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Preliminary avifaunal surveys in the lower Tana River Forests: Mchelelo East, Sifa East, Wenje East and Makere East

George Amutete and Alfred Owino

*Department of Ornithology
National Museums of Kenya
P O Box 40658, Nairobi*

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English name	Scientific name	Category	Sifa East	Mchelelo East	Makere East	Wenje East
Black-backed Puffback	<i>Dryoscopus cubla</i>	F	x	x	x	x
Black Cuckoo-shrike	<i>Campephaga flava</i>	f	x			
Common Drongo	<i>Dicrurus adsimilis</i>	s	x	x	x	x
Square-tailed Drongo	<i>Dicrurus ludwigii</i>	F	x	x	x	x
Black-headed Oriole	<i>Onolus larvatus</i>	f	x	x		x
Pied Crow	<i>Corvus albus</i>	s	x	x	x	x
Black-bellied Starling	<i>Lamprotomis corruscus</i>	FC	x	x	x	x
Rüppell's Long-tailed Starling	<i>Lamprotomis purpuriferus</i>	s	x	x		x
Superb Starling	<i>Lamprotomis superbus</i>	s	x	x	x	x
Fischer's Starling	<i>Spreb fischeri</i>	s	x	x	x	x
Collared Sunbird	<i>Anthreptes collaris</i>	F	x	x	x	x
Olive Sunbird	<i>Nectarinia olivacea</i>	FF	x	x	x	x
Variable Sunbird	<i>Nectarinia venusta</i>	f	x	x	x	x
White-headed Buffalo-weaver	<i>Dinemellia dinemellii</i>	s	x	x	x	x
Red-billed Buffalo-weaver	<i>Bubalomis niger</i>	s	x	x	x	x
White-browed Sparrow-weaver	<i>Plocepasser mahali</i>	s	x	x	x	x
African Golden Weaver	<i>Ploceus subaureus</i>	s			x	
Golden Palm Weaver	<i>Ploceus bojeri</i>	s	x			
Dark-backed Weaver	<i>Ploceus bicolor</i>	F	x	x	x	x
Green-backed Twinspot	<i>Mandingoa nitidula</i>	FF	x	x	x	x
Red-billed Firefinch	<i>Lagonosticta senegala</i>	s	x	x	x	x
Black-and-white Mannikin	<i>Lonchura bicolor</i>	f		x	x	

Key: FF, forest-specialist species; F, forest-generalist species; f, forest visitors; s, savanna/woodland species; W, water-associated species; Nt, globally near-threatened species; vu, regionally Vulnerable species; C, East Coast Biome species

Table 3. Summary of the bird species recorded from the four study sites

Variable	Mchelelo E	Sifa E	Wenje E	Makere E
Total number of species	105	113	110	109
Total no. of terrestrial species	80	88	85	85
FF species	5	8	7	6
% FF species	6.3	9.1	8.2	7.1
F species	19	23	22	21
% F species	23.8	26.1	25.9	24.7
Forest dependent species (FF+F)	24	31	29	27
% forest dependent spp	30.0	35.2	34.1	31.8
f species	24	24	23	22
% f species	30.0	27.3	27.1	25.9
s species	32	33	33	36
% s species	40.0	37.5	38.8	42.4

All sites showed a similar species composition, with 105–113 species recorded overall, of which 80–88 were non-waterbirds. Of the terrestrial species, 30–35% were forest-dependent. At all sites well over a third (38–42%) of the terrestrial bird species recorded were characteristic of savanna or woodland rather than forest.

Understorey species

Results of mist netting are shown in Tables 4–6. The Olive Sunbird was the most-captured species at three sites, Sifa East, Makere East and Wenje East, with capture rates of 5.4, 7.1 and 10.3 birds/1000 m h respectively. This species was ranked second at Mchelelo East, with a capture rate of 5.6 birds/1000 m h; here, Red-capped Robin-Chat ranked first (6.7 birds/1000 m h).

Overall numbers captured were low, with a high proportion of species and individuals that were not forest-dependent. Sifa East stood out from the other three forests, with a particularly low capture rate (18.5 compared to 28.8–38.4 birds/1000 m h, representing just seventeen individuals and eight species). However, Sifa also had the highest percentage of forest-dependent individuals captured (94.1% compared to 50.0–64.3%) and the lowest proportion of individuals of savanna species (5.9% compared to 14.7–26.3%).

East Coast Akalat *Sheppardia gunningi* was captured and ringed in Wenje East. This is a globally threatened species whose status is unknown in this area.

Table 4. Bird species ringed at Mchelelo East in order of abundance

English name	Scientific name	Category	No. of birds	Captures/1000 m h	Rank
Red-capped Robin-Chat	<i>Cossypha natalensis</i>	F	6	6.7	1
Olive Sunbird	<i>Nectarinia olivacea</i>	FF	5	5.6	2
Fischer's Greenbul	<i>Phyllastrephus fischeri</i>	FFC	5	5.6	2
Brown-hooded Kingfisher	<i>Halcyon albiventris</i>	s	3	3.4	3
Narina Trogon	<i>Apaloderma narina</i>	F	3	3.4	3
African Pygmy Kingfisher	<i>Ispidina picta</i>	F	2	2.2	4
Dark-backed Weaver	<i>Ploceus bicolor</i>	F	2	2.2	4
Grey-backed Camaroptera	<i>Camaroptera brachyura</i>	f	2	2.2	4
Tropical Boubou	<i>Laniarius aethiopicus</i>	f	2	2.2	4
African Golden Weaver	<i>Ploceus subaureus</i>	s	1	1.1	5
Zanzibar Sombre Greenbul	<i>Andropadus importunus</i>	s	1	1.1	5
Red-tailed Ant Thrush	<i>Neocossyphus rufus</i>	FF	1	1.1	5
Black-throated Wattle-eye	<i>Platysteira peltata</i>	F	1	1.1	5

Table 5. Bird species ringed at Sifa East in order of abundance

English name	Scientific name	Category	No. of birds	Captures/1000 m h	Rank
Olive Sunbird	<i>Nectarinia olivacea</i>	FF	5	5.4	1
Red-capped Robin-Chat	<i>Cossypha natalensis</i>	F	4	4.4	2
Green-backed Twinspot	<i>Mandingoa nitidula</i>	FF	3	3.3	3
Brown-hooded Kingfisher	<i>Halcyon albiventris</i>	s	1	1.1	4
Red-tailed Ant Thrush	<i>Neocossyphus rufus</i>	FF	1	1.1	4
Fischer's Greenbul	<i>Phyllastrephus fischeri</i>	FFC	1	1.1	4
Dark-backed Weaver	<i>Ploceus bicolor</i>	F	1	1.1	4
Mombasa Woodpecker	<i>Campethera mombassica</i>	F	1	1.1	4

