynchus</i>
Red-billed teal	Anatidae	<i>Anas erythrorhyncha</i>
Red-necked spurfowl	Phasianidae	<i>Francolinus afer</i>
Red-rumped swallow	Hirundinidae	<i>Hirundo daurica</i>
Ringed plover	Charadriidae	<i>Charadrius hiaticula</i>
Rosy-breasted longclaw	Motacillidae	<i>Macronyx ameliae</i>
Ruff	Scolopacidae	<i>Philomachus pugnax</i>
Rufous-chested swallow	Hirundinidae	<i>Hirundo semirufa</i>
Rufous-crowned roller	Coraciidae	<i>Coracias naevius</i>
Rufous-tailed weaver	Passeridae	<i>Histurgops ruficaudus</i>
Ruppell's long-tailed starling	Sturnidae	<i>Lamprotornis purpuropterus</i>
Sacred ibis	Threskiornithidae	<i>Threskiornis aethiopicus</i>
Saddle-billed stork	Ciconiidae	<i>Ephippiorhynchus senegalensis</i>
Sand martin	Hirundinidae	<i>Riparia riparia</i>
Secretary bird	Sagittariidae	<i>Sagittarius serpentarius</i>
Senegal plover	Charadriidae	<i>Vanellus lugubris</i>
Shelley's francolin	Phasianidae	<i>Francolinus shelleyi</i>
Silverbird	Muscicapidae	<i>Empidonis semipartitus</i>
Southern ground hornbill	Bucerotidae	<i>Bucorvus leadbeateri</i>
Speckle-fronted weaver	Ploceidae	<i>Sporopipes frontalis</i>
Spotted redshank	Scolopacidae	<i>Tringa erythropus</i>
Superb starling	Sturnidae	<i>Lamprotornis superbus</i>
Swifts	Apodidae	<i>Apus sp./Cypsiurus sp.</i>
Tawny eagle	Accipitriformes	<i>Aquila rapax</i>
Three-banded plover	Charadriidae	<i>Charadrius tricollaris</i>



Common Name	Family	Scientific name
Von Der Decken's hornbill	Bucerotidae	<i>Tockus deckeni</i>
Wattled starling	Sturnidae	<i>Creatophora cinerea</i>
White-bellied bustard	Otididae	<i>Eupodotis senegalensis</i>
White-bellied go-away-bird	Musophagidae	<i>Corythaixoides leucogaster</i>
White-browed Coucal	Cuculidae	<i>Centropus superciliosus</i>
White-headed buffalo weaver	Ploceidae	<i>Dinemellia dinemelli</i>
Yellow-billed oxpecker	Buphagidae	<i>Buphagus africanus</i>
Yellow-throated sandgrouse	Pteroclididae	<i>Pterocles gutturalis</i>

Density

Density of birds per point (No/km²) was dependent on the habitat type (ANOVA: F (2,66)=21.95, p<0.05). Riverine had 26.11

± 5.59SE birds per plot compared to only 4.59 ± 1.71SE in the grassland (Figure 2).

