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THE COMPOSITION AND HABITAT PREFERENCES OF THE AVIFAUNA OF MOLE NATIONAL PARK, GHANA

by P. W. Greig-Smith

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Mole National Park covers almost 5000 km^2 in the Northern Region of Ghana, in the centre of the Guinea savanna belt. With the exception of game-scouts' camps, the Park has been uninhabited since 1964, and is much less disturbed than most areas of savanna woodland in West Africa. As a result of the excellent tourist accommodation, the Park attracts large numbers of visitors, and several bird lists have been compiled. Three accounts have been published (Genelly 1969, Maze 1970, Oxford Expedition Report 1970), but none includes observations from more than a few months, and no full list has been produced.

This paper draws together the available records from Mole, forming an up-to-date bird list for the Park. The migrant status, relative abundance, and habitat preferences of species are discussed, based on my own observations at Mole (7 July to 28 August 1974; 3 July to 3 September 1975; 28 October to 3 December 1975), chiefly in the vicinity of the Park headquarters, 09° 16'N 01° 51'W, and Lovi Camp, 09° 23'N 02° 00'W.

DESCRIPTION OF HABITATS

The area is topographically uniform, varying from 120 to 490 metres above sea level, and relieved only by a network of low scarps. The vegetation associations are typical of the West African Guinea Savanna zone, described by Keay (1953) and Hopkins (1965). For the purpose of the following analysis, I have divided the bird habitats into nine broad types :

1 Human settlements The surroundings of the game-scouts' camps and the HQ buildings are distinguished from the adjacent savanna by their lower tree density, mown grass, and continual human disturbance. They also contain small gardens planted with a variety of crops.

2 Water edge This includes the surface and immediate surroundings of (i) the larger rivers, (ii) the transient pools which form during the rains in savanna and grassland, and (iii) permanent water-holes, particularly two artificial pools formed by dams near to the tourist motel.

3 Marsh Marshes are generally associated with rivers and water-holes, and though completely waterlogged in the rainy season, they dry out almost totally by the late dry season. The vegetation comprises grasses and sedges, 1 - 1.5 metres high, often with bushes of Mitragyna inermis and Pterocarpus santalinoides at the fringes.

4 Bovals Where soil cover is thin, the savanna gives way to flat treeless areas, bearing a layer of short herbs and grasses. Ephemeral pools form in the rainy season, as a result of inadequate drainage (no bird records from such pools are included, however). Fingers of woodland extending into the bovals are denser than the neighbouring savanna, by virtue of their protection from the worst of the annual fires.

5 Riverine woodland The larger rivers are fringed by a narrow strip of forest, composed of dense undergrowth and a closed canopy of tall emergent trees. Within the forest illumination is low and humidity is high. The vegetation is not affected by annual grass burning, and the undergrowth remains green throughout the year.

6 Anogeissus groves The sites of abandoned villages are marked by almost unispecific stands of the tree Anogeissus leiocarpus, which forms a higher, more closed canopy than in the savanna. Baobab trees Adansonia digitata are generally present, and the grass layer is not well developed.

7 Guinea savanna This is by far the predominant habitat at Mole, occurring in large unbroken areas separating relatively small patches of the other habitats. The open tree canopy is up to about 12 metres in height, over a grass layer which reaches 2.5 metres by the end of the rainy season. The common tree species include Isoberlinia doka, Butyrospermum paradoxum, Burkea africana, and Combretum spp.. Tree density and grass cover are reduced on the eroded slopes of scarps, and greater than average in areas close to streams. Annual burning in the dry season destroys the grass, and if severe can damage the trees.

8 Acacia scrub Small areas of arid, stony ground occur in savanna, particularly at the foot of the scarps. They are dotted with low thorny bushes, chiefly Acacia spp., and have no grass layer.

9 Grassland This differs from typical savanna in the virtual absence of trees, and occurs where soil cover is moderately thin. It is an intermediate category along a continuum between Guinea savanna and bovals.

THE SPECIES

Appendix 1 lists 314 species which have been seen at Mole during the last 12 years. Doubtful records of 21 birds have been omitted where the following three conditions are fulfilled : (i) identification seems

doubtful for distributional reasons, (ii) the species is easily confused in the field with a species already known to occur, (iii) the species has been recorded by only one (or rarely two) observers.