Table 6. Birds ringed in Makere East, in order of abundance

English name	Scientific name	Category	No. of birds	Capture/1000 m h	Rank
Olive Sunbird	<i>Nectarinia olivacea</i>	FF	7	7.1	1
Red-billed Hornbill	<i>Tockus erythrorhynchus</i>	s	5	5.0	2
Dark-backed Weaver	<i>Ploceus bicolor</i>	F	4	4.0	3
Scaly Babbler	<i>Turdoides squamulatus</i>	s	3	3.0	4
Grey-backed Camaroptera	<i>Camaroptera brachyura</i>	f	3	3.0	4
Zanzibar Sombre Greenbul	<i>Andropadus importunus</i>	s	2	2.0	5
Fischer's Greenbul	<i>Phyllastrephus fischeri</i>	FFC	2	2.0	5
African Paradise Flycatcher	<i>Terpsiphone viridis</i>	f	2	2.0	5
Spectacled Weaver	<i>Ploceus oculans</i>	f	2	2.0	5
Terrestrial Brownbul	<i>Phyllastrephus terrestris</i>	F	2	2.0	5
Yellow-rumped Tinkerbird	<i>Pogoniulus bilineatus</i>	F	2	2.0	5
African Pygmy Kingfisher	<i>Ispidina picta</i>	F	1	1.0	6
Tambourine Dove	<i>Turtur tympanistria</i>	F	1	1.0	6
Tawny-flanked Prinia	<i>Prinia subflava</i>	f	1	1.0	6
White-browed Robin-Chat	<i>Cossypha heuglini</i>	f	1	1.0	6

Table 7. Birds ringed in Wenje East, in order of abundance

English name	Scientific name	Category	No of birds	Captures/1000 m h	Rank
Olive Sunbird	<i>Nectarinia olivacea</i>	FF	10	10.3	1
Collared Palm Thrush	<i>Cichladusa arquata</i>	s	2	2.1	2
Scaly Babbler	<i>Turdoides squamulatus</i>	s	2	2.1	2
Eastern Nicator	<i>Nicator gularis</i>	F	2	2.1	2
Red-capped Robin-Chat	<i>Cossypha natalensis</i>	F	2	2.1	2
Red-fronted Tinkerbird	<i>Pogoniulus pusillus</i>	s	1	1.0	3
East Coast Akalat	<i>Sheppardia gunningi</i>	FF	1	1.0	3
Northern Brownbul	<i>Phyllastrephus strepitans</i>	fC	1	1.0	3
African Paradise Flycatcher	<i>Terpsiphone viridis</i>	f	1	1.0	3
Dark-backed Weaver	<i>Ploceus bicolor</i>	F	1	1.0	3
Grey-headed Kingfisher	<i>Halcyon leucocephala</i>	f	1	1.0	3
Lesser Honeyguide	<i>Indicator minor</i>	f	1	1.0	3
Narina Trogon	<i>Apaloderma narina</i>	F	1	1.0	3
Scaly-throated Honeyguide	<i>Indicator vanegatus</i>	f	1	1.0	3
Terrestrial Brownbul	<i>Phyllastrephus terrestris</i>	F	1	1.0	3

Table 8. Summary of ringing results for the four study sites

Variable	Mchelelo East	Sifa East	Makere East	Wenje East
No. of species	13	8	15	15
No. of individuals	34	17	38	28
Capture rate (birds/1000 m h)	38.2	18.5	38.4	28.8
No. of FF species	3	4	2	2
% of FF species	23.1	50.0	13.3	13.3
No. of F species	5	3	5	5
% of F species	38.5	37.5	33.3	33.3
No. of f species	2	0	5	5
% of f species	15.4	0.0	33.3	33.3
No. of s species	3	1	3	3
% of s species	23.1	12.5	20.0	20.0
No of FF individuals	11	10	9	11
% of FF individuals	32.4	58.8	23.7	39.3
No. F individuals	14	6	10	7
% of F individuals	41.2	35.3	26.3	25.0
No. of f individuals	4	0	9	5
% of f individuals	11.8	0.0	23.7	17.9
No. of s species	5	1	10	5
% of s species	14.7	5.9	26.3	17.9

Timed species-counts

The results of the timed species-counts are shown in Tables 9–12. Of the species in the top ten ranks at each site, the proportion of forest-dependent birds

was 76.9% at Mchelelo East (10/13), 72.7% at Sifa East (8/11), 61.5% at Wenje East (8/13) and 50.0% at Makere East (6/12).

Table 9. Results of timed species-counts at Mchelelo East (n = 12)

English name	Scientific name	Category	Index	Rank
Black-bellied Starling	<i>Lamprolomis corruscus</i>	F	3.17	1
Olive Sunbird	<i>Nectarinia olivacea</i>	FF	3.17	1
Tropical Boubou	<i>Lanius aethiopicus</i>	f	2.50	2
Black-backed Puffback	<i>Dryoscopus cubla</i>	F	2.42	3
Dark-backed Weaver	<i>Ploceus bicolor</i>	F	2.42	4
Square-tailed Drongo	<i>Dicurus ludwigii</i>	F	2.17	5
Brown-hooded Kingfisher	<i>Halcyon albiventris</i>	s	2.17	5
Red-capped Robin-Chat	<i>Cossypha natalensis</i>	F	1.83	6
Fischer's Greenbul	<i>Phyllastrephus fischeni</i>	FFC	1.75	7
Tambourine Dove	<i>Turtur tympanistria</i>	F	1.67	8
Crowned Hornbill	<i>Tockus alboterminatus</i>	F	1.50	9
Black-headed Apalis	<i>Apalis melanocephala</i>	FF	1.50	9
Brown-breasted Barbet	<i>Lybius melanopterus</i>	f	1.42	10
African Pygmy Kingfisher	<i>Ispidina picta</i>	F	1.33	11
Red-fronted Tinkerbird	<i>Pogoniulus pusillus</i>	s	1.33	11
Grey-backed Camaroptera	<i>Camaroptera brachyura</i>	f	1.17	12
Emerald-spotted Wood Dove	<i>Turtur chalcospilos</i>	f	1.08	13
Broad-billed Roller	<i>Eurystomus glaucurus</i>	f	0.92	14
Eastern Bearded Scrub Robin	<i>Cercotrichas quadrivirgata</i>	f	0.75	15
Mombasa Woodpecker	<i>Campethera mombassica</i>	FC	0.75	15
Terrestrial Brownbul	<i>Phyllastrephus terrestris</i>	F	0.75	15
Gabar Goshawk	<i>Micronisus gabar</i>	s	0.75	15
Black-and-white Mannikin	<i>Lonchura bicolor</i>	f	0.67	16
Fischer's Turaco	<i>Tauraco fischeri</i>	FCNT	0.67	16
African Paradise Flycatcher	<i>Terpsiphone vindis</i>	f	0.58	17
Grey-headed Kingfisher	<i>Halcyon leucocephala</i>	F	0.58	17
Red-eyed Dove	<i>Streptopelia semitorquata</i>	f	0.58	17
Yellow-rumped Tinkerbird	<i>Pogoniulus bilineatus</i>	F	0.58	17
Northern Brownbul	<i>Phyllastrephus strepitans</i>	fC	0.58	17
Red-fronted Barbet	<i>Tricholaema diadematus</i>	s	0.58	17
African Green Pigeon	<i>Treron calva</i>	F	0.50	18
Black-headed Oriole	<i>Oriolus larvatus</i>	f	0.50	18
White-browed Coucal	<i>Centropus superciliosus</i>	s	0.50	18
Black-collared Barbet	<i>Lybius torquatus</i>	F	0.42	19
Bearded Woodpecker	<i>Thripas namaquus</i>	s	0.42	19
Green-backed Woodpecker	<i>Campethera cailliautii</i>	f	0.33	20
Eastern Pale Chanting Goshawk	<i>Melierax poliopterus</i>	s	0.33	20
Red-billed Firefinch	<i>Lagonosticta senegala</i>	s	0.33	20
Greater Honeyguide	<i>Indicator indicator</i>	f	0.25	21
Green Wood-hoopoe	<i>Phoeniculus purpureus</i>	s	0.25	21
Red-tailed Ant Thrush	<i>Neocossyphus rufus</i>	FF	0.25	21
Pale Flycatcher	<i>Bradornis pallidus</i>	s	0.25	21
White-headed Mousebird	<i>Colius leucocephalus</i>	s	0.25	21
White-throated Bee-eater	<i>Merops albicollis</i>	f	0.25	21
African Fish Eagle	<i>Haliaeetus vocifer</i>	w	0.17	22
Black-throated Wattle-eye	<i>Platysteira peltata</i>	F	0.17	22
Great Sparrowhawk	<i>Accipiter melanoleucus</i>	F	0.17	22
Lesser Honeyguide	<i>Indicator minor</i>	f	0.17	22
Pel's Fishing Owl	<i>Scotopelia peli</i>	F	0.17	22
Trumpeter Hornbill	<i>Bycanistes bucinator</i>	F	0.17	22
Hadada Ibis	<i>Bostrychia hagedash</i>	w	0.17	22
African Goshawk	<i>Accipiter tachiro</i>	F	0.08	23
African Grey Hornbill	<i>Tockus nasutus</i>	s	0.08	23
Lilac-breasted Roller	<i>Coracias caudata</i>	s	0.08	23

