Table Att2.4-1 Fish Species Recorded from Aquatic Ecology Sampling Sites (June/July and November 2017)

Fish Species	Sampling Site											Conservation Status*
	Sigi River	Pangani River	Kagera River	Mwanzugi Dam	Mnekezi River	Mhegela Dam	Itobo Dam	Bulenya Dam	Munguri Pond	Ibembela Swamp	Nsheshe Swamp	
Clarias gariepinus		✓		✓			✓		✓	✓		Least concern
Protopterus aethiopicus			✓	✓								Least concern
Oreochromis urolepis		✓										Least concern
Oreochromis niloticus		✓		✓	✓			✓			✓	Exotic
Oreochromis variabilis	✓											Critically endangered
Oreochromis korogwe	✓											Least concern
Tilapia zillii										✓		Least concern
Haplochromis sp.					✓		✓			✓		Least concern
Astatotilapia burtoni					✓			✓				Least concern
Astatotilapia calliptera								✓				Least concern
Astatotilapia nubila							✓					Least concern
Pseudocrenila brus multicolor							✓				✓	Least concern

Table Att2.4-1 Fish Species Recorded from Aquatic Ecology Sampling Sites (June/July and November 2017)

Fish Species	Sampling Site											Conservation Status*
	Sigi River	Pangani River	Kagera River	Mwanzugi Dam	Mnekezi River	Mhegela Dam	Itobo Dam	Bulenya Dam	Munguri Pond	Ibembela Swamp	Nsheshe Swamp	
Brycinus affinis	✓											Least concern
Ctenopoma muriei											✓	Least concern
Rhabdalestes tangensis		✓										Least concern

NOTE: *Conservation status according to the IUCN Red List (2017)

ATTACHMENT A2.5 MACROINVERTEBRATE SPECIES DATA

Table Att2.5-1 Macroinvertebrate Species Composition and Mean Abundance (Nos.), Sensitivity Score (SS) and Average Score per Taxon (ASPT) for Aquatic Ecology Sampling Sites

Taxonomic Group	Sensitivity Score	Sigi River	Pangani River	Kagera River	Nasihukuru Pond	Mnekezi River	Bulenya Dam	Itobo Dam	Munguri Pond at Bubu River	Mwanzugi Dam	Lake Gairo	Mhegela Dam	Ibembela Swamp	Nsheshe Swamp	TOTAL	% Score
Crustacea																
Atyidae	8	2	3	14	52	0	0	0	0	0	0	0	0	0	71	7.64
Ephemeroptera																
Baetidae	6	21	10	1	0	0	0	3	6	0	0	1	19	0	61	6.57
Caenidae	6	1	1	0	0	0	0	1	0	0	0	0	0	0	3	0.32
Heptageniidae	13	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0.11
Polymitarcyidae	10	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0.11
Leptophlebiidae	9	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0.11
Odonata															0	0.00
Calopterygidae	10	1		1											2	0.22
Coenagrionidae	4	1	7	2	0	1	0	2	14	0	6	1	0	0	34	3.66
Aeshnidae	8	0	0	0	0	0	0	1	5	0	0	0	0	0	6	0.65

Table Att2.5-1 Macroinvertebrate Species Composition and Mean Abundance (Nos.), Sensitivity Score (SS) and Average Score per Taxon (ASPT) for Aquatic Ecology Sampling Sites

Taxonomic Group	Sensitivity Score	Sigi River	Pangani River	Kagera River	Nasihukuru Pond	Mnekezi River	Bulenya Dam	Itobo Dam	Munguri Pond at Bubu River	Mwanzugi Dam	Lake Gairo	Mhegela Dam	Ibembela Swamp	Nsheshe Swamp	TOTAL	% Score
Gomphidae	6	0	0	0	0	0	3	0	0	0	0	0	0	0	3	0.32
Libellulidae	4	1	0	0	0	0	0	1	11	0	0	4	4	7	28	3.01
Hemiptera																
Notonectidae	3	0	0	0	5	11	0	2	10	7	85	17	18	3	158	17.01
Nepidae	3	0	0	0	1	0	1	1	0	0	0	0	0	1	4	0.43
Pleidae	4	0	0	0	0	0	0	0	3	0	0	0			3	0.32
Naucoridae	7	0	0	0	0	0	0	0	0	0	0	1	8	1	10	1.08
Veliidae	5	0	2	1	0	0	0	1	12	0	1	0			17	1.83
Corixidae	3	0	0	0	0	0	0	6	3	2	56	0	2	3	72	7.75
Gerridae	5	0	0	0	0	18	0	0	0	0	0	0			18	1.94
Hydrometridae	6	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0.11
Belostomatidae	3	0	5	1	0	0	1	5	0	0	0	3	0	0	15	1.61
Trichoptera																
Ecnomidae	8												4	0	4	0.43

Table Att2.5-1 Macroinvertebrate Species Composition and Mean Abundance (Nos.), Sensitivity Score (SS) and Average Score per Taxon (ASPT) for Aquatic Ecology Sampling Sites

Taxonomic Group	Sensitivity Score	Sigi River	Pangani River	Kagera River	Nasihukuru Pond	Mnekezi River	Bulenya Dam	Itobo Dam	Munguri Pond at Bubu River	Mwanzugi Dam	Lake Gairo	Mhegela Dam	Ibembela Swamp	Nsheshe Swamp	TOTAL	% Score
Hydropsychidae	6	1	0	0	0	0	0	0	0	1	0	0	0	0	2	0.22
Coleoptera																
Dytiscidae	5	0	0	0	2	7	0	9	0	0	0	234	3	7	262	28.20
Pleidae	4												4	1	5	0.54
Gerridae	5												4	2	6	0.65
Noteridae	5	0	0	0	15	1	0	20	4	0	0	0	0	0	40	4.31
Hydrophilidae	5	0	0	2	0	1	0	1	2	0	0	24	0	0	30	3.23
Haliplidae	5	0	0	0	0	1	0	2	0	0	0	0	0	0	3	0.32
Diptera																
Simuliidae	5	3	0	0	0	0	0	0	0	0	0	0	0	0	3	0.32
Chironomidae	2	0	1	1	0	0	0	1	0	0	1	0	0	0	4	0.43
Tabanidae	5	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0.11
Culicidae	1	0	0	0	0	0	0	0	2	0	0	0	0	0	2	0.22
Hydrachnidia																

Table Att2.5-1 Macroinvertebrate Species Composition and Mean Abundance (Nos.), Sensitivity Score (SS) and Average Score per Taxon (ASPT) for Aquatic Ecology Sampling Sites

Taxonomic Group	Sensitivity Score	Sigi River	Pangani River	Kagera River	Nasihukuru Pond	Mnekezi River	Bulenya Dam	Itobo Dam	Munguri Pond at Bubu River	Mwanzugi Dam	Lake Gairo	Mhegela Dam	Ibembela Swamp	Nsheshe Swamp	TOTAL	% Score
Hydrachnellae	8												6	1	7	0.75
Gastropoda																
Planorbidae	3	0	0	0	0	0	0	13	6	0	0	0	0	0	19	2.05
Lymaneidae	3	0	0	0	0	0	0	0	2	0	0	0	0	4	6	0.65
Thiaridae	3	3	0	0	0	0	1	0	0	19	0	0	0	0	23	2.48
Bivalvia																
Corbiculidae	5	0	0	0	0	0	0	0	0	3	0	0	0	0	3	0.32
Total count		36	29	23	75	41	6	69	81	33	149	285	72	30	929	100
Mean abundance		12.0	9.7	7.7	25.0	13.7	2.0	23.0	27.0	11.0	49.7	95.0	24.0	10.0		
Total no. of families		11	7	8	5	8	4	16	14	6	5	8	10	10		
TARISS score		74	34	43	24	38	15	70	59	30	17	37	53	45		
ASPT		6.7	4.9	5.4	4.8	4.8	3.8	4.4	4.2	5.0	3.4	4.6	5.3	4.5		