A rough index of abundance has been assigned to those species encountered during my visits, giving 43 species with abundance rating 1 : irregular, 83 with rating 2 : rare, 92 with rating 3 : common, and 31 with rating 4 : abundant.

Migrant status has been indicated for all species. This is based principally on the pattern of occurrence of species at Mole, but also takes account of established migration patterns, as described by Moreau (1966), Mackworth-Praed and Grant (1970, 1973), and Elgood, Fry & Dowsett (1973). The category 'intra-African migrant' here includes some species which may be involved in only local movements, as well as those with long-distance migrations.

HABITAT PREFERENCES

Appendix 1 also records the habitats occupied by 230 species observed during my visits, and indicates the apparently preferred habitat in each case. Most species (151 out of 230) are restricted to one or two habitats, and only four (Crinifer piscator, Centropus senegalensis, Pycnonotus barbatus and Eremomela pusilla) occur in more than five. However, this is not necessarily a good indication of the number of species with specialised habitat requirements, since some of the nine habitat-types include a considerable variety of sub-divisions.

The habitat-occupancy data are summarised in Table 1, indicating the diversity and uniqueness of the communities. Guinea savanna harbours almost twice as many species as any other habitat, none of which have more than one third of the total. The bovals appear to have a very impoverished bird fauna. The most distinctive communities, as measured by the proportion of species unique to the habitat, are those in marshes, water edge, and bovals, although all three share more than 60% of their species with other habitats. Four habitats (water edge, marsh, riverine forest and Guinea savanna) account for 82% of the species which are restricted to a single habitat.

In order to demonstrate relationships between the nine communities, an ordination was carried out on the habitat-occupancy data. The method used was that of Reciprocal Averaging (Hill 1973), which has the advantage of providing comparable species and stand (i.e. habitat) ordinations. The results will be discussed fully elsewhere, but one stand ordination is presented in Figure 1, to demonstrate similarity in species-composition between habitats. The figure shows the two axes of greatest variation of a three-dimensional graph on which the distance between two habitats is inversely related to the similarity of their species-lists.

Table 1. Composition of the bird communities in Mole National Park

Habitat	Number of species recorded	Number of spp. preferring the habitat		Number unique to the habitat	
			%		%
Human settlements	43	13	(32)	5	(12)
Water edge	31	7	(23)	12	(39)
Marsh	71	31	(44)	19	(27)
Bovals	9	6	(67)	3	(33)
Riverine forest	70	39	(56)	15	(21)
Anogeissus groves	29	1	(3)	1	(3)
Guinea savanna	131	76	(58)	20	(15)
Acacia scrub	63	12	(19)	3	(5)
Grassland	67	13	(18)	2	(3)

DISCUSSION

The species-total for Mole of 314 is very similar to totals recorded at two other well-studied Guinea savanna areas, in Gambia (300 species, Moreau 1966) and Nigeria (329 species, Fry 1966). Further, species-composition is closely similar to several localities in the Guinea savanna belt in Nigeria. The number of species shared with Mole, expressed as a percentage of the lower species-total, is 87% for Zaria, 11° 10'N 7° 40'E (Fry 1966); 88% for Yankari, 9° 45'N 10° 20'E (Dyer and Gartshore 1975); and 95% for both Falgore, 11° 14'N 8° 12'E, and Shagunu, 10° 20'N 4° 29'E (personal observation). Many of the differences are attributable to the restricted ranges of species which do not extend as far west as Mole, or to the presence of different habitats (e.g. the lake at Shagunu). Such close correspondence reflects the uniformity of the Guinea savanna zone in West Africa, and suggests that deductions made from observations at Mole are likely to be applicable to any Guinea savanna locality.