Only data for birds recorded above 3 m and within 25 m are included. For status codes, see Table 1.

Turdoides aylmeri and African Crowned Eagle *Stephanoaetus coronatus* were also recorded, along with African Darter *Anhinga rufa* on the river and associated wetlands. Brown-hooded Kingfisher *Halcyon albiventris* was the most obvious non-forest species at all the sites.

Table 2. Birds recorded in the four study areas

English name	Scientific name	Category	Sifa East	Mchelelo East	Makere East	Wenje East
African Darter	<i>Anhinga rufa</i>	w	x	x	x	x
Cattle Egret	<i>Bubulcus ibis</i>	w	x	x	x	x
Little Egret	<i>Egretta garzetta</i>	w	x	x	x	x
Green-backed Heron	<i>Butorides striatus</i>	w	x	x	x	x
Yellow-billed Egret	<i>Mesophox intermedia</i>	w	x	x	x	x
Grey Heron	<i>Ardea cinerea</i>	w	x	x	x	x
Goliath Heron	<i>Ardea goliath</i>	w	x	x	x	x
Black-headed Heron	<i>Ardea melanocephala</i>	w	x	x	x	x
Hamerkop	<i>Scopus umbretta</i>	w	x	x	x	x
African Open-billed Stork	<i>Anasomus lamelligerus</i>	w	x	x	x	x
Sacred Ibis	<i>Threskiornis aethiopicus</i>	w	x	x	x	x
Hadada Ibis	<i>Bostrychia hagedash</i>	w	x	x	x	x
African Spoonbill	<i>Platalea alba</i>	w	x	x	x	x
Fulvous Whistling Duck	<i>Dendrocygna bicolor</i>	w	x	x	x	x
White-faced Whistling Duck	<i>Dendrocygna viduata</i>	w	x	x	x	x
Egyptian Goose	<i>Alopochen aegyptiacus</i>	w	x	x	x	x
Brown Snake Eagle	<i>Circaetus cinereus</i>	s	x	x	x	x
Southern Banded Snake Eagle	<i>Circaetus fasciolatus</i>	FNT	x	x	x	x
African Harrier-hawk	<i>Polyboroides typus</i>	F	x	x	x	x
Gabar Goshawk	<i>Micronisus gabar</i>	s	x	x	x	x
Eastern Pale Chanting Goshawk	<i>Melierax poliopterus</i>	s	x	x	x	x
African Goshawk	<i>Accipiter tachiro</i>	F	x	x	x	x
Shikra	<i>Accipiter badius</i>	f	x	x	x	x
Little Sparrowhawk	<i>Accipiter minullus</i>	f	x	x	x	x
Great Sparrowhawk	<i>Accipiter melanoleucus</i>	F	x	x	x	x
African Fish Eagle	<i>Haliaeetus vocifer</i>	w	x	x	x	x
Palm-nut Vulture	<i>Gypohierax angolensis</i>	s	x	x	x	x
African Crowned Eagle	<i>Stephanoaetus coronatus</i>	FF	x	x	x	x
Crested Guineafowl	<i>Gulliera edouardi</i>	F	x	x	x	x
Vulturine Guineafowl	<i>Acrylium vulturinum</i>	s	x	x	x	x
Black-winged Stilt	<i>Himantopus himantopus</i>	w	x	x	x	x
Water Thick-knee	<i>Burhinus vermiculatus</i>	w	x	x	x	x
Spur-winged Plover	<i>Vanellus spinosus</i>	w	x	x	x	x
Little Stint	<i>Calidris minuta</i>	w	x	x	x	x
Common Greenshank	<i>Tringa nebularia</i>	w	x	x	x	x
Common Sandpiper	<i>Actitis hypoleucos</i>	w	x	x	x	x
Black-faced Sandgrouse	<i>Pterocles decoratus</i>	s	x	x	x	x
African Green Pigeon	<i>Treron calva</i>	F	x	x	x	x
Tambourine Dove	<i>Turtur tympanistria</i>	F	x	x	x	x
Emerald-spotted Wood Dove	<i>Turtur chalcospilos</i>	f	x	x	x	x
Red-eyed Dove	<i>Streptopelia semitorquata</i>	f	x	x	x	x
African Mourning Dove	<i>Streptopelia decipiens</i>	s	x	x	x	x
Ring-necked Dove	<i>Streptopelia capicola</i>	f	x	x	x	x
Laughing Dove	<i>Streptopelia senegalensis</i>	s	x	x	x	x
Fischer's Turaco	<i>Tauraco fischeri</i>	FCNT	x	x	x	x
Red-chested Cuckoo	<i>Cuculus solitarius</i>	F	x	x	x	x
Diederik Cuckoo	<i>Chrysococcyx caprius</i>	s	x	x	x	x
Yellowbill	<i>Ceuthmochares aereus</i>	F	x	x	x	x
White-browed Coucal	<i>Centropus superciliosus</i>	s	x	x	x	x
Pel's Fishing Owl	<i>Scotopelia peli</i>	F	x	x	x	x
African Barred Owl	<i>Glaucidium capense</i>	F	x	x	x	x
African Wood Owl	<i>Strix woodfordii</i>	F	x	x	x	x
Mottled Spinetail	<i>Telacanthura ussheri</i>	F	x	x	x	x