ATTACHMENT A2.6 FISH AND MACROINVERTEBRATE DATA ANALYSIS

Table Att2.6-1 CPUE Data for Fish Sampling Sites in the Project Areas

Sampling Site	CPUE	Gear Type
Sigi River (KP1424)	8.66	Gillnet
Pangani River (KP1370)	16.33	Gillnet
Kagera River (KP425)	4.33	Gillnet
Mnekezi River (KP551–557)	2467.7	Seine net
Bulenya Dam (KP811.5)	7838.6	Seine net
Itobo Dam (KP729.5)	6967.6	Seine net
Munguri Pond (KP1036 and 1037)	108.4	Seine net
Mwanzugi Dam (KP823.5)	3.66	Gillnet
Mhegela Dam (KP695.5)	7257.9	Seine net
Ibembera Swamp (KP344)	4.33	Gillnet
Nsheshe Swamp (KP372 and 372.5)	4064.5	Seine net

Table Att2.6-2 Interpretation of ASPT scores by Chutter (1998) and Mandaville (2002)

Chutter (1998)			Mandaville (2002)	
Total Sensitivity Score	**ASPT Score**	**Health Class**	**ASPT Score**	**Interpretation**
>100	>6	Water quality natural; habitat diversity high	>6	Clean water
<100	>6	Water quality natural; habitat diversity reduced	5–6	Doubtful quality
<100	<6	Borderline good/bad water quality. Interpretation based on extent that TS score <100, ASPT <6	4–5	Probable moderate pollution
50–100	<6	Some deterioration in water quality	<4	Probable severe pollution
<50	Variable	Major deterioration in water quality		

Table Att2.6-3 Shannon–Wiener Species Diversity Indices for Macroinvertebrate at the Aquatic Ecology Sampling Sites and Their Use as Indicator of Water Quality

Sampling Site	Species Diversity Index	Species Evenness
Sigi River (KP1424)	1.59	0.66
Pangani River (KP1370)	1.67	0.86
Kagera River (KP425)	1.41	0.68
Nasihukuru Pond (KP605)	0.91	0.57
Mnekezi River (KP551–557)	1.47	0.71
Bulenya Dam (KP811.5)	1.24	0.89
Itobo Dam (KP729.5)	2.22	0.80
Munguri Pond (Bubu River) (KP1036 and 1037)	2.40	0.91
Mwanzugi Dam (KP823.5)	1.08	0.67
Lake Gairo (KP967)	0.89	0.55
Mhegela Dam (KP695.5)	0.71	0.34
Ibembera Swamp (KP344)	2.03	0.88
Nsheshe Swamp (KP372 and 372.5)	2.04	0.89

Interpretations of *H'* Values with Regard to River Water Quality	
***H'* Score**	**Water Quality Status**
>4	Clean water
3–4	Slightly polluted
2–3	Moderately polluted
<2	Very polluted

Table Att2.6-4 Periphyton Biomass Data for Aquatic Ecology Sampling Sites

	Sigi River	Pangani River	Kagera River	Munguri Pond	Bulenya Dam	Nasihukuru Pond	Mhegela Dam (Bukooba)	Iboto Dam	Lake Gairo	Mnekezi Stream	Mwanzugi Dam
Chlorophyceae (green algae)											
Spirogyra sp.	118.72	590.91	1,588.18	1,570.88	590.91	1,969.24	1,950.01	315.69	771.69	566.62	2,663.15
Cosmarium sp.	43.17	89.04	211.27	358.39	29.68	107.32	322.77	16.19	21.59	86.34	64.76
Closterium sp.	–	–	–	–	–	–	–	175.39	–	–	–
Total	161.89	679.95	1,799.45	1,929.27	620.59	2,076.56	2,272.78	507.27	793.28	652.97	2,727.91
Cyanophyceae (blue green algae)											
Oscillatoria tenuis	661.07	2104.62	2,860.66	4,314.67	4,972.84	4,467.59	2,593.34	5,391.07	2,638.87	2,347.46	990.25
Oscillatoria limnetica	329.18	2428.41	2,396.84	2,296.97	2,398.73	2,463.42	961.65	3,024.72	1,467.84	1,195.32	569.33
Planktolyngbya sp.	930.89	304.90	648.38	2,741.47	3,343.11	3,102.36	2,197.10	4,263.20	1,775.44	1,529.90	750.11
Total	1,921.14	4,837.93	5,905.88	9,353.11	10,714.68	10,033.38	5,752.09	12,678.99	5,882.15	5,072.68	2,309.66
Bacillariophyceae (diatoms)											
Melosira granulata	8,666.72	2,663.15	4,555.69	5,399.16	3,356.60	2,186.38	3,681.87	1,794.32	903.91	720.43	930.89
Melosira sp.	5,712.15	555.83	461.40	2,741.47	2,064.15	274.54	1,702.92	281.31	175.39	151.10	304.90
Navicula sp.	474.89	590.91	531.82	246.68	264.43	499.17	251.54	215.86	318.39	302.20	302.20
Fragilaria sp.	35.08	385.85	1,049.07	442.17	1,465.14	1,415.15	40.06	215.86	1,465.13	1,829.40	151.10
Coscinodiscus sp.	275.22	72.85	211.27	176.87	26.98	–	48.97	–	–	13.49	–
Surirella sp.	615.20	–	–	–	–	–	–	–	–	–	–

Table Att2.6-4 Periphyton Biomass Data for Aquatic Ecology Sampling Sites

	Sigi River	Pangani River	Kagera River	Munguri Pond	Bulenya Dam	Nasihukuru Pond	Mhegela Dam (Bukooba)	Iboto Dam	Lake Gairo	Mnekezi Stream	Mwanzugi Dam
Nitzschia sp.	1,165.63	631.39	–	–	–	–	–	–	–	–	–
Tabellaria flocculosa	86.3486	229.35	206.41	495.69	207.76	199.67	149.14	–	–	–	21.59
Diatoma vulgaris	323.78	286.01	400.69	802.89	–	289.52	–	–	–	91.74	67.46
Total	17,355.02	5,415.35	7,416.36	10,304.95	7,385.15	4,864.44	5,874.52	3,040.90	,862.83	3,108.36	1,778.13