A large proportion of the species-differences which are not obviously a result of restricted ranges or absence of habitats involve water-birds (Ardeidae, Ciconiidae, Anatidae, Charadriidae, and others) or birds of prey (Accipitridae and Falconidae). Together with the swifts and swallows, these groups are also the least predictable at a single

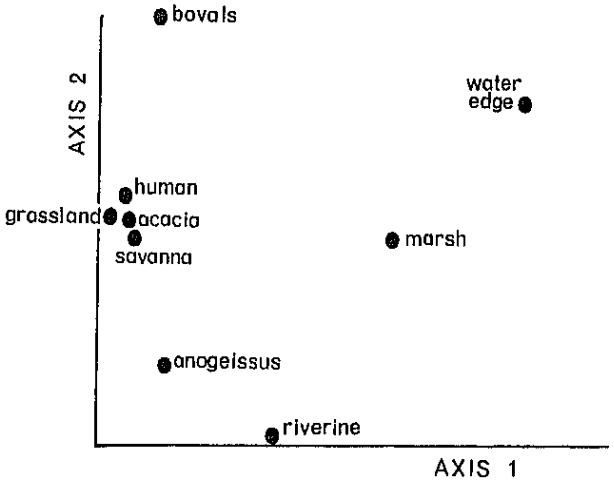

Figure 1. Relationship between the bird communities of nine habitats in Mole National Park, indicated by an ordination of the habitat preferences of 218 species.

locality - for example, no observer at Mole has recorded more than 60% of the total number of birds of prey in Appendix 1, nor more than 55% of the larger water-birds. This demonstrates the irregular, wide-ranging habits of the water-birds, constituting an adaptation to the extreme seasonal fluctuation in the extent and location of open water. The apparent unpredictability of the birds of prey may similarly reflect migrations and wanderings, but also indicates the large ranges required by individuals, and consequent low population densities.

The numbers of species recorded on each of my three visits to Mole were very similar (178, 191, and 194), and no other observers have certainly recorded more than 204 birds. Thus it seems that the number of species present at any time is about 200, so species-composition must change substantially by seasonal immigration and emigration. This accords with the large number of migrants (43 Palaearctic species, and 81 African species) included in Appendix 1.

The abundance index, although very imprecise, indicates that only a small proportion (about one eighth) of the species are abundant. Many of these are seed-eating passerines whose food becomes seasonally superabundant when the grasses flower in the early dry season. It is of interest that several species (e.g. Poicephalus robustus, Salpornis spilonota, and Emberiza cabanisi) which are rare and local in Nigeria (C. H. Fry, pers. comm.) are regular or common at Mole. This is probably a reflection of the lack of agriculture and other major human disturbance.

Consideration of species-composition within the various habitats (Appendix 2; Fig. 1) identifies four principal types of bird community :

(a) Savanna birds

This includes not only the birds of the true Guinea savanna, but also those of human settlements, Acacia scrub, and grassland, each of which has very few unique species (less than 12%), and shares over 75% with Guinea savanna. The closeness of this relationship is attributable mainly to the general similarity of vegetation structure in the four habitats. The lack of some components, such as a grass layer in the Acacia scrub, or a tree canopy in grassland, reduces species-diversity in these habitats, although it also permits the addition of a few species not found elsewhere. It is likely that the distribution of the habitats also promotes a general similarity to Guinea savanna. The other habitats occur as small patches within a matrix of savanna, which birds must occupy at least temporarily unless they are extremely sedentary. This applies also to the bovals and Anogeissus groves, and is probably a major contributor to the number of species that these structurally very different habitats share with Guinea savanna.

Five species appear to be restricted to the vicinity of human settlements. In some cases this is probably a result of the small number of records, but Lamprotornis spp. and Corvus albus are associated with urban areas throughout West Africa, and it may be that they would not occur at Mole in the absence of man. Despite human disturbance, several other species have shifted their habitat preferences to settlements, although also occurring elsewhere.

(b) Riverine Forest birds

Of the 15 species which are restricted to riverine forest, all but two are included in a list of 'fringing forest' species of the Guinea savanna zone in Nigeria (Fry 1975). Their distributions are all largely within the forest belt to the south of the savannas, where their habitat preferences are less rigid, and they extend into the drier savannas only along riverine forest. It is likely that several other species in Appendix 1 are also in this category, but are able to occupy adjacent habitats during the rains, when the environment is less arid and lacking in cover. There is apparently a general movement of birds into the riverine forest at the height of the dry season (Maze 1970).

The Anogeissus grove community shows considerable similarity to riverine forest as well as to savanna. This is attributable to the similarities in vegetation structure - both habitats have a high, closed tree canopy - and to the fact that the natural location of A. leiocarpus is along river banks. The presence of several otherwise riverine forest birds (Halcyon malimbicus, Cossypha niveicapilla, Turdus pelios, Camaroptera brachyura, Myioparus plumbeus, and Terpsiphone viridis) suggests that low illumination and relatively high humidity are more important habitat requirements for them than dense cover, which is much less plentiful in Anogeissus groves than in riverine forest.