English name	Scientific name	Category	Sifa East	Mchelelo East	Makere East	Wenje East
African Palm Swift	<i>Cypsiurus parvus</i>	s	x			
Speckled Mousebird	<i>Colius striatus</i>	s			x	
White-headed Mousebird	<i>Colius leucocephalus</i>	s	x	x		
Blue-naped Mousebird	<i>Urocolius macrourus</i>	s	x	x	x	x
Narina Trogon	<i>Apaloderma narina</i>	F	x		x	x
Grey-headed Kingfisher	<i>Halcyon leucocephala</i>	f	x	x		
Brown-hooded Kingfisher	<i>Halcyon albiventris</i>	s	x	x	x	x
Malachite Kingfisher	<i>Alcedo cristata</i>	w	x	x	x	x
African Pygmy Kingfisher	<i>Ispidina picta</i>	f	x	x	x	x
Pied Kingfisher	<i>Ceryle rudis</i>	w	x	x	x	x
Carmine Bee-eater	<i>Merops nubicus</i>	s	x	x	x	x
White-throated Bee-eater	<i>Merops albicollis</i>	s	x	x	x	x
Lilac-breasted Roller	<i>Coracias caudata</i>	s		x	x	x
Broad-billed Roller	<i>Eurystomus glaucurus</i>	f	x	x	x	x
Green Wood-hoopoe	<i>Phoeniculus purpureus</i>	s	x	x	x	x
Common Scimitarbill	<i>Rhinopomastus cyanomelas</i>	s	x			x
Red-billed Hornbill	<i>Tockus erythrorhynchus</i>	s	x	x	x	x
Crowned Hornbill	<i>Tockus albiterminatus</i>	f	x	x	x	x
African Grey Hornbill	<i>Tockus nasutus</i>	s	x	x	x	x
Trumpeter Hornbill	<i>Bycanistes bucinator</i>	F	x	x	x	x
Yellow-rumped Tinkerbird	<i>Pogoniulus bilineatus</i>	F		x	x	x
Red-fronted Tinkerbird	<i>Pogoniulus pusillus</i>	s	x	x	x	x
Red-fronted Barbet	<i>Trichotaema diadematus</i>	s		x	x	x
Black-collared Barbet	<i>Lybius torquatus</i>	f	x	x	x	
Brown-breasted Barbet	<i>Lybius melanopterus</i>	fC	x	x	x	x
Red-and-yellow Barbet	<i>Trachylaemus erythrocephalus</i>	s			x	x
d'Amaud's Barbet	<i>Trachylaemus darnaudi</i>	s	x	x	x	x
Scaly-throated Honeyguide	<i>Indicator variegatus</i>	f			x	x
Greater Honeyguide	<i>Indicator indicator</i>	f	x	x		
Lesser Honeyguide	<i>Indicator minor</i>	f	x	x	x	x
Mombasa Woodpecker	<i>Campethera mombassica</i>	FC	x	x	x	x
Green-backed Woodpecker	<i>Campethera cailliauti</i>	f	x	x		x
Cardinal Woodpecker	<i>Denropicos fuscescens</i>	f			x	x
Bearded Woodpecker	<i>Thripias namaquus</i>	f		x	x	x
Sand Martin	<i>Riparia riparia</i>	s	x	x	x	x
African Pied Wagtail	<i>Motacilla aguimp</i>	s	x	x	x	x
Zanzibar Sombre Greenbul	<i>Andropadus importunus</i>	s			x	
Fischer's Greenbul	<i>Phyllastrephus fischeri</i>	FFC	x	x	x	x
Northern Brownbul	<i>Phyllastrephus strepitans</i>	fc	x	x	x	x
Terrestrial Brownbul	<i>Phyllastrephus terrestris</i>	F	x	x		
Eastern Nicator	<i>Nicator gularis</i>	F			x	x
Scaly Babbler	<i>Turdoides squamulatus</i>	sC			x	x
Scaly Chatterer	<i>Turdoides aylmeri</i>	s			x	x
East Coast Akalat	<i>Sheppardia gunningi</i>	FFC			x	x
Red-capped Robin-Chat	<i>Cossypha natalensis</i>	F	x	x	x	x
White-browed Robin-Chat	<i>Cossypha heuglini</i>	f			x	x
Red-tailed Ant Thrush	<i>Neocossyphus rufus</i>	FF	x	x	x	x
Collared Palm Thrush	<i>Cichladusa arquata</i>	s			x	
Eastern Bearded Scrub Robin	<i>Cercotrichas quadringata</i>	f	x	x	x	x
Pale Flycatcher	<i>Bradornis pallidus</i>	s	x	x	x	
Tawny-flanked Prinia	<i>Prinia subflava</i>	f	x	x	x	x
Grey-backed Camaroptera	<i>Camaroptera brachyura</i>	f	x	x	x	x
Yellow-breasted Apalis	<i>Apalis flavida</i>	f	x			x
Black-headed Apalis	<i>Apalis melanocephala</i>	FF	x	x	x	x
Little Yellow Flycatcher	<i>Erythrocercus holochlorus</i>	FFCvu			x	x
Blue-mantled Crested Flycatcher	<i>Trochocercus cyanomelas</i>	FF	x			
African Paradise Flycatcher	<i>Terpsiphone viridis</i>	f	x	x	x	x
Pale Batis	<i>Batis soror</i>	FC	x		x	x
Black-throated Wattle-eye	<i>Platysteira peltata</i>	F	x	x	x	x
Retz's Helmet-Shrike	<i>Prionops retzii</i>	F	x			x
Tropical Boubou	<i>Lanius aethiopicus</i>	f	x	x	x	x

Preliminary avifaunal surveys in the lower Tana River Forests: Mchelelo East, Sifa East, Wenje East and Makere East

George Amutete and Alfred Owino

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Introduction

The lower Tana River forests (1°55'S, 40°5'E) are located some 240 km north of Mombasa and 350 km east of Nairobi, in Tana River District of Coast Province. The forests lie at an altitude of 40–70 m within 1–6 km wide alluvial floodplain of the river. There are about 71 distinct forests ranging in size from 1–1,100 ha and covering around 3,700 ha in total (Butynski & Mwangi 1995). Of the 71 patches, 16 (covering 1,000 ha) fall within the 17,100 ha Tana River Primate National Reserve (Bennun & Njoroge 1999). These remnants of the forest that once extended from the east coast of Africa to the Congo Basin during the Miocene (26 million years ago) occur patchily on either side of River Tana. These forests are the only true representatives in Kenya of the West African type of riverine forest, and comprise deciduous woodland and lowland evergreen forests.

The lower Tana River forests are listed among the key forests for bird conservation in Africa (Collar & Stuart 1988) and qualify as an Important Bird Area (Bennun & Njoroge 1999). Several species in these forests are either globally threatened or near threatened (Bennun & Njoroge 1999). Some general ornithological surveys were carried out here in the 1970s (Andrews *et al.* 1975, Marsh *et al.* 1975) but there has been little systematic ornithological work in the lower Tana. Information on the avifauna is therefore patchy and scant. Recently there have been focused avifaunal surveys of particular forest patches (Oyugi & Amutete 1999, Amutete & Eshiamwata 2000).

This series of surveys was continued in October 2000, covering an additional four fragments within the Tana River Primate National Reserve, all on the east bank of the river. The forest fragments are at different successional stages and it was thought likely that they differed in their conservation importance for birds.