Table Att2.6-5 Periphyton Biomass Data for Aquatic Biodiversity Sampling Sites

	Zigi River	Pangani River	Kagera River	Munguri Pond	Bulenya Dam	Nasihukulu Pond	Mhegela Dam (Bukooba)	Itobo Dam	Lake Gairo	Mnekezi Stream	Mwanzugi Dam
Chlorophyceae											
• *Spirogyra sp*	118.72	590.91	1588.18	1570.88	590.91	1969.24	1950.01	315.69	771.69	566.62	2663.15
• *Cosmarium sp*	43.17	89.04	211.27	358.39	29.68	107.32	322.77	16.19	21.59	86.34	64.76
• *Closterium sp*	-	-	-	-	-	-	-	175.39	-	-	-
Total	161.89	679.95	1799.45	1929.27	620.59	2076.56	2272.78	507.27	793.28	652.97	2727.91
Cyanophyceae											
• *Oscillatoria tenuis*	661.07	2104.62	2860.66	4314.67	4972.84	4467.59	2593.34	5391.07	2638.87	2347.46	990.25
• *Oscillatoria limnetica*	329.18	2428.41	2396.84	2296.97	2398.73	2463.42	961.65	3024.72	1467.84	1195.32	569.33
• *Planktolyngbya sp*	930.89	304.90	648.38	2741.47	3343.11	3102.36	2197.10	4263.20	1775.44	1529.90	750.11
Total	1921.14	4837.93	5905.88	9353.11	10714.68	10033.38	5752.09	12678.99	5882.15	5072.68	2309.69
Bacillariophyceae											
• *Melosira granulate*	8666.72	2663.15	4555.69	5399.16	3356.60	2186.38	3681.87	1794.32	903.91	720.43	930.89
• *Melosira sp*	5712.15	555.83	461.40	2741.47	2064.15	274.54	1702.92	283.31	175.39	151.10	304.90
• *Navicula sp*	474.89	590.91	531.82	246.68	264.43	499.17	251.54	215.86	318.39	302.20	302.20
• *Fragilaria sp*	35.08	385.85	1049.07	442.17	1465.14	1415.15	40.06	215.86	1465.13	1829.40	151.10
• *Coscinodiscus sp*	275.22	72.85	211.27	176.87	26.98	-	48.97	-	-	13.49	-
• *Surirella sp*	615.20	-	-	-	-	-	-	-	-	-	-
• *Nitzschia sp*	1165.63	631.39	-	-	-	-	-	-	-	-	-
• *Tabellaria flocculosa*	86.3486	229.35	206.41	495.69	207.76	199.67	149.14	-	-	-	21.59
• *Diatoma vulgaris*	323.78	286.01	400.69	802.89	-	289.52	-	-	-	91.74	67.46
Total	17355.02	5415.35	7416.36	10304.95	7385.15	4864.44	5874.52	3040.90	2862.83	3108.36	1778.13

ATTACHMENT A2.7 SECONDARY FISH DATA

Fish Species Known to Occur in Key Water Catchments along the EACOP Route

Sigi River Catchment

The river rises in the Amani Nature Reserve in the Usambara Mountains at an altitude of 1130 m and flows for 100 km into the Indian Ocean about 40 km north of the city of Tanga. From its headwaters to the estuary, the Sigi River drains through a vast area with several land uses, including an agricultural region where traditional irrigation is practiced, artisanal gold mining, protected areas such as the Amani Nature Reserve and intake points for domestic and industrial water supply for more than 500,000 residents in Tanga.

Table Att2.7-1 Fish Species in the Sigi River Catchment

Species	IUCN Status	Migratory or Congregatory	Endemic or Range Restricted	Status in Catchment (Historic Information or Trends)
Brycinus imberi	Least concern	Congregatory but undertakes seasonal upstream breeding migration	Range not restricted to Sigi catchment	Not known, but infrequent in fisheries catches
*Brycinus affinis**	Least concern	Migrates up rivers for spawning during the rainy season	Range not restricted to Sigi catchment	Has suffered recent declines through overfishing
Barbus macrolepis	Near threatened	Migrates up rivers for spawning during the rainy season when it becomes highly vulnerable to netting	Range not restricted to Sigi catchment	Heavy fishing pressure with small meshed nets, especially across rivers; silt loading; and land-based pollution, water turbidity through erosion on watershed and agriculture extension
Barbus jacksonii	Least concern	Migratory, swimming up rivers to spawn during the rainy season	Range not restricted to Sigi catchment	Suspected to be decreasing through to overfishing

Table Att2.7-1 Fish Species in the Sigi River Catchment

Species	IUCN Status	Migratory or Congregatory	Endemic or Range Restricted	Status in Catchment (Historic Information or Trends)
*Barbus johnstonii**	Least concern	Migratory; swims up rivers to spawn during the rainy season	Range not restricted to Sigi catchment	Suspected to be decreasing through overfishing
Barbus paludinosus	Least concern	Migration appears to correspond to periods of heavy rainfall or flushing	Range not restricted to Sigi catchment	A hardy and widely distributed species
*Oreochromis korogwe**	Endemic to the Sigi and Pangani rivers	Congregatory	Range restricted to Lower sections of Pangani and Sigi catchments	Has suffered recent declines through overfishing and land-based pollution
Oreochromis niloticus	Introduced (exotic)	Reproduces through mass spawning of a brood within a nest made by the male	Wide distribution. Range not restricted to Sigi catchment	Has suffered recent through overfishing and land-based pollution
*Oreochromis variabilis**	Critically endangered	Congregatory	Range not restricted to Pangani Basin	Overfishing, particularly using illegal methods and gear. Competition for habitats and food with exotic species (introduced Nile tilapia)
*Labeo cylindricus**	Least concern	Swims upstream in masses to breed. It is mainly caught when migrating up streams to spawn	Range not restricted to Sigi catchment	Population decline through habitat degradation through sedimentation from agricultural practices
Tilapia zillii	Least concern	Congregates in swampy and pool areas of the river	Range not restricted to Sigi catchment	Has suffered recent declines due to overfishing and land-based pollution
Tilapia rendalli	Least concern	It forms schools in quiet, well-vegetated water along river littorals or backwaters	Range not restricted to Sigi catchment	Has suffered recent declines through overfishing and land-based pollution

Table Att2.7-1 Fish Species in the Sigi River Catchment

Species	IUCN Status	Migratory or Congregatory	Endemic or Range Restricted	Status in Catchment (Historic Information or Trends)
Amphilius uranoscopus	Least concern	Congregatory and adapted for fast flow and rocky habitats with pebbles and boulders	Range not restricted to Sigi catchment	Population decline through its habitat being degraded by sedimentation from agricultural practices
Gambusia affinis	Least concern	Limited migration within clear to turbid freshwater to estuarine habitats	Range not restricted to Sigi catchment	Has suffered recent declines through overfishing and land-based pollution
Awaous aeneofuscus	Least concern	Limited migration within clear to turbid freshwater to estuarine habitats	Range not restricted to Sigi catchment	Has suffered recent declines through overfishing and land-based pollution
Glossogobius giuris	Least concern	Limited migration within clear to turbid freshwater to estuarine habitats	Range not restricted to Sigi catchment	Has suffered recent declines through overfishing and land-based pollution
Eleotris fusca	Least concern	Limited migration within the estuarine section of the Sigi River	Range not restricted to Sigi catchment	Has suffered recent declines through overfishing and land-based pollution
Hippopotamyrus ansorgii	Least concern	Congregates in rocky habitats in flowing waters	Range not restricted to Sigi catchment	Population decline through land-based pollution, erosion and silting
Labeobarbus dimidiatus (Varicorhinus dimidiatus)	Least concern	Congregates in fast flowing stretches of river and deeper pools	Range not restricted to Sigi catchment	Population decline through land-based pollution, erosion and silting
Chiloglanis deckenii	Least concern	Usually congregatory in rapidly flowing waters in rocky habitats	Range not restricted to Sigi catchment	Population decline through land-based pollution, erosion and silting