(c) Water and Marsh birds

Though not closely similar to one another, these two communities are distinct from all others, reflecting their quite different physical structure. The lack of similarity between them is due to the fact that marsh includes not only birds associated with water, but also a number of species (e.g. Euplectes spp., Cisticola galactotes and C. natalensis, Merops pusillus, Tchagra minuta, Quelea erythrops) which occupy the grass and sedges. The wandering habits of water-birds have already been mentioned, and described as an adaptation to the ephemeral nature of open water sites. The water-living marsh birds are also subject to this pressure, but it is likely that they move only when compelled to do so by extreme drying-out.

(d) Boval birds

Bovals hold the best-defined bird fauna. This is a result of the specialisations needed to occupy a habitat which lacks cover, and is subject to extremely high temperatures and low humidity. Thus only a small number of species (Vanellus senegallus, Charadrius forbesi, Mirafra rufocinnamomea, Galerida cristata, Anthus leucophrys) occur on the flats themselves. The ephemeral pools temporarily attract water-birds, and the fingers of woodland dividing the flats contain a number of species which are usually associated with riverine forest and the denser patches of savanna trees (Camaroptera brachyura, Platysteira cyanea, Lybius dubius, and Turdoides plebejus). The nearest relationship of the boval community is with human settlements, explained by the closely mown grass which surrounds the camps.

No habitat preferences were determined for the swifts (Apodidae) and swallows (Hirundinidae), because of their high mobility, and virtual independence of vegetation. The occurrence of these species was very unpredictable, in location, time and number of birds. Large flocks of up to four species frequently and suddenly arrived to feed on insects over open water and marshes.

Finally, it seems useful to attempt a synthesis of the migration and breeding patterns, and the habitat preferences of species. The following scheme summarises the major elements comprising the avifauna of Mole National Park:-

Resident savanna birds, breeding at Mole, and occupying the full range of habitats described above. They may or may not have their populations augmented seasonally by migrant sections of the species.

Birds of the drier or wetter savanna, not breeding at Mole, and present only for a part of the year, as they migrate with the movement of the inter-tropical convergence and the associated rains.

Riverine forest birds near the limits of their southern forest distributions.

Birds associated only with human settlements, and presumably occurring because of the presence of man.

Resident marsh and water-birds which are restricted to marshes throughout their ranges.

Water-birds indulging in local wanderings related to changes in areas of open water.

Palaearctic migrant species, of various ecological types, which are non-breeding visitors in the dry season.

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APPENDIX 1 - BIRDS RECORDED FROM MOLE NATIONAL PARK

Sequence and nomenclature follow White (1960-65).

Status : R, resident whole year; AM, intra-African migrant; PM, Palaearctic migrant.

Abundance : Index assigned only to species recorded by the author and N.C. Davidson during 1974 and 1975 Aberdeen University expeditions.

I, irregular (occasional records of one or two birds); 2, rare (seen regularly in small numbers); 3, common (recorded frequently in moderate numbers); 4, abundant (recorded frequently in large numbers).

Habitats : + indicates habitats in which the species was recorded; * indicates the preferred habitat, judged by the high proportion of records there. Only species seen by the author are considered, and the highly mobile swifts and swallows are ignored. No preference is given for species with abundance rating of 1.

Authority : Records are by the author unless indicated by the following symbols :

- D - N.C. Davidson, July-Sept 1974 and July-August 1975
- EG - M. Edmunds and L. Grimes, March 1969
- G - R.E. Genelly, July-Oct 1966
- M - R.L. Maze, Jan, April and August 1967 and 1968
- O - Oxford University expedition, July-Sept 1968
- P - R.B. Payne, October 1975
- S - R. Sutton, December 1968
- skin - study-skin deposited at Mole, examined by the author
- T - game rangers
- X - combined records of J. Edwards (Aug 1964); K.J. McAdam (Dec 1964); K. Curry-Lindahl (March 1968); P. Pegg (March-Aug 1968).