Sites and methods

Study areas

Assessments of avifauna and vegetation were made from 16–23 October 2000 in four forest fragments, Mchelelo East (10 ha), Sifa East (150 ha), Wenje East (525 ha) and Makere East (4 ha) (areas given in Butynski & Mwangi 1994). Accessibility and security influenced the choice of fragments. All four fragments are on the eastern bank of the River Tana. Mchelelo East is a narrow strip of forest bordering the river. Human activities appeared to be light around this fragment, but charcoal burning and firewood collection were evident within it. Sifa East is a large fragment, relatively undisturbed by human activities. Some of the area around it is cultivated, and within the fragment we observed cleared patches, some of them also cultivated as farms. Wenje East was the largest fragment we surveyed. It was adjacent to a densely populated area, and cultivation was evident all along the forest edge.

Within the fragment we noted selective tree felling (for making canoes and for building), charcoal burning and firewood collection. This disturbance seemed more intense than in the other three fragments. Human activity within and around Makere East appeared light, but there were a few cleared and cultivated patches within the fragment.

Weather

Heavy rain had fallen a few days before our survey. It did not rain during it. The weather was cool in the early morning, becoming sunny and hot by mid-morning, with clear skies.

Avifaunal surveys

Birds were surveyed by a combination of mist-netting, timed species-counts (TSCs) and general observation.

To survey understorey birds, we carried out mist-netting in each forest on a narrow cleared trail 110

m long. Small-mesh mist-nets, 3 m high and 108 m in total length, were erected and operated for two mornings at each site. Nets were opened for four hours each morning, starting from 06:30–07:30 h depending on the availability of security personnel.

TSCs were performed simultaneously with mist-netting. The procedure followed Bennun & Waiyaki (1993). Every time a new bird species was detected during a count, the time was recorded, together with an indication of whether the detection was by sight or sound, whether the bird was within 25 m of the observer and, if so, whether it was above 3 m from ground. Each count lasted for 40 minutes. A total of 12 counts was conducted in each study fragment.

Relative abundance indices for canopy/mid-canopy level species were calculated using only records for birds detected within 25 m of the observer and above 3 m from ground. For each count, each species was scored according to when it was first recorded (4 in the first ten minutes, 3 if in next ten minutes and so on). The scores were then averaged over all counts to give a simple relative abundance index.

General observations of birds were also made at any time.

Vegetation survey method

We walked along randomly selected directions in the forests and marked 60 points at intervals of 20 m. At each point, canopy height was estimated to the nearest 1 m and canopy cover was visually

estimated as a percentage. Shrub density was determined by measuring the number of squares visible on a chequered board (40 cm x 40 cm, with 8 cm x 8 cm black and white squares), held at 1.5 m height at 5 m distance directly north and south of each sample point. Two plots (1 m x 1 m) were also established on the north and south compass bearings at a distance of 5 m from the point. In each plot, percentage herb and litter cover and bare ground were visually estimated. All vegetation parameters were averaged for each forest patch and Student-Newman-Keuls multiple range tests used to assess structural differences among the fragments.

Categorisation of birds

Three forest-dependence categories were used following Bennun *et al.* (1996):

- (1) 'FF species' (forest specialists). These are true forest birds, characteristic of the interior of undisturbed forest.
- (2) 'F species' (forest generalists). These may occur in undisturbed forest but are also regularly found in forest strips, edges and gaps.
- (3) 'f species' (forest visitors). These are birds that are often recorded in forest but are not dependent upon it.

Global threat categories follow BirdLife International (2000); regional threat categories follow Bennun & Njoroge (1996) and birds characteristic of the East African Coast Biome follow the list in Fishpool (1996).

Table 1. Mist-netting effort at the four forest fragments in the Tana River Primate Reserve

Site	Date	Area	Net length (m)	Hours	Total m h
Mchelelo East	16–17/10/00		108	8.3	891
Sifa East	18–19/10/00		108	8.5	918
Wenje East	20–21/10/00		108	9.0	972
Makere East	22–23/10/00		108	9.2	990

Results

Species list

A total of 136 species was recorded in the three fragments (Table 2). These included nine forest specialists (FF), 29 forest generalists (F) and 29 forest visitors (f). Twenty-five species were water-associated and 44 were characteristic of savanna or woodland. The 67 forest birds recorded represent 79.8% of the 84 species recorded for the lower Tana River forests by Mlingwa *et al.* (in press), and the nine species of the East Coast biome represent 45.0% of the 20 known from this area (Bennun & Njoroge 1999).

We recorded the globally near-threatened Fischer's Turaco *Tauraco fischeri* in all the four fragments. One Red Data Book species, East Coast Akalat *Sheppardia gunningi* (Vulnerable) was mist-netted only at Wenje East. This was the first time this species had been encountered during the present series of systematic surveys. The near-threatened Southern Banded Snake Eagle *Circaetus fasciolatus* was recorded in three fragments. Pel's Fishing Owls *Scotopelia peli* individuals were encountered at Sifa East and Mchelelo East. This species is regionally Vulnerable. In the same category, Scaly Babbler

species diversity, mature forests of considerable diversity, and dying or senescent forests. This creates a major conservation challenge: how to retain the late successional stages and a mix of all successional types within the landscape, and avoid assuming that the ecosystem as static and unchanging — as it may appear, on our short time-scales of human observation.

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The management planning should take into consideration that metapopulations of threatened species could be distributed across the fragments both within and out of the reserve. Thus there is the need for conserving all forest habitats, whatever their protected status at present.

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Table 13. Mean values of vegetation variables measured in each fragment. F values and associated probabilities are shown for an analysis of variance testing for differences among the means. The mean values with the same letters are not significantly different (at the 5% level) on a Student-Newman-Keuls test

Variable		Mean	s.d.		F	df	P
Canopy height (m)	Mchelelo East	9.0	8.97	a	18.7	3,236	<0.0001
	Sifa East	20.4	12.43	b			
	Wenje East	11.6	7.32	a			
	Makeré East	11.2	6.53	a			
	All Groups	13.0	10.06				
Canopy cover (%)	Mchelelo East	33.5	31.10	a	8.2	3,236	<0.0001
	Sifa East	57.8	26.12	b			
	Wenje East	49.8	27.65	b			
	Makere East	47.5	22.84	b			
	All Groups	47.2	28.30				
Shrub density (no. visible squares)	Mchelelo East	16.9	7.96	a	11.1	3,476	<0.0001
	Sifa East	21.4	5.55	b			
	Wenje East	19.2	6.60	a			
	Makere East	16.6	7.94	a			
	All Groups	18.5	7.30				
Litter cover (%)	Mchelelo East	69.7	22.95	a	7.6	3,476	<0.0001
	Sifa East	63.3	22.13	b			
	Wenje East	73.3	21.43	a			
	Makere East	64.8	22.83	b			
	All Groups	67.8	22.55				
Herb cover (%)	Mchelelo East	10.9	17.98	a	11.0	3,476	<0.0001
	Sifa East	16.5	20.65	b			
	Wenje East	7.4	10.76	a			
	Makere East	17.8	17.96	b			
	All Groups	13.1	17.63				
Bare ground cover (%)	Mchelelo East	19.9	21.22	a	0.3	3,476	0.86
	Wenje East	19.2	19.03	a			
	Sifa East	20.2	20.36	a			
	Makere East	17.4	19.06	a			

Vegetation structure

The mean values of vegetation variables measured in each fragment are shown in Table 13. Sifa East showed markedly greater canopy height and significantly lower shrub density than all other sites,

a sign of less disturbance and/or a later successional stage. Mchelelo East had the lowest canopy and markedly less canopy cover than other sites, a sign of increased disturbance. Differences in ground cover were generally small across the sites.