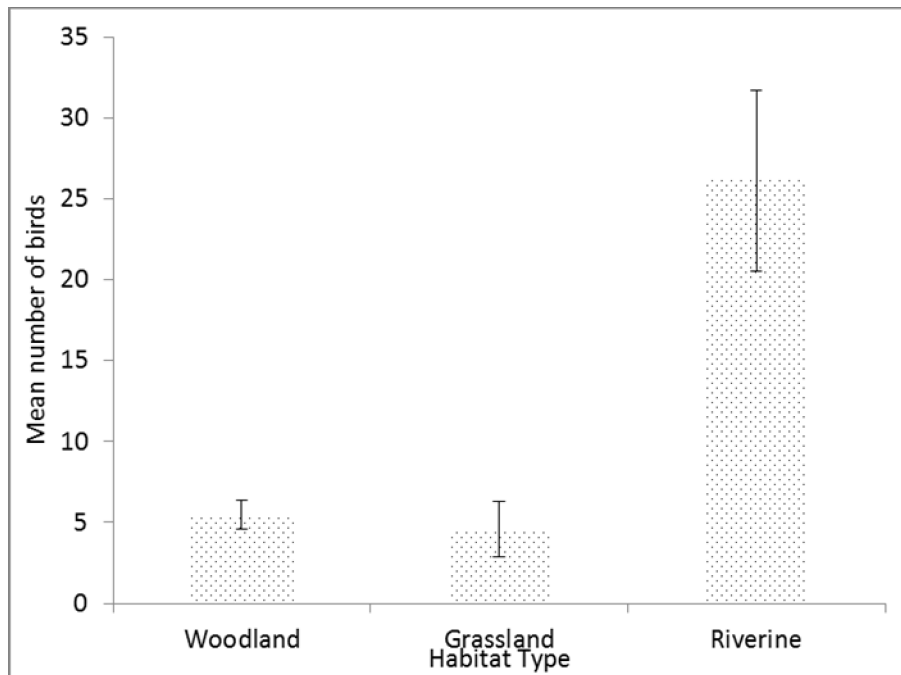


Figure 2: Mean number of birds per point ±SE in woodland, riverine and grassland habitats

Feeding Guild

There was a significant difference in number of birds among feeding guilds ($\chi^2=$

493.16, df= 6, p<0.05). Most (38.9%) of the birds (214 individuals), were Gramnivores, while predators comprised of only 4 individuals (0.7%) (Table 2).



Table 2. Distribution of birds sighted by feeding guild.

Feeding Guild	Frequency (%)	Common Birds
Gramnivore	38.9	Chestnut-bellied sandgrouse, <i>Pterocles exustus olivascens</i> ; Helmeted guinea fowl, <i>Numida meleagris</i>
Insectivore	31.1	Superb starling, <i>Lamprotornis superbus</i> ; Long-toed stint, <i>Calidris subminuta</i>
Omnivore	13.6	Von Der Decken's hornbill, <i>Tockus deckeni</i>
Scavenger	9.1	Marabou stork, <i>Leptoptilus crumeniferus</i>
Herbivore	3.8	Egyptian geese, <i>Alopochen aegyptiacus</i>
Frugivore	2.7	African orange-billed parrot, <i>Poicephalus r. rufiventris</i>
Predator	0.7	African fish eagle, <i>Haliaeetus vocifer</i>

Diversity

The number of bird species per point in the different habitats differed significantly (ANOVA: $F(2,66) = 22.99$, $p < 0.05$). The riverine habitat had the highest number of

bird species per plot ($5.89 \pm 0.48SE$) and grassland the lowest ($1.85 \pm 0.37SE$) (Figure 3).

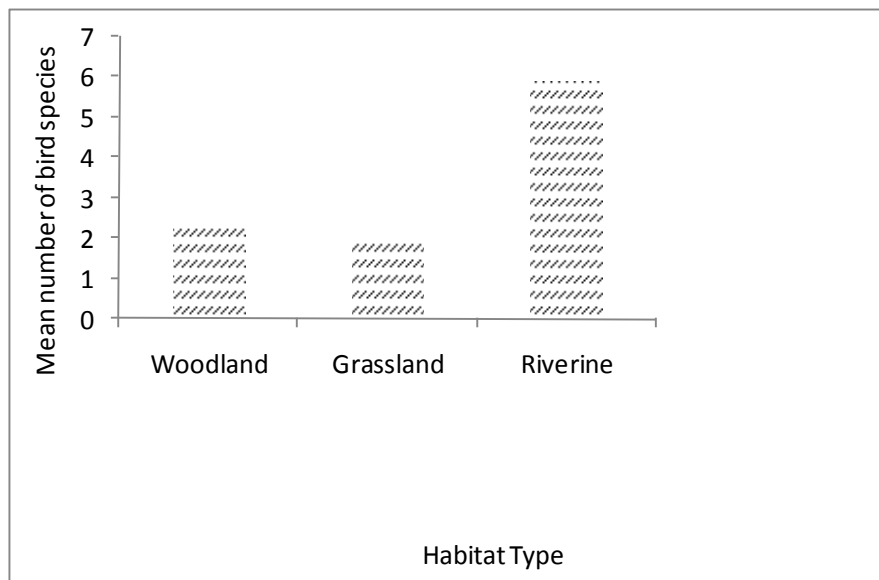


Figure 3: Mean number of bird species per point in woodland, grassland and riverine habitats.