SPECIES	STATUS	ABUNDANCE	HABITATS								AUTHORITY
			Human settlement	Water	Marsh	Bovals	Riverine woods	Anogeissus	Savanna	Acacia	Grassland	
PHALACROCORACIDAE												
Phalacrocorax africanus	AM	1		+								
ARDEIDAE												
Ixobrychus minutus	R	2		+	*							
I. sturmii	R	2			*							
Nycticorax nycticorax	AM											EG G O
Ardeola ralloides	AM+PM	2		+	*							
A. ibis	AM	3	+	*	+							
Butorides striatus	R	3		+	*							
Egretta alba	AM	1		+								
E. intermedia	AM	1		+								

SPECIES	STATUS	ABUNDANCE	HABITATS								AUTHORITY
			Human	Water	Marsh	Bovals	Riverine	Anogeissus	Savanna	Acacia	Grassland	
Ardea cinerea	AM+PM	2		+	*							
A. melanocephala	AM	1		+								
A. goliath	AM											EG O
A. purpurea	AM+PM	2		+	*							
SCOPIDAE												
Scopus umbretta	R	2		*	+							
CICONIIDAE												
Ciconia ciconia	PM											skin
C. abdimii	AM											M
C. episcopus	AM	1			+							
Ephippiorhynchus senegalensis	AM	1			+							
Anastomus lamelligerus	AM											EG X
Leptoptilus crumeniferus	AM	1			+							
Ibis ibis	AM											M O
THRESKIORNITHIDAE												
Threskiornis aethiopica	AM											O
Bostrychia hagedash	R	3		+	*		+					
ANATIDAE												
Dendrocygna viduata	R	3		*	+							
Alopochen aegyptiaca	AM											G
Plectropterus gambensis	R	2			*							
Sarkidiornis melanotus	AM											M
Nettapus auritus	R											O
ACCIPITRIDAE												
Trigonoceps occipitalis	R	1							+		+	
Gyps bengalensis	R	1							+		+	
Neophron monachus	R	3	*						+	+	+	
Gypohierax angolensis	R	2					*		+			
Polyboroides radiatus	R	1					+					
Terathopius ecaudatus	R	3	+						*	+	+	
Circaetus gallicus	PM											EG
C. cinereus	R											P O
C. cinerascens	R	1			+		+					
Accipiter toussenelii	R											EG G P
A. badius	AM	2			+				*	+	+	
Melierax metabates	R											EG O
M. gabar	R	2			+			+	*		+	
Kaupifalco monogrammicus	R	3							*		+	
Butastur rufipennis	AM	2							*			
Buteo auguralis	AM	2				+			+	+	+	
Lophoaetus occipitalis	R	1			+		+					
Polemaetus bellicosus	R	2							*			
Hieraaetus spilogaster	R?											EG G O
H. dubius	R?											EG
Aquila rapax	R											O
A. wahlbergi	R	2	+		+				*			
Haliaetus vocifer	R	3			*		+					

SPECIES	STATUS	ABUNDANCE	HABITATS									AUTHORITY
			Human	Water	Marsh	Bovals	Riverine	Anogeissus	Savanna	Acacia	Grassland	
Milvus migrans	AM	2	*		+				+			
Pernis apivorus	PM											G P
Aviceda cuculoides	AM	1	+									
Elanus caeruleus	AM											skin
FALCONIDAE												
Falco peregrinus	AM	1										D
F. cuvieri	R	2							*			
F. chicquera	AM?											O
F. ardosiaceus	R	2		+					+	*		
F. ?vespertinus	PM	2			*							
F. naumanni	PM											M
F. tinnunculus	AM+PM											skin S O
SAGITTARIIDAE												
Sagittarius serpentarius	R											EG
PHASIANIDAE												
Francolinus albogularis	R	2							*			
F. bicalcaratus	R	4						+	*	+	+	
Coturnix chinensis	R	2									*	
Ptilopachus petrosus	R	4						+	*		+	
Numida meleagris	R	4					+	+	*		+	
RALLIDAE												
Limnocorax flavirostris	R	2			*							
Gallinula chloropus	R	2			*							
Porphyrio alleni	AM?	2			*							
GRUIDAE												
Balearica pavonina	AM											P X
OTIDAE												
Neotis denhami	AM	1		+					+			
Eupodotis melanogaster	AM											X
JACANIDAE												
Actophilornis africana	R	3			*							
BURHINIDAE												
Burhinus senegalensis	AM	2		*								
B. capensis	AM	1		+								
CHARADRIIDAE												
Vanellus albiceps	AM											S
V. senegallus	R	2		+		*						
Pluvialis squatorola	PM											M
Charadrius pecuarius	AM?	1										D
C. forbesi	R	2	+		*							
Numenius phaeopus	PM											O
Tringa nebularia	PM	1		+								
T. stagnatilis	PM	1		+								
T. glareola	PM	1		+								
T. ochropus	PM											M S
T. hypoleucos	PM+R	1		+								
T. totanus	PM											O