Discussion

A moderately rich avifauna characteristic of East African coastal forests was supported in all the four fragments. Butynski & Wahungu (1994) rated human activity very low at Sifa East and Mchelelo East but very high at Makere East and Wenje East. This was borne out by the ranking of vegetation structure measures for Sifa East, but

not for Mchelelo East. Mchelelo ranked lowest on some measures indicating forest intactness, which might indicate recent disturbance by people or an earlier successional stage. At all sites there was evidence of disturbance, both from human influences such as encroachment, mid-forest farming, fires and tree-cutting, and the natural effects of flooding and

succession through the river changing its course. The overall low number of forest dependent species – even by the standards of coastal forests, which are relatively impoverished in such birds – is an indication of disturbance. This may also account for the absence of several key coastal species at all the sites.

The number and proportion of forest-dependent birds is a useful indicator of overall forest condition (Bennun & Fanshawe 1997). In this respect Sifa East took top rank on various

measures (Table 14), with a 1.9 mean ranking. Makere East ranked low in almost all respects (mean ranking 3.4) followed by Wenje East (2.6). Mchelelo East had mixed rankings, scoring high on forest-dependent birds captured and seen in TSCs, but low in terms of the overall forest-dependent component of the avifauna. Overall, the ranks corresponded with the history of human disturbance: Sifa East and Mchelelo East having better forest bird populations and less disturbance in the past, and Wenje East and Makere East having poorer forest bird communities and more disturbance in the past.

Table 14. The four forest patches ranked according to four measures that indicate disturbance. Ranks are 1 (most intact) to 4 (most disturbed)

Variable	Mchelelo E	Sifa E	Wenje E	Makere E
No. of forest dependent spp. recorded	4	1	2	3
% of forest dependent spp. recorded	4	1	2	3
No. of forest dependent spp. captured	1	3	3	3
% of forest dependent spp. captured	2	1	3.5	3.5
No. of forest-dependent birds captured	1	4	2	3
% of forest-dependent birds captured	2	1	3	4
No. of forest dependent spp. among top 10 on TSCs	1	2	3	4
Mean rank	2.1	1.9	2.6	3.4

Canopy cover and height have been shown to be important structural variables for many forest dependent birds (Fanshawe 1995, Matiku 1996, Kosgey 1998). Sifa East had a significantly higher canopy cover and a taller canopy than the other sites, and emerged 'best' in terms of forest-dependent birds. Surprisingly, Mchelelo East scored poorly on canopy height and cover, yet was ranked second to Sifa East in terms of its forest birds – and best for canopy bird species. It is possible that the opening out of the canopy at Mchelelo is a recent phenomenon and the bird community has not yet fully responded to the change.

The understory variables remained difficult to interpret. Makere East showed the thickest shrub density and the highest level of herb cover (though not significantly different from other sites), which are associated with disturbance. This could be one explanation, along with the small size of the fragment, for the impoverished forest-dependent bird community here. Increasing the sample from 40 (Oyugi & Amutete 1999) to 60 samples per fragment improved the resolution of structural differences (Amutete & Eshiamwata 2000), but precise interpretation of these remains problematic.

One individual of the globally threatened East Coast Akalat *Sheppardia gunningi* was captured and ringed in Wenje East. This is the only forest patch where this species has been recorded out of

the 11 surveyed so far along the lower Tana River. Wenje East has suffered, and is suffering, extensive habitat modification, to which the akalat is known to be very sensitive (Matiku 1996, Nemeth 1996). This species is characterised by a patchy distribution over much of its range, and even within particular forests like the Shimba Hills and Arabuko-Sokoke (Nemeth & Bennun 2000). Its absence from nearly all apparently suitable forest patches in Tana River Primate National Reserve is suggestive of a metapopulation where local extinctions are outpacing local colonisations. It is notable that Wenje East is by far the largest fragment surveyed during the current study, more than three times the size of Sifa East, which in turn is more than twice the size of Mchelelo (Oyugi & Amutete 1999). It may be that the akalat is unable to survive in the smaller forest fragment. Particular conservation attention needs to be paid to Wenje East and the East Coast akalat population persisting here.

Snares, burning (fires that escape agricultural plots and pastures, and set by honey harvesters), canoe construction and pole cutting were very evident at sites. Ideally, proper information on all the fragments, including their avifauna, rate of habitat loss and other human impacts, is needed. The riverine forests are best viewed as a dynamic patch mosaic of colonising forests, young forests with low

Table 10. Results of timed species-counts at Sifa East (n = 12)