Table Att2.7-1 Fish Species in the Sigi River Catchment

Species	IUCN Status	Migratory or Congregatory	Endemic or Range Restricted	Status in Catchment (Historic Information or Trends)
Stenogobius kenyae	Least concern	Limited migration within the estuarine section of the Sigi River	Range not restricted to Sigi catchment	Population decline through land-based pollution, erosion and silting
Macrobranchius sp. (freshwater prawn)	Least concern	Migrates from freshwater to estuarine section of the river for spawning	Range not restricted to Sigi catchment	Population decline through land-based pollution, erosion and silting

NOTE: *Caught in the 2017 EACOP survey

Pangani River Catchment

The main tributaries of the 500-km long Pangani River are the Kikuletwa (from Mount Meru) and the Ruvu (from Mount Kilimanjaro). The Kikuletwa and the Ruvu rivers merge before entering the Nyumba ya Mungu Reservoir to form the Pangani River. The Pangani River is joined by the Mkomazi and Luengera rivers that drain the Pare and Usambara mountains respectively. The river enters the Indian Ocean estuary at the coastal town of Pangani.

Table Att2.7-2 Fish Species in River Pangani Catchment

Species	IUCN Status	Migratory or Congregatory	Endemic or Range Restricted	Status in Catchment (Historic Information or Trends)
Anguilla bengalensis labiata	*Least concern*	Migratory species that breeds in the ocean; it requires rivers and oceans	Range not restricted to Pangani catchment	Has suffered recent declines through barriers to migration

Table Att2.7-2 Fish Species in River Pangani Catchment

Species	IUCN Status	Migratory or Congregatory	Endemic or Range Restricted	Status in Catchment (Historic Information or Trends)
Anguilla bicolor bicolor	Near threatened	Migratory species that breeds in the ocean. Lives in fresh water areas as an adult; in estuaries and seas when young	Range not restricted to Pangani catchment	Major threat in the Pangani include barriers to migration, mortality at hydropower turbines, pollution, exploitation and habitat reduction
Amphilius uranoscopus	Least concern	Congregatory and adapted for fast flow and rocky habitats with pebbles and boulders	Range not restricted to Pangani catchment	Population decline through its habitat being degraded by sedimentation from agricultural practices
Arius africanus	Data deficient	Limited migration in lower freshwater and estuarine section of the Pangani River	Range not restricted to Pangani catchment	Population decline through deforestation and resulting sedimentation of the lower reaches of the river
Bagrus orientalis	Least concern	Limited migration in deeper sections of the river	Range not restricted to Pangani catchment	Population reported to be declining
Brycinus affinis	Least concern	Migrates up the rivers for spawning during the rainy season	Range not restricted to Pangani catchment	Has suffered recent declines through overfishing
Brycinus sadleri	Least concern	Migrates up the rivers for spawning during the rainy season	Range not restricted to Pangani catchment	Has suffered recent declines through overfishing
Petersius conserialis	Least concern	Migrates up the rivers for spawning during the rainy season	Range not restricted to Pangani catchment	Population reported to be declining
Rhabdalestes leleupi	Critically endangered	Congregatory mostly quieter stretches of rivers	Distribution range restricted to Pangani catchment	Has suffered a considerable population decline through overfishing and deterioration of habitat

Table Att2.7-2 Fish Species in River Pangani Catchment

Species	IUCN Status	Migratory or Congregatory	Endemic or Range Restricted	Status in Catchment (Historic Information or Trends)
*Rhabdalestes tangensis**	Least concern	Forms shoals in the shallow margins of the river	Distribution range restricted to Pangani catchment	Ongoing population decline
Oreochromis esculentus	Critically endangered	Congregatory	Range not restricted to Pangani catchment	Heavy fishing pressure. Increased siltation through agricultural and cattle grazing practice in the area
Oreochromis korogwe	Least concern	Congregatory	Range restricted to Lower sections of Pangani and Sigi catchments	Has suffered recent declines through overfishing and land-based pollution
*Oreochromis niloticus**	Introduced (exotic)	Reproduces through mass spawning of a brood within a nest made by the male	Wide distribution. Range not restricted to Sigi catchment	Has suffered recent declines through overfishing and land-based pollution
*Oreochromis urolepis**	Least concern	Congregatory	Range not restricted to Pangani catchment	Has suffered recent declines through overfishing and land-based pollution
Oreochromis jipe	Critically endangered	Congregatory	Distribution range restricted to Pangani catchment	Suffering from a continued decline in population (mature individuals) through competition for habitat, siltation, overfishing and weed infestation
Oreochromis variabilis	Critically endangered	Congregatory	Range not restricted to Pangani Basin	Overfishing, particularly using illegal methods and gear. Competition for habitats and food with exotic species (introduced Nile tilapia)
Oreochromis hunteri	Critically endangered	Inhabit lake Sometimes shoaling	Range restricted to Lake Chala in Pangani catchment	Siltation and erosion; seasonal drought; and weed infestation.

Table Att2.7-2 Fish Species in River Pangani Catchment

Species	IUCN Status	Migratory or Congregatory	Endemic or Range Restricted	Status in Catchment (Historic Information or Trends)
Tilapia rendalli	least concern	It forms schools in quiet, well-vegetated water along river littorals or backwaters	Range not restricted to Pangani Basin	Has suffered recent declines through overfishing and land-based pollution
Tilapia zillii	least concern	Congregates in swampy and pool areas of the river	Range not restricted to Pangani Basin	Has suffered recent declines through overfishing and land-based pollution
Tilapia sparrmanii	Least concern	Undertakes seasonal upstream migration and breeds before and during these migrations	Range not restricted to Pangani Basin	Population decline from potential overfishing
Astatotilapia bloyeti	Data deficient	Sometimes shoaling	Range restricted to the coastal river systems of Tanzania	Has suffered a considerable population decline through overfishing and deterioration of habitat
Ctenochromis pectoralis	Erroneously recorded as 'extinct' in IUCN Red List (see FishBase.org)	No information	Range restricted to Pangani River near Korogwe	Suffering from a continuing decline in population through overfishing and land-based pollution
*Clarias gariepinus**	Least concern	Potamodromous (migratory)	Widespread and not restricted to Pangani catchment	Declining population through periodic drought, overfishing and land-based pollution
*Barbus paludinosus**	Least concern	Migration appears to correspond to periods of heavy rainfall or flushing	Least concern and range not restricted to Pangani catchment	A hardy and widely distributed species
*Barbus oxyrhynchus**	Least concern	Migratory	Range not restricted to Pangani catchment	Has suffered recent declines through overfishing and land-based pollution