SPECIES	STATUS	ABUNDANCE	HABITATS: Human	Water	Marsh	Bovals	Riverine	Anogeissus	Savanna	Acacia	Grassland	AUTHORITY
Gallinago media	PM											skin
G. gallinago	PM	1			+							
Philomachus pugnax	PM	1		+								
Himantopus himantopus	PM											T
GLAREOLIDAE												
Pluvianus aegyptius	AM											skin
Cursorius chalcopterus	AM											EG skin
PTEROCLIDIDAE												
Pterocles quadricinctus	AM	4		+					*	+		
TURNICIDAE												
Turnix hottentota	R											M
COLUMBIDAE												
Streptopelia turtur	PM	1								+		
S. semitorquata	R	4			+					*		
S. decipiens	R	2								*		
S. vinacea	R	4	+		+				*	+	+	
S. senegalensis	R	3	*		+				+	+	+	
Oena capensis	AM	1										D skin
Turtur afer	R	3					+		*	+	+	
Turtur abyssinicus	R	3										
Treron australis	R	3					*		+			
T. waalia	R	3	+				*		+			
PSITTACIDAE												
Poicephalus robustus	R	2			*							
P. senegalus	R	3			+		*		+			
Psittacula krameri	R	3			*							
Agapornis pullaria	R	2					*			+		
MUSOPHAGIDAE												
Tauraco persa	R	2					+					
Musophaga violacea	R	3			+		*					
Crinifer piscator	R	3	+		+		*	+	+		+	
CUCULIDAE												
Clamator jacobinus	AM	2					+		*			
C. levaillanti	R	3			+		*		+			
Cuculus canorus	PM+AM?	1	+									
Chrysococcyx klaas	AM	3					+		*			
C. caprius	AM	3					+		*	+	+	
Centropus toulou	R	2			*							
C. senegalensis	R	3	+		+		+		*	+	+	
STRIGIDAE												
Tyto alba	R											skin
Otus scops	R	3							+		*	
O. leucotis	R	2							*			
Bubo africanus	R	2	+						*		+	
Glaucidium perlatum	R	2							*		+	

SPECIES	STATUS	ABUNDANCE	HABITATS									AUTHORITY
			Human	Water	Marsh	Bovals	Riverine	Anogeissus	Savanna	Acacia	Grassland	
CAPRIMULGIDAE												
Caprimulgus inornatus	AM											EG O
C. climacurus	R	2							+	*	+	
Macrodipteryx longipennis	AM	1							+			
APODIDAE												
Apua apus	PM	1										
A. caffer	AM	1										
A. affinis	AM	3										
Cypsiurus parvus	R	4										
Chaetura ussheri												G O
COLIIDAE												
Colius striatus	R	2							+			
ALCEDINIDAE												
Ceryle maxima	R	2			+		*					
C. rudis	AM	1		+								
Alcedo quadribrachys	R	2		+			*					
A. cristata	R	2		*			+					
Ceyx picta	R	3		+	+		*	+	+			
Halcyon senegalensis	AM	2			*		+					
H. malimbica	R	3			+		*	+				
H. chelicuti	R	3							*	+	+	
H. leucocephala	AM	2			*							
MEROPIDAE												
Merops apiaster	PM											P
M. orientalis	AM?											M
M. malimbicus	AM											O
M. nubicus	AM											EG O M S skin
M. albicollis	AM	3	+			+	+		+		*	
M. pusillus	R	2			*							
M. bulocki	R	4			+		*	+	+	+		
M. hirundineus	R	2							*			
CORACIIDAE												
Coracias abyssinica	AM	3	+						+		*	
C. naevia	AM	1							+			
C. cyanogaster	AM	1							+			
Eurystomus glaucurus	R	3			*						+	
UPUPIDAE												
Upupa epops	AM+PM?											EG S X
Phoeniculus purpureus	R	3					+	+	*			
P. aterrimus	R	2						+	*		+	
BUCEROTIDAE												
Tockus nasutus	AM	4	+				+		*			
Bucorvus abyssinicus	R	2				*			+			
CAPITONIDAE												
Lybius dubius	R	3	+				+		*		+	
L. vieilloti	R	2							*	+		
Pogoniulus chrysoconus	R	2	+					+	*			