English name	Scientific name	Category	Index	Rank
Tropical Boubou	<i>Lanius aethiopicus</i>	f	3.58	1
Square-tailed Drongo	<i>Dicurus ludwigii</i>	F	3.33	2
Dark-backed Weaver	<i>Ploceus bicolor</i>	F	3.17	3
Fischer's Turaco	<i>Tauraco fischeri</i>	FCNt	2.75	4
Black-backed Puffback	<i>Dryoscopus cubla</i>	F	2.67	5
Olive Sunbird	<i>Nectarinia olivacea</i>	FF	2.58	6
Trumpeter Hornbill	<i>Bycanistes bucinator</i>	F	2.33	7
Black-bellied Starling	<i>Lamprotomis corruscus</i>	F	2.17	8
Broad-billed Roller	<i>Eurystomus glaucurus</i>	f	2.17	8
Brown-hooded Kingfisher	<i>Halcyon albiventris</i>	s	2.08	9
Black-headed Apalis	<i>Apalis melanocephala</i>	FF	2.00	10
Grey-backed Camaroptera	<i>Camaroptera brachyura</i>	f	1.67	11
Narina Trogon	<i>Apaloderma narina</i>	F	1.50	12
African Pygmy Kingfisher	<i>Ispidina picta</i>	F	1.25	13
Fischer's Greenbul	<i>Phyllastrephus fischeri</i>	FFC	1.25	13
Green Wood-hoopoe	<i>Phoeniculus purpureus</i>	s	1.25	13
Little Yellow Flycatcher	<i>Erythrocerus holochlorus</i>	FFCvu	1.17	14
Red-capped Robin-Chat	<i>Cossypha natalensis</i>	F	1.17	14
Variable Sunbird	<i>Nectarinia venusta</i>	f	1.17	14
African Paradise Flycatcher	<i>Terpsiphone viridis</i>	f	1.00	15
Grey-headed Kingfisher	<i>Halcyon leucocephala</i>	s	1.00	15
Red-fronted Barbet	<i>Tricholaema diadematus</i>	f	1.00	15
Lesser Honeyguide	<i>Indicator minor</i>	s	0.92	16
Pale Flycatcher	<i>Bradornis pallidus</i>	s	0.92	16
Black-collared Barbet	<i>Lybius torquatus</i>	F	0.83	17
Crowned Hornbill	<i>Tockus alboterminalis</i>	f	0.83	17
Pygmy Batis	<i>Batis perkeo</i>	s	0.83	17
White-throated Bee-eater	<i>Merops albicollis</i>	f	0.83	17
Yellow-breasted Apalis	<i>Apalis flavida</i>	f	0.83	17
Great Sparrowhawk	<i>Accipiter melanoleucus</i>	F	0.75	18
Eastern Bearded Scrub Robin	<i>Cercotrichas quadringata</i>	f	0.67	19
African Green Pigeon	<i>Treron calva</i>	F	0.58	20
Emerald-spotted Wood Dove	<i>Turtur chalcospilos</i>	f	0.58	20
Red-tailed Ant Thrush	<i>Neocossyphus rufus</i>	FF	0.58	20
African Crowned Eagle	<i>Stephanoaetus coronatus</i>	FF	0.50	21
African Fish Eagle	<i>Haliaeetus vocifer</i>	w	0.50	21
African Golden Weaver	<i>Ploceus subaureus</i>	s	0.50	21
Hadada Ibis	<i>Bostrychia hagedash</i>	w	0.50	21
Red-eyed Dove	<i>Streptopelia semitorquata</i>	f	0.42	22
African Goshawk	<i>Accipiter tachiro</i>	F	0.33	23
Pel's Fishing Owl	<i>Scotopelia peli</i>	F	0.33	23
Retz's Helmet-Shrike	<i>Prionops retzii</i>	F	0.33	23
Rüppell's Long-tailed Starling	<i>Lamprotomis purpuropterus</i>	s	0.33	23
Southern Banded Snake Eagle	<i>Circaetus fasciolatus</i>	FNT	0.33	23
African Palm Swift	<i>Cypsiurus parvus</i>	s	0.25	24
Black Cuckoo-shrike	<i>Campephaga flava</i>	f	0.25	24
Black-throated Wattle-eye	<i>Platysteira peltata</i>	F	0.25	24
Blue-mantled Crested Flycatcher	<i>Trochocercus cyanomelas</i>	FF	0.25	24
Common Scimitarbill	<i>Rhinopomastus cyanomelas</i>	s	0.25	24
Crested Guineafowl	<i>Guttera edouardi</i>	F	0.25	24
Gabar Goshawk	<i>Micronisus gabar</i>	s	0.25	24
Greater Honeyguide	<i>Indicator indicator</i>	f	0.25	24
Little Spotted Woodpecker	<i>Campethera cailliautii</i>	f	0.25	24
Tambourine Dove	<i>Turtur tympanistria</i>	F	0.25	24
White-browed Robin-Chat	<i>Cossypha heuglini</i>	f	0.25	24
White-headed Mousebird	<i>Colius leucocephalus</i>	s	0.25	24
Black-headed Oriole	<i>Oriolus larvatus</i>	f	0.17	25

English name	Scientific name	Category	Index	Rank
Mombasa Woodpecker	<i>Campethera mombassica</i>	FC	0.17	25
Terrestrial Brownbul	<i>Phyllastrephus terrestris</i>	F	0.17	25
Yellow-rumped Tinkerbird	<i>Pogoniulus bilineatus</i>	F	0.17	25
Brown-breasted Barbet	<i>Lybius melanopterus</i>	f	0.08	26
Northern Brownbul	<i>Phyllastrephus strepitans</i>	IC	0.08	26
Palm-nut Vulture	<i>Gypohierax angolensis</i>	s	0.08	26
White-browed Coucal	<i>Centropus superciliosus</i>	s	0.08	26

Only data for birds recorded above 3 m and within 25 m are included. For status codes, see Table 1.

Table 11. Results of timed species-counts at Wenje East (n=12)

English name	Scientific name	Category	Index	Rank
Tropical Boubou	<i>Lanius aethiopicus</i>	f	3.00	1
Olive Sunbird	<i>Nectarinia olivacea</i>	FF	2.75	2
Square-tailed Drongo	<i>Dicrurus ludwigii</i>	F	2.50	3
Dark-backed Weaver	<i>Ploceus bicolor</i>	F	2.33	4
Red-fronted Tinkerbird	<i>Pogoniulus pusillus</i>	s	2.25	5
Variable Sunbird	<i>Nectarinia venusta</i>	f	2.25	5
Eastern Bearded Scrub Robin	<i>Cercotrichas quadrivirgata</i>	f	1.83	6
Tambourine Dove	<i>Turtur tympanistria</i>	F	1.83	6
Black-backed Puffback	<i>Dryoscopus cubla</i>	F	1.75	7
Black-headed Apalis	<i>Apalis melanocephala</i>	FF	1.58	8
Fischer's Turaco	<i>Tauraco fischeri</i>	FCNT	1.42	9
Grey-backed Camaroptera	<i>Camaroptera brachyura</i>	f	1.33	10
Red-capped Robin-Chat	<i>Cossypha natalensis</i>	F	1.33	10
Trumpeter Hornbill	<i>Bycanistes bucinator</i>	F	1.17	11
Narina Trogon	<i>Apaloderma nana</i>	F	1.08	12
Red-eyed Dove	<i>Streptopelia semitorquata</i>	f	1.00	13
African Paradise Flycatcher	<i>Terpsiphonia viridis</i>	f	0.92	14
African Pygmy Kingfisher	<i>Ispidina picta</i>	F	0.92	14
Fischer's Greenbul	<i>Phyllastrephus fischeri</i>	FFC	0.92	14
Rüppell's Long-tailed Starling	<i>Lamprolomis purpureus</i>	s	0.83	15
White-browed Coucal	<i>Centropus superciliosus</i>	s	0.83	15
Yellow-rumped Tinkerbird	<i>Pogoniulus bilineatus</i>	F	0.83	15
Black-throated Wattle-eye	<i>Platysteira peltata</i>	F	0.75	16
Eastern Nicator	<i>Nicator gularis</i>	F	0.75	17
Yellow-breasted Apalis	<i>Apalis flavida</i>	f	0.75	17
Green Wood-hoopoe	<i>Phoeniculus purpureus</i>	s	0.67	18
Red-fronted Barbet	<i>Tricholaema diadematus</i>	s	0.67	18
Bearded Woodpecker	<i>Thripias namaquus</i>	s	0.58	19
Brown-hooded Kingfisher	<i>Halcyon albiventris</i>	s	0.58	19
Hadada Ibis	<i>Bostrychia hagedash</i>	w	0.58	19
Mombasa Woodpecker	<i>Campethera mombassica</i>	F	0.58	19
Red-tailed Ant Thrush	<i>Neocossyphus rufus</i>	FF	0.58	19
Retz's Helmet-Shrike	<i>Prionops retzii</i>	F	0.58	19
African Green Pigeon	<i>Treron calva</i>	F	0.50	20
Little Yellow Flycatcher	<i>Erythrocerus holochlorus</i>	FFCvu	0.50	20
Scaly Babbler	<i>Turdoides squamulatus</i>	s	0.50	20
Black-bellied Starling	<i>Lamprolomis cornuscus</i>	F	0.42	21
Scaly-throated Honeyguide	<i>Indicator variegatus</i>	f	0.42	21
Southern Banded Snake Eagle	<i>Circaetus fasciolatus</i>	FNT	0.42	21
Broad-billed Roller	<i>Eurystomus glaucurus</i>	f	0.33	22
Brown-breasted Barbet	<i>Lybius melanopterus</i>	f	0.33	22
Cardinal Woodpecker	<i>Denropicos fuscescens</i>	f	0.33	22
Common Scimitarbill	<i>Rhinopomastus cyanomelas</i>	s	0.33	22
Emerald-spotted Wood Dove	<i>Turtur chalcospilos</i>	f	0.33	22