Table Att2.7-2 Fish Species in River Pangani Catchment

Species	IUCN Status	Migratory or Congregatory	Endemic or Range Restricted	Status in Catchment (Historic Information or Trends)
Barbus cf. *eutaenia*	Data deficient	Ascends tributaries and moves into floodplains in the rainy season	Range not restricted to Pangani catchment	Population decline through flow reduction, sedimentation and pollution
*Barbus jacksonii**	Least concern	Migratory; swims up rivers to spawn during the rainy season	Range not restricted to Pangani catchment	Suspected to be decreasing through overfishing
Barbus kerstenii	Least concern	Often found in shoals	Range not restricted to Pangani catchment	Population declining through land-based anthropogenic pollutants
Barbus lineomaculatus	Least concern	Migrates upstream to spawn in flooded grassy areas	Range not restricted to Pangani catchment	Population decline through increased turbidity from erosion on watershed and agriculture extension
Barbus quadripunctatus	Least concern	Migratory	Range restricted to Pangani catchment	Population decline through increased turbidity from erosion on watershed and agriculture extension
Barbus radiatus	Least concern	Undertakes seasonal migratory movements	Range not restricted to Pangani catchment	Population decline through turbidity and siltation of spawning habitats from erosion on watershed and agriculture extension and pollution
Barbus toppini	Least concern	Possibly migrating to spawning sites	Range not restricted to Pangani catchment	Population decline through increased turbidity from erosion on watershed and agriculture extension

Table Att2.7-2 Fish Species in River Pangani Catchment

Species	IUCN Status	Migratory or Congregatory	Endemic or Range Restricted	Status in Catchment (Historic Information or Trends)
Barbus usambarae	Least concern	Migrates into flooded grassy areas to spawn	Range restricted to Pangani catchment	Has suffered recent declines through overfishing and land-based pollution
Barbus zanzibaricus	Least concern	Migrates between main river and stream channels during the rainy season	Widespread. Range not restricted to Pangani catchment	Has suffered recent declines through overfishing, flow reduction land-based pollution
*Labeo cylindricus**	Least concern	Swims upstream in masses to breed. It is mainly caught when migrating up streams to spawn	Widespread. Range not restricted to Pangani catchment	Population decline through its habitat being degraded by sedimentation from agricultural practices
*Labeo victorianus**	Critically endangered	Ascends both large rivers and streams in fairly compact shoals during the rainy season to spawn	Widespread. Range not restricted to Pangani catchment	Major threats include gill netting of gravid fishes during seasonal spawning migration and loss of spawning/nursery grounds through siltation, pollution and water extraction as a result of agricultural extension
Labeo cf. *coubie*	Least concern	Full migrant	Widespread. Range not restricted to Pangani catchment	Population decline through heavy fishing pressure, dams and water pollution
Garra dembeensis	Least concern	Congregates in rapid parts of rivers where it adheres to stones in swift water	Widespread. Range not restricted to Pangani catchment	Population declining through water turbidity through erosion on river basin, a consequence of agriculture expansion and deforestation

Table Att2.7-2 Fish Species in River Pangani Catchment

Species	IUCN Status	Migratory or Congregatory	Endemic or Range Restricted	Status in Catchment (Historic Information or Trends)
Neobola fluviatilis	Least concern	Congregates in shallow parts of the river	Range not restricted to Pangani catchment	Population decline through its habitat being degraded by sedimentation from agricultural practices
Pantanodon podoxys	Least concern	Limited migrations within estuaries	Restricted to estuarine sections of the river. Range not restricted to Pangani catchment	Has suffered recent declines through overfishing, flow reduction and land-based pollution
Aplocheilichthys kongoranensis	Least concern	Congregates in shallow parts of the river	Restricted coastal lowlands of eastward flowing rivers in Tanzania	Population decline through drought and its habitat being degraded by sedimentation from agricultural practices
Nothobranchius melanospilus	Least concern	Congregatory	Widespread. Range not restricted to Pangani catchment	Population decline through drought and its habitat being degraded by sedimentation from agricultural practices
Nothobranchius guentheri	Endemic	Congregatory	Widespread. Range not restricted to Pangani catchment	Population decline through drought and its habitat being degraded by sedimentation from agricultural practices
Nothobranchius palmqvisti	Least concern	Congregatory	Widespread. Range not restricted to Pangani catchment	Population decline through drought and its habitat being degraded by sedimentation from agricultural practices
Eleotris fusca	Least concern	Limited migration within clear to turbid freshwater to estuarine habitats	Widespread. Range not restricted to Pangani catchment	Has suffered recent declines through overfishing and land-based pollution

Table Att2.7-2 Fish Species in River Pangani Catchment

Species	IUCN Status	Migratory or Congregatory	Endemic or Range Restricted	Status in Catchment (Historic Information or Trends)
Glossogobius giuris	Least concern	Limited migration within clear to turbid freshwater to estuarine habitats	Widespread. Range not restricted to Pangani catchment	Has suffered recent declines through overfishing and land-based pollution
Glossogobius biocellatus	Least concern	Limited migration within clear to turbid freshwater to estuarine habitats	Widespread. Range not restricted to Pangani catchment	Has suffered recent declines through overfishing and land-based pollution
Favonigobius reichei	Least concern	Limited migration within clear to turbid freshwater to estuarine habitats	Widespread. Range not restricted to Pangani catchment	Has suffered recent declines through overfishing and land-based pollution
Chiloglanis deckenii	Least concern	Usually congregatory in rapidly flowing waters in rocky habitats	Widespread. Range not restricted to Pangani catchment	Population decline through land-based pollution, erosion and silting
Synodontis afrofischeri	Least concern	Congregatory	Widespread. Range not restricted to Pangani catchment	Population decline through overfishing using illegal nets land-based pollution
Synodontis leopardus	Least concern	Congregatory	Widespread. Range not restricted to Pangani catchment	Population decline through overfishing using illegal nets land-based pollution
*Synodontis punctulatus**	Least concern	Congregatory	Widespread. Range not restricted to Pangani catchment	Population decline through overfishing using illegal nets and land-based pollution
Mormyrus kannume	Least concern	Solitary with limited migration within the deeper parts of the river	Widespread. Range not restricted to Pangani catchment	Population decline through overfishing using illegal nets and land-based pollution

Table Att2.7-2 Fish Species in River Pangani Catchment

Species	IUCN Status	Migratory or Congregatory	Endemic or Range Restricted	Status in Catchment (Historic Information or Trends)
Schilbe moebiusii	Least concern	Swims upstream in masses to breed. It is mainly caught when migrating up streams to spawn	Range restricted to Pangani, Wami and Rufiji catchments	Population decline through overfishing using illegal nets and land-based pollution
Pareutropius longifilis	Least concern	Congregates in standing or slowly moving open water of the river	Widespread. Range not restricted to Pangani catchment	Population decline through overfishing using illegal nets and land-based pollution

Kagera River Catchment

The Kagera river catchment includes the Ruvubu, Kagera and Ngono rivers and associated satellite lakes such as Ikimba.