SPECIES	STATUS	ABUNDANCE	HABITATS: Human	Water	Marsh	Bovals	Riverine	Anogeissus	Savanna	Acacia	Grassland	AUTHORITY
INDICATORIDAE												
Indicator indicator	R	3							*	+		
I. minor	R	2							*			
PICIDAE												
Jynx torquilla	PM	1								+		
Campethera punctuligera	R	3	+				+		*			
C. abingoni	R	2					*					
Dendropicos fuscescens	R	2					+		*			
D. obsoletus	R	2							*	+		
Mesopicos goertae	R	3					+	+	*			
ALAUDIDAE												
Mirafra rufocinnamomea	R	3				+			+		*	
Eremopterix leucotis	AM	1								+		
Galerida cristata	R	2				*						
HIRUNDINIDAE												
Riparia riparia	PM											P skin
Hirundo rustica	PM	1										
"	AM	3										
H. smithii	AM	3										
H. leucosoma	AM	3										
H. semirufa	AM	3										
H. senegalensis	AM	2										
H. daurica	AM	2										
H. abyssinica	AM	3										
H. fuligula	R	2				cliffs						
Delichon urbica	PM	4										
Psalidoprocne obscura	R	2					*		+		+	
MOTACILLIDAE												
Motacilla flava	PM	1	+									
M. alba	AM											P O
Anthus leucophrys	R	2				*						
A. trivialis	PM	3							+		*	
LANIIDAE												
Prionops plumata	R	3	+						*		+	
Nilaus afer	R	3							+	*		
Dryoscopus gambensis	R	3							*	+		
Tchagra minuta	R	2			*							
T. senegala	R	4							*	+	+	
Laniarius ferrugineus	R	2					*					
L. barbarus	R	3			+		*					
Malaconotus sulfureopectus	R	2			+		*			+		
M. blanchoti	R	1							+			
Corvinella corvina	R	3							*	+	+	
Lanius collaris	AM?											G O
L. senator	PM											EG S X

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ORIOLIDAE												
Oriolus auratus	AM	3							*	+	+	
DICRURIDAE												
Dicrurus ludwigii	R	2					*					
D. adsimilis	R	3					+	+	*		+	
STURNIDAE												
Lamprotornis purpureus	R	3	*						+			
Lamprotornis chalcurus/chalybeus	AM	2	*									
Cinnyricinclus leucogaster	AM	1								+		
Buphagus africanus	R	3				*						
CORVIDAE												
Ptilostomus afer	R	2					*					
Corvus albus	AM	2	*									
CAMPEPHAGIDAE												
Coracina pectoralis	R	2							*		+	
Campephaga phoenicea	R	3			+				*			
PYCNONOTIDAE												
Pycnonotus barbatus	R	4	+		+		+	+	*	+	+	
Chlorocichla flavicollis	R	2					*					
MUSCICAPIDAE (Turdinae)												
Saxicola rubetra	PM											EG S X
Cercomela familiaris	R	2					+			*		
Myrmecocichla albifrons	R	2							+	*		
Phoenicurus phoenicurus	PM											S
Cossypha albicapilla	R	3					*					
C. niveicapilla	R	3					*	+				
Luscinia megarhynchos	PM											P
Turdus pelios	R	3					*	+	+			
MUSCICAPIDAE (Timaliinae)												
Turdoides plebejus	R	3					+		*			
T. reinwardii	R	3					*					
MUSCICAPIDAE (Sylviinae)												
Acrocephalus scirpaceus	PM	1			+							
A. rufescens	R											O
Sphenoeacus mentalis	R	3							*		+	
Hippolais polyglotta	PM	2						*				
Sylvia borin	PM	3							*	+	+	
S. communis	PM	2								+	+	
Phylloscopus trochilus	PM	3						+	*	+	+	
Cisticola erythrops	R	2					*		+			
C. cantans	R											O EG
C. lateralis	R	3					*		+			
C. aberrans	R											O
C. galactotes	R	3			*							
C. natalensis	R	4			*				+			
C. ruficeps	R	1							+			