English name	Scientific name	Category	Index	Rank
Grey-headed Kingfisher	<i>Halcyon leucocephala</i>	f	0.33	22
Lesser Honeyguide	<i>Indicator minor</i>	f	0.33	22
White-headed Mousebird	<i>Colius leucocephalus</i>	s	0.33	22
Scaly Chatterer	<i>Turdoides aylmeri</i>	s	0.25	23
White-throated Bee-eater	<i>Merops albicollis</i>	f	0.25	23
African Crowned Eagle	<i>Stephanoaetus coronatus</i>	FF	0.17	24
African Grey Hornbill	<i>Tockus nasutus</i>	s	0.17	24
Black-headed Oriole	<i>Oriolus larvatus</i>	f	0.17	24
Gabar Goshawk	<i>Micronisus gabar</i>	s	0.17	24
Laughing Dove	<i>Streptopelia senegalensis</i>	s	0.17	24
Grey-backed Woodpecker	<i>Campethera cailliauti</i>	f	0.17	24
Terrestrial Brownbul	<i>Phyllastrephus terrestris</i>	F	0.17	24
African Barred Owllet	<i>Glaucidium capense</i>	F	0.08	25
Crowned Hornbill	<i>Tockus alboterminatus</i>	F	0.08	25
Great Sparrowhawk	<i>Accipiter melanoleucus</i>	F	0.08	25
Lilac-breasted Roller	<i>Coracias caudata</i>	s	0.08	25
Pygmy Batis	<i>Batis perkeo</i>	s	0.08	25
Red-and-yellow Barbet	<i>Trachylaemus erythrocephalus</i>	s	0.08	25

Only data for birds recorded above 3 m and within 25 m are included. For status codes, see Table 1.

Table 12. Results of timed species-counts at Makere East (n=12)

English name	Scientific name	Category	Index	Rank
Tambourine Dove	<i>Turtur tympanistria</i>	F	2.92	1
Tropical Boubou	<i>Lanius aethiopicus</i>	f	2.83	2
Brown-hooded Kingfisher	<i>Halcyon albiventris</i>	s	2.50	3
Olive Sunbird	<i>Nectarinia olivacea</i>	FF	2.42	4
Black-backed Puffback	<i>Dryoscopus cubla</i>	F	2.17	5
Dark-backed Weaver	<i>Ploceus bicolor</i>	F	2.08	6
Red-fronted Tinkerbird	<i>Pogoniulus pusillus</i>	s	2.08	7
Eastern Bearded Scrub Robin	<i>Cercotrichas quadrivirgata</i>	f	1.92	8
Grey-backed Camaroptera	<i>Camaroptera brachyura</i>	f	1.58	9
Fischer's Greenbul	<i>Phyllastrephus fischeri</i>	FFC	1.58	9
Lesser Honeyguide	<i>Indicator minor</i>	f	1.50	10
Red-capped Robin-Chat	<i>Cossypha natalensis</i>	F	1.50	10
Variable Sunbird	<i>Nectarinia venusta</i>	f	1.42	11
Yellow-rumped Tinkerbird	<i>Pogoniulus bilineatus</i>	F	1.33	12
Gabar Goshawk	<i>Micronisus gabar</i>	s	1.33	12
White-browed Coucal	<i>Centropus superciliosus</i>	s	1.33	12
African Paradise Flycatcher	<i>Terpsiphonia viridis</i>	f	1.25	13
Fischer's Turaco	<i>Tauraco fischeri</i>	FCNT	1.00	14
Eastern Nicator	<i>Nicator gularis</i>	F	0.92	15
Hadada Ibis	<i>Bostrychia hagedash</i>	w	0.92	15
Red-eyed Dove	<i>Streptopelia semitorquata</i>	f	0.83	16
Square-tailed Drongo	<i>Dicrurus ludwigii</i>	F	0.83	16
Black-headed Apalis	<i>Apalis melanocephala</i>	FF	0.75	17
Red-fronted Barbet	<i>Tricholaema diadematus</i>	s	0.75	17
Black-bellied Starling	<i>Lamprolomis cornuscus</i>	F	0.67	18
Green Wood-hoopoe	<i>Phoeniculus purpureus</i>	F	0.67	18
Northern Brownbul	<i>Phyllastrephus strepitans</i>	IC	0.67	18
Trumpeter Hornbill	<i>Bycanistes bucinator</i>	F	0.58	19
Zanzibar Sombre Greenbul	<i>Andropadus importunus</i>	s	0.50	20
White-browed Robin-Chat	<i>Cossypha heuglini</i>	f	0.42	21
Crowned Hornbill	<i>Tockus alboterminatus</i>	F	0.42	21
African Pygmy Kingfisher	<i>Ispidina picta</i>	F	0.33	23
Black-and-white Mannikin	<i>Lonchura bicolor</i>	f	0.33	23
Diederik Cuckoo	<i>Chrysococcyx caprius</i>	s	0.33	23

English name	Scientific name	Category	Index	Rank
Black-collared Barbet	<i>Lybius torquatus</i>	F	0.33	23
Little Yellow Flycatcher	<i>Erythrocerus holochlorus</i>	FFCvu	0.25	24
African Green Pigeon	<i>Treron calva</i>	F	0.25	24
Pale Flycatcher	<i>Bradomis pallidus</i>	s	0.25	24
Scaly Babbler	<i>Turdoides squamulatus</i>	s	0.25	24
Bearded Woodpecker	<i>Thripas namaquus</i>	f	0.25	24
Mombasa Woodpecker	<i>Campethera mombassica</i>	F	0.25	24
Narina's Trogon	<i>Apaloderma nanna</i>	F	0.25	24
Emerald-spotted Wood Dove	<i>Turtur chalcospilos</i>	f	0.25	24
Broad-billed Roller	<i>Eurystomus glaucurus</i>	f	0.17	25
Red-tailed Ant Thrush	<i>Neocossyphus rufus</i>	FF	0.17	25
Lilac-breasted Roller	<i>Coracias caudata</i>	s	0.17	25
Pygmy Batj	<i>Batis perkeo</i>	s	0.17	25
Scaly Chatterer	<i>Turdoides aymeri</i>	s	0.17	25
Speckled Mousebird	<i>Colius striatus</i>	s	0.08	26
African Harrier-Hawk	<i>Polyboroides typus</i>	F	0.08	26
Black-throated Wattle-eye	<i>Platysteira peltata</i>	F	0.08	26
Brown-breasted Barbet	<i>Lybius melanopterus</i>	f	0.08	26
Yellowbill	<i>Ceuthocharis aereus</i>	F	0.08	26
African Golden Weaver	<i>Ploceus subaureus</i>	s	0.08	26
Collared Palm Thrush	<i>Cichladusa arquata</i>	s	0.08	26

Only data for birds recorded above 3 m and within 25 m are included. For status codes, see Table 1.

Species accumulation. end of the survey, with little sign of having reached a plateau.
Figure 1 shows that species accumulation of captured birds was continuing to rise steeply to the

Figure 1. Accumulation rate of species from mist-net captures