Abundance

Bird abundance was dependent on the bird taxonomic orders ($\chi^2 = 714.46$, $p < 0.05$). The Galliformes were the most abundant (178

individuals, 34.0% of total bird abundance) and the Musophagiformes were the least abundant (1 individual, 0.2% of total bird abundance) (Table 3).



Table 3. Distribution of birds based on taxonomic order.

Order	Number of birds (%)	Dominant species of birds
Galliformes	34.00	Chestnut-bellied sandgrouse, <i>Pterocles exustus olivascens</i>
Passeriformes	25.60	Superb starling, <i>Lamprotornis superbus</i>
Charadriiformes	11.80	Long-toed stint, <i>Calidris subminuta</i>
Ciconiiformes	9.70	Marabou Stork, <i>Leptoptilus crumeniferus</i>
Anseriformes	4.40	Egyptian goose, <i>Alopochen aegyptiacus</i>
Columbiformes	4.00	African mourning dove, <i>Streptopelia decipiensperspicillata</i>
Coraciiformes	4.00	Lilac-breasted roller, <i>Coracias caudate</i>
Psittariformes	3.00	African orange-bellied parrot, <i>Poicephalus rufiventris rufiventris</i>
Pelecaniformes	2.70	Sacred ibis, <i>Threskiornis a. aethiopicus</i>
Apodiiformes	1.1	Swifts (<i>Apus sp.</i>)
Struthioformes	0.80	Common ostrich, <i>Struthio camelus massaicus</i>
Falconiformes	0.60	African fish eagle, <i>Haliaeetus vocifer</i>
Musophagiformes	0.02	White-bellied go-away-bird, <i>Criniferoides leucogaster</i>

DISCUSSION

Bird density was found to be highest in the riverine habitat. Such findings could be attributed to riverine habitats having greater resources such as water, food, and nesting sites and a resulting ability to support more birds (Remsen and Parker 1983; Rice *et al.* 1983; Walwert *et al.* 2004). Vegetation stratification typical within riverine and woodland habitats offers a range of niches and increased bird activity in these habitats (Tworek 2007; Azman, *et al.* 2011). The presence of greater green vegetative biomass in riverine habitats allows the habitat to support a greater density of birds (Folse 1982). The grassland habitat includes mostly homogenous vegetation, being dominated by grass and, therefore, largely suitable for Gramnivores and certain insectivore species. Gramnivores were the most abundant feeding guild in the Seronera area. Grains are seasonal and

clumped and this results in large aggregations of Gramnivores in the savannahs, particularly when grass seed mature.

Galliformes were the most abundant species throughout the habitats. It would be expected that Passeriformes would be present in the greatest numbers, as the majority of bird species are included in this order (Gill 2006). However, Galliformes may have had more individuals observed than that of Passeriformes due to the large aggregations of birds, such as sandgrouse, recorded near water points, as well as greater visibility due to their larger size. Musophagiformes, the least common order, contains relatively uncommon birds species, with only five species found Serengeti National Park (Ross's turaco, *Musphaga rossae*, Schalow's turaco, *Tauraco schalowi*, Bare-faced go-away-bird, White-bellied go-away-bird, and Eastern grey plantain-eater, *Crinifer*



zonurus), which explains the fewer comparative sightings of the order (Zimmerman *et al.* 1999).

Attracting birding tourists would allow Serengeti National Park to increase and diversify tourism activities. Specific bird-rich areas, such as the riverine habitat, can have areas set aside for birders. Efforts could also be made to locate and conserve areas with specific birds that might be of special interest to birders. In these areas, birding walking trails can be developed. Such steps would create a value-addition to tourism in the Seronera area. Also, during this study, several roosting sites for African White-backed vultures were recorded in the riverine sections, on *yellow barked acacia* trees. In one section of the Seronera area, these trees had been burned and were dying. Fire may be an impediment to the white-backed vulture's habitat within the Seronera area. Therefore, firebreaks can be constructed to safeguard the vulture's roosting and nesting sites.

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