SPECIES	STATUS	ABUNDANCE	HABITATS									AUTHORITY
			Human	Water	Marsh	Bovals	Riverine	Anogeissus	Savanna	Acacia	Grassland	
C. brachyptera	R	4							*		+	
C. rufa?	R	3							*		+	
Prinia erythroptera	R	3									*	
P. subflava	R	4							*		+	
Apalis flavida	R?											EG
Hypergerus atriceps	R	2					*					
Camaroptera brachyura	R	3					*	+				
Eremomela pusilla	R	4	+		+			+	*	+	+	
Sylvietta brachyura	R	3							*	+		
MUSCICAPIDAE (Muscicapinae)												
Muscicapa striata	PM											P
M. aquatica	R	2		*	+		+					
Myioparus plumbeus	R	2					*	+				
Ficedula hypoleuca	PM	3					+	+	+	*	+	
Melanornis edolioides	R	3			+		+	+	*	+		
Bradornis pallidus	R	3	*					+	+	+		
Hyliota flavigaster	R	2						+	*			
Batis senegalensis	R	3						+	*	+		
Platysteira cyanea	R	3					*					
Trochocerus longicauda	R	3					*					
Terpsiphone viridis	R	3					*	+	+			
PARIDAE												
Parus leucomelas	R	3	+						*	+	+	
REMIZIDAE												
Remiz parvulus	R	3						+	+	*	+	
SALPORNITHIDAE												
Salpornis spilonota	R	2							*			
NECTARINIIDAE												
Anthreptes longuemarei	R	1							+	+		
A. platura	AM	3							*	+	+	
Nectarinia verticalis	R	2					*					
N. senegalensis	R	4	+						*	+	+	
N. venusta	R	1			+		+					
N. cuprea	R	4			*				+	+	+	
N. cocciniigaster	R	3	*		+							
N. pulchella	R	4			*				+			
ZOSTEROPIDAE												
Zosterops senegalensis	R	3	+						*	+		
EMBERIZIDAE												
Emberiza cabanisi	R	3							*			
E. forbesi	R	3							*			
E. tahapisi	AM	3							+	*		
FRINGILLIDAE												
Serinus mozambicus	R	4	*					+	+	+	+	
S. gularis	R	3							*			

SPECIES	STATUS	ABUNDANCE	HABITATS									AUTHORITY
			Human	Water	Marsh	Bovals	Riverine	Anogeissus	Savanna	Acacia	Grassland	
PLOCEIDAE (Ploceinae)												
Ploceus luteolus	R	3			+		+		*	+		
P. heuglini	R	2					*					
P. cucullatus	R	4	*		+							
P. melanocephalus	R											O
P. nigricollis	R	3			+		*					
Malimbus rubriceps	R	2							*			
Quelea erythrops	AM?	4			*						+	
Euplectes afer	R	4		+	*				+		*	
E. hordeaceus	R	3			*		+		+		*	
E. macrourus	R	3			+				*			
E. orix	R	4		+	*				+		*	
PLOCEIDAE (Passerinae)												
Plocepasser superciliosus	R	3	+						*	+	+	
Passer griseus	R	3	*						+			
Petronia dentata	AM	4							*	+		
Sporopipes frontalis	R?											P X
PLOCEIDAE (Viduinae)												
Vidua macroura	R	3	*						+	+	+	
V. chalybeata	R	2							+	*		
V. orientalis	AM?	2			+				*			
PLOCEIDAE (Estrildinae)												
Nesocharis capistrata	R	2					*					
Pytilia hypogrammica	AM	1										D
P. phoenicoptera	AM	3	+						*		+	
Estrilda melpoda	R	4	+						+	+	*	
E. caerulescens	R	4	+							*	+	
E. bengala	R	4	+						+	+	*	
E. larvata	R	3					+		*			
Lagonosticta rufopicta	R	4	*					+	*	+	+	
L. senegala	R	4	*						*	+	+	
L. rara	R	3					*		+			
Lonchura cucullata	R	4			+				+	+	*	