Table Att2.7-3 Fish Species in Kagera River Catchment

Species	IUCN Status	Migratory or Congregatory	Endemic or Range Restricted	Status in Catchment (Historic Information or Trends)
Barbus kerstenii	Least concern	Often found in shoals	Widespread. Range not restricted to Kagera catchment	Population declining through land-based anthropogenic pollutants
Barbus paludinosus	Least concern	Migration appears to correspond to periods of heavy rainfall or flushing	Widespread. Range not restricted to Kagera catchment	A hardy and widely distributed species
Barbus jacksonii	Least concern	Migratory; swimming up rivers to spawn during the rainy season	Widespread. Range not restricted to Kagera catchment	Suspected to be decreasing through overfishing

Table Att2.7-3 Fish Species in Kagera River Catchment

Species	IUCN Status	Migratory or Congregatory	Endemic or Range Restricted	Status in Catchment (Historic Information or Trends)
Barbus neumayeri	Least concern	Migratory; swims up rivers to spawn during the rainy season	Widespread. Range not restricted to Kagera catchment	Population decline through regression of swamps and other wetlands around the river, illegal fishing and sedimentation through excessive soil erosion
Barbus profundus	Data deficient	Congregatory	Widespread. Range not restricted to Kagera catchment	Population decline through regression of swamps and other wetlands around the river, illegal fishing and sedimentation through excessive soil erosion
Brycinus sadleri	Least concern	Migrates up rivers and streams in during the rainy season for spawning	Widespread. Range not restricted to Kagera catchment	Population decline through illegal fishing, water turbidity and siltation as a consequence of erosion and farming
*Labeo victorianus**	Critically endangered	Ascends both large rivers and streams in fairly compact shoals during the rainy season to spawn	Widespread. Range not restricted to Kagera catchment	Major threats include gillnetting of gravid fishes during seasonal spawning migration and loss of spawning/nursery grounds through siltation, pollution and water extraction as a result of agricultural extension
Haplochromis nubilus	Vulnerable	Congregatory	Widespread. Range not restricted to Kagera catchment	Major threat is hybridisation through decreased water transparency (on account of eutrophication and erosion leading to increased sedimentation and runoff) interfering with mate recognition of visual cues

Table Att2.7-3 Fish Species in Kagera River Catchment

Species	IUCN Status	Migratory or Congregatory	Endemic or Range Restricted	Status in Catchment (Historic Information or Trends)
Haplochromis venator	Endangered	Congregatory	Widespread. Range not restricted to Kagera catchment	Population decline through illegal fishing, water turbidity and siltation as a consequence of erosion and farming
Astatotilapia velifer	Vulnerable	Congregatory	Widespread. Range not restricted to Kagera catchment	Population decline through illegal fishing, water turbidity and siltation as a consequence of erosion and farming
Haplochromis lacrimosus	Least concern	Congregatory	Widespread. Range not restricted to Kagera catchment	Population decline through illegal fishing, water turbidity and siltation as a consequence of erosion and farming
Astatoreochromis alluaudi	Least concern	Congregatory	Widespread. Range not restricted to Kagera catchment	Major threat is hybridisation through decreased water transparency (on account of eutrophication and erosion leading to increased sedimentation and runoff) interfering with mate recognition of visual cues
Tilapia zillii	Least concern	Congregates in swampy and pool areas of the river	Widespread. Range not restricted to Kagera catchment	Population decline through illegal fishing, water turbidity and siltation as a consequence of erosion and farming
Tilapia (Coptodon) rendalli	Least concern	It forms schools in quiet, well-vegetated water along river littorals or backwaters	Widespread. Range not restricted to Kagera catchment	Population decline through illegal fishing, water turbidity and siltation as a consequence of erosion and farming

Table Att2.7-3 Fish Species in Kagera River Catchment

Species	IUCN Status	Migratory or Congregatory	Endemic or Range Restricted	Status in Catchment (Historic Information or Trends)
Oreochromis niloticus	Introduced (exotic)	Reproduces through mass spawning of a brood within a nest made by the male	Wide distribution. Range not restricted to Kagera catchment	Population decline through illegal fishing, water turbidity and siltation as a consequence of erosion and farming
Oreochromis esculentus	Critically endangered	Congregatory	Range not restricted to Kagera catchment	Heavy fishing pressure. Increased siltation through agricultural and cattle grazing practice in the area
Oreochromis variabilis	Critically endangered	Congregatory	Range not restricted to Pangani Basin	Overfishing, particularly using illegal methods and gear. Competition for habitats and food with exotic species (introduced Nile tilapia)
Clarias gariepinus	Introduced (exotic)	Reproduces through mass spawning of a brood within a nest made by the male	Wide distribution. Range not restricted to Kagera catchment	Population decline through illegal fishing, water turbidity and siltation as a consequence of erosion and farming
*Protopterus aethiopicus**	Least concern	Limited migration within river swamps and floodplain to spawn	Wide distribution. Range not restricted to Kagera catchment	Population decline through illegal fishing, water turbidity and siltation as a consequence of erosion and farming
Clarias liocephalus	Least concern	migrate into rivers and temporary streams	Wide distribution. Range not restricted to Kagera catchment	Strongly declining population through competition with introduced species and fishing pressure
Chiloglanis somereni	Least concern	Usually congregatory in rapidly flowing waters in rocky habitats	Widespread. Range not restricted to Kagera catchment	Population decline through land-based pollution, erosion and silting

Table Att2.7-3 Fish Species in Kagera River Catchment

Species	IUCN Status	Migratory or Congregatory	Endemic or Range Restricted	Status in Catchment (Historic Information or Trends)
Pollimyrus nigricans	Least concern	Migrates up the rivers to spawn in temporary pools and streams	Widespread in Lake Victoria basin. Range not restricted to Kagera catchment	Population declining through loss of riverine migratory routes, fishing pressure and loss of papyrus swamps and other vegetated wetlands through agriculture expansion
Barbus apleurogramma	Least concern	Congregates near the margins of rivers between the vegetation and in fast-flowing water	Widespread in Lake Victoria basin. Range not restricted to Kagera catchment	Population declining through fishing pressure, eutrophication as result of increased use of agrochemicals and water abstraction for agriculture
Barbus acuticeps	Near threatened	Congregates on the inshore waters and the main river channel	Widespread in Lake Victoria basin. Range not restricted to Kagera catchment	Population decline through regression of swamps and other wetlands around the river through farming, fishing pressure and sedimentation through excessive soil erosion
Barbus claudinae	Vulnerable	Congregates on the inshore waters and the main river channel	Endemic to the upper Kagera system upstream of the Rusumo Falls	Population decline through regression of swamps and other wetlands around the river through farming, fishing pressure and sedimentation through excessive soil erosion
Schilbe intermedius	Least concern	Migrates into rivers in fairly compact schools during the rainy season to spawn	Widespread in other river basins of Tanzania. Range not restricted to Kagera catchment	Population decline through heavy fishing at river mouths, weed infestation and biotope changes through land-based pollution

Table Att2.7-3 Fish Species in Kagera River Catchment

Species	IUCN Status	Migratory or Congregatory	Endemic or Range Restricted	Status in Catchment (Historic Information or Trends)
Amphilius uranoscopus	Least concern	Congregatory and adapted for fast flow and rocky habitats with pebbles and boulders	Range not restricted to Kagera catchment	Population decline through its habitat being degraded by sedimentation from agricultural practices
*Synodontis afrofischeri**	Least concern	Congregatory	Widespread. Range not restricted to Kagera catchment	Population decline through overfishing using illegal nets land-based pollution
Synodontis ruandae	Vulnerable	Often congregates in shallow waters and marginal vegetation of the main river channel	Range restricted to Kagera catchment	Major threats include regression of swamps and other wetlands around the river through farming, fishing pressure and sedimentation through excessive soil erosion
Caecomastacembelus frenatus	Least concern	Sedentary fish, more or less nocturnal and usually waiting for its prey to swim or drift within range	Widespread. Range not restricted to Kagera catchment	Population decrease through illegal fishing practice and pollution of the river (sedimentation, nutrient flows, agrochemicals)
Gnathonemus longibarbis	Least concern	Migrates up rivers to spawn during the rain seasons	Widespread. Range not restricted to Kagera catchment	Population decline through regression of swamps and other wetlands around the river through farming, fishing pressure and sedimentation through excessive soil erosion

Table Att2.7-3 Fish Species in Kagera River Catchment

Species	IUCN Status	Migratory or Congregatory	Endemic or Range Restricted	Status in Catchment (Historic Information or Trends)
Ctenopoma muriei	Least concern	Congregates in marginal vegetation areas of the main river	Widespread. Range not restricted to Kagera catchment	Population decline through regression of swamps and other wetlands around the river through farming, fishing pressure and sedimentation through excessive soil erosion

NOTE: *Caught in the present EACOP survey

River Mnekezi and Streams Draining the Southwestern Lake Victoria Wetland Areas

Table Att2.7-4 Fish Species in Mnekezi River Catchment

Species	IUCN Status	Migratory or Congregatory	Endemic or Range Restricted	Status in Catchment (Historic Information or Trends)
*Barbus paludinosus**	Least concern	Migration appears to correspond to periods of heavy rainfall or flushing	Widespread. Range not restricted to Mnekezi catchment	A hardy and widely distributed species
Chiloglanis somereni	Least concern	Usually congregatory in rapidly flowing waters in rocky habitats	Widespread. Range not restricted to Mnekezi catchment	Population decline through land-based pollution, erosion and silting
Barbus jacksonii	Least concern	Migratory; swims up rivers to spawn during the rainy season	Range not restricted to Mnekezi catchment	Population decline through overfishing, land-based pollution, erosion and silting

Table Att2.7-4 Fish Species in Mnekezi River Catchment

Species	IUCN Status	Migratory or Congregatory	Endemic or Range Restricted	Status in Catchment (Historic Information or Trends)
Barbus lineomaculatus	Least concern	Migrates upstream to spawn in flooded grassy areas	Range not restricted to Mnekezi catchment	Population decline through illegal fishing, water turbidity and siltation as a consequence of erosion and farming
Barbus apleurogramma	Least concern	Congregates near the margins of rivers between the vegetation and in fast-flowing water	Widespread in Lake Victoria basin. Range not restricted to Mnekezi catchment	Population declining through fishing pressure, eutrophication as result of increased use of agrochemicals and water abstraction for agriculture
Pseudocrenilabrus multicolor	Least concern	Congregates among submerged plants and in open water zones enclosed by papyrus swamps in the river	Widespread in Lake Victoria basin. Range not restricted to Mnekezi catchment	Population decline through drought, conversion of riverine swamps for agriculture and erosion and increase water turbidity
*Astatotilapia burtoni**	Least concern	Congregates in slow-flowing sections of the river	Widespread in Tanganyika and Victoria basins. Range not restricted to Mnekezi catchment	Population decline through drought, conversion of riverine swamps for agriculture and erosion and increase water turbidity
*Oreochromis niloticus**	Introduced (exotic)	Reproduces through mass spawning of a brood within a nest made by the male	Wide distribution. Range not restricted to Mnekezi catchment	Population decline through illegal fishing, water turbidity and siltation as a consequence of erosion and farming
Tilapia zillii	Least concern	Congregates in swampy and pool areas of the river	Widespread. Range not restricted to Mnekezi catchment	Population decline through illegal fishing, water turbidity and siltation as a consequence of erosion and farming

Table Att2.7-4 Fish Species in Mnekezi River Catchment

Species	IUCN Status	Migratory or Congregatory	Endemic or Range Restricted	Status in Catchment (Historic Information or Trends)
Clarias liocephalus	Least concern	migrate into rivers and temporary streams	Wide distribution. Range not restricted to Mnekezi catchment	Strongly declining population through competition with introduced species and fishing pressure
Clarias werneri	Least concern	Reproduces through mass spawning of a brood within a nest made by the male	Widespread. Range not restricted to Mnekezi catchment	Population affected by regression of swamps and other wetlands around the river and expansion of farms
Ctenopoma muriei	Least concern	Congregates in marginal vegetation areas of the main river	Widespread. Range not restricted to Kagera catchment	Population decline through regression of swamps and other wetlands around the river through farming, fishing pressure and sedimentation through excessive soil erosion
Protopterus aethiopicus	Least concern	Limited migration within river swamps and floodplain to spawn	Wide distribution. Range not restricted to Mnekezi catchment	Population decline through illegal fishing, water turbidity and siltation as a consequence of erosion and farming
Schilbe mystus	Least concern	Migrates into the tributaries of rivers and streams during the rainy season to breed	Wide distribution. Range not restricted to Mnekezi catchment	Potential decline through overfishing, exploitation and water pollution (agriculture)

Wembere Swamp

Wembere Swamp is formed by the Wembere and Manonga streams and is connected to Lake Eyasi through seasonal streams to form a closed drainage system. Fish fauna of the Wembere Swamp have been documented in a directory of African wetlands (Hughes and Hughes 1992).

Table Att2.7-5 Fish Species in Wembere Swamp Catchment

Species	IUCN Status	Migratory or Congregatory	Endemic or Range Restricted	Status in Catchment (Historic Information or Trends)
Brycinus jacksonii	Least concern	Migration appears to correspond to periods of heavy rainfall or flushing	Widespread. Range not restricted to Wembere catchment	A hardy and widely distributed species
Clarias gariepinus	Least concern	Potamodromous (migratory). Reproduces through mass spawning of a brood within a nest made by the male	Widespread and not restricted to Wembere catchment	Declining population through periodic drought, overfishing and land-based pollution.
Hydrocynus vittatus	Least concern	Undertakes a spawning migration up river and into small streams to spawn during the rainy season	Widespread and not restricted to Wembere catchment	Affected by heavy fishing pressure from unregulated gillnets, silt loading through agricultural activities and deforestation, and pollution through pesticides for agricultural use
Mormyrus kannume	Least concern	Solitary with limited migration within the deeper parts of the river	Widespread. Range not restricted to Wembere catchment	Population decline through overfishing using illegal nets and land-based pollution
Schilbe intermedius	Least concern	Migrates into rivers in fairly compact schools during the rainy season to spawn	Widespread in other river basins of Tanzania. Range not restricted to Wembere catchment	Heavy fishing at river mouths, weed infestation and biotope changes through land-based pollution
Synodontis punctulatus	Least concern	Congregatory	Widespread. Range not restricted to Wembere catchment	Population decline through overfishing using illegal nets and land-based pollution

Bahi Swamp

Bahi Swamp has no outlet and is fed by the seasonal River Bubu.

Table Att2.7-6 Fish Species in Bahi Swamp Catchment

Species	IUCN Status	Migratory or Congregatory	Endemic or Range Restricted	Status in Catchment (Historic Information or Trends)
*Clarias gariepinus**	Least concern	Potamodromous (migratory)	Widespread and not restricted to Bahi Swamp	Declining population through periodic drought around the swamp
*Barbus paludinosus**	Least concern	Migration appears to correspond to periods of heavy rainfall or flushing	Least concern and range not restricted to Bahi swamp	A hardy and widely distributed species

ATTACHMENT A2.8 FISH PLATES

S/N	Site: Mwanzugi Dam: Igunga: KP823/824
1	
	Oreochromis niloticus

2	
	Protopterus aethiopicus

3	
	Clarias gariepinus

S/N	Site: Kagera river
1	
	Protopterus aethiopicus

2	
	Synodontis afrofischeri

S/N	Mnekezi River KP557
1	
	Barbus paludinosus

2	
	Haplochromis sp.

3	
	Astatotilapia burtoni

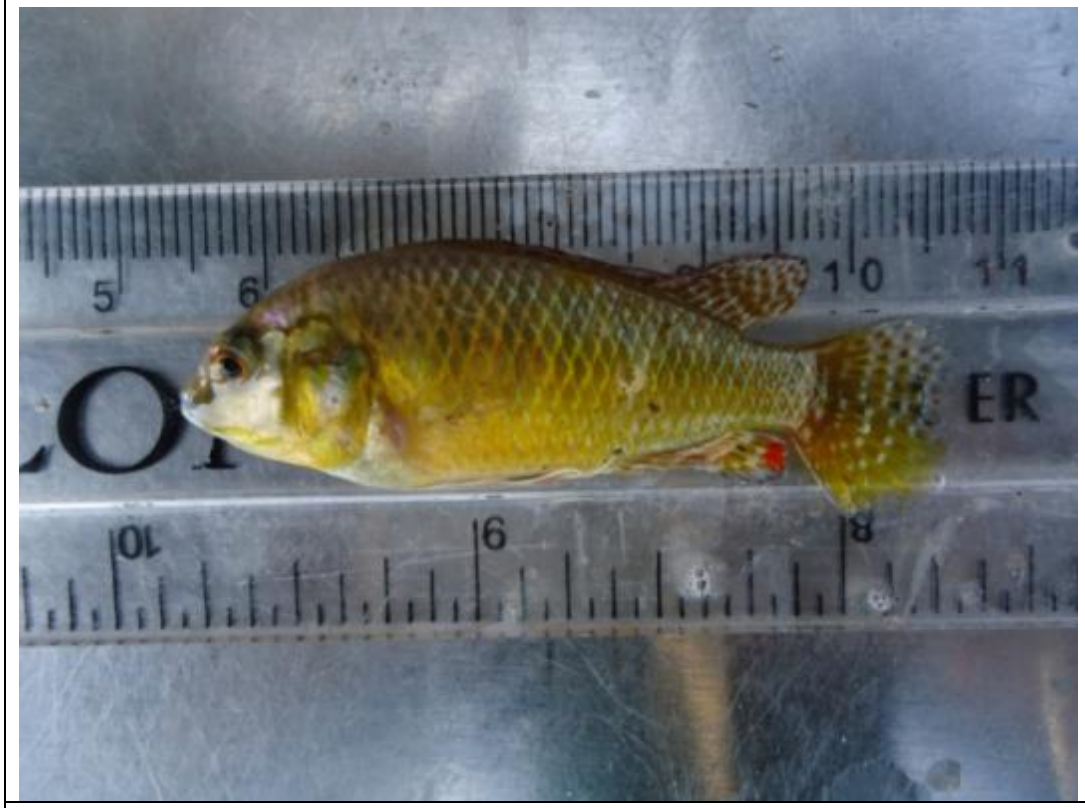
4	
	Oreochromis niloticus

S/N	Mhegela Dam (Bukooba village) KP695/696
1	
	Barbus paludinosus

S/N	Itobo Dam: KP729/730
1	
	Haplochromis sp.

2	
	Barbus paludinosus

3	
	Clarias gariepinus

4	
	Pseudocrenilabrus multicolor

S/N	Bubu River KP1037
1	
	Clarias gariepinus

2	
	Barbus paludinosus

S/N	Pangani River: KP1370
1	
	Oreochromis korogwe

2	
	Barbus oxyrhynchus

3	
	Labeo victorianus

4	
	Clarias gariepinus

5	
	Synodontis punctulatus

S/N	Bulenya Dam: KP811.5
1	
	Oreochromis niloticus

2	
	Astatotilapia nubila

2	
	Barbus paludinosus

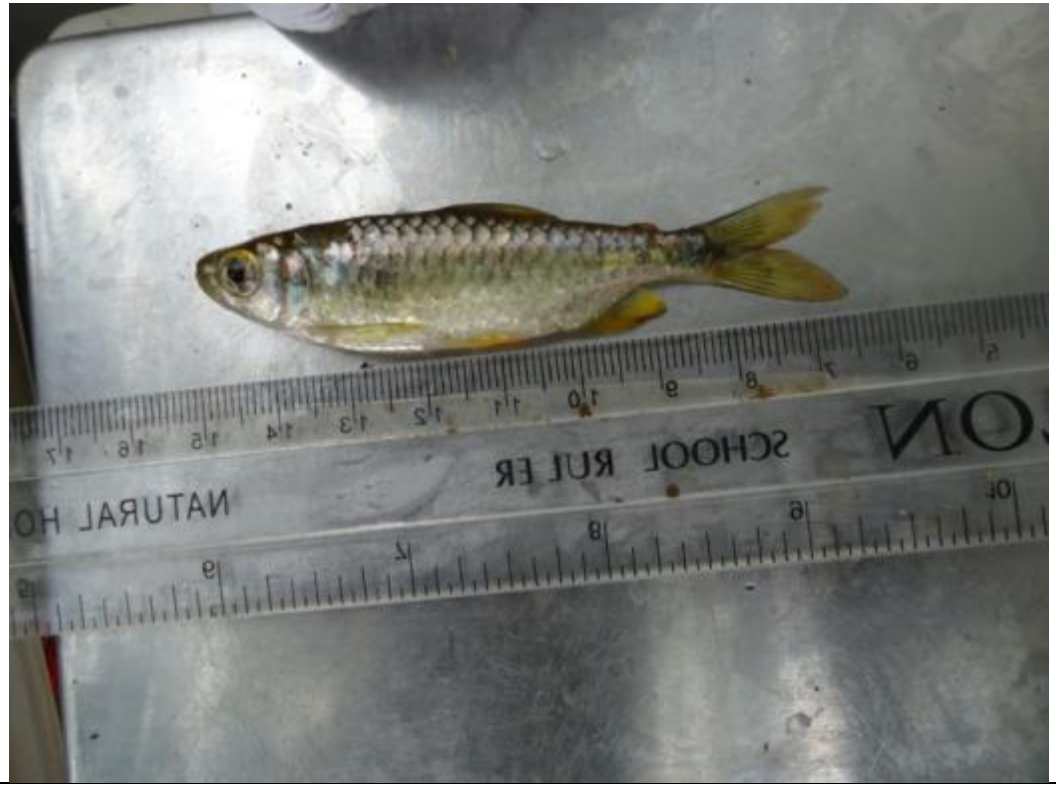
4	
	Oreochromis niloticus

S/N	Sigi River: KP1424
1	
	Barbus johnstonii

2	
	Labeo cylindricus

3	
	Oreochromis korogwe

4	
	Oreochromis variabilis

5	
	Brycinus affinis

Appendix A3: Avifauna Biodiversity Baseline Report

August 2019

CONTENTS

TABLES

FIGURES

ATTACHMENTS

GLOSSARY AND ACRONYMS

Symbols	
%	percentage
A	
AGI	aboveground installation
AOI	area of influence
C	
CITES	Convention for the International Trade of Endangered Species on Wild Fauna and Flora
cm	centimetre
E	
EBA	Endemic Bird Area, identified by BirdLife International as being important for habitat-based bird conservation because it contains the habitats of restricted-range bird species
ESIA	environmental and social impact assessment
D	
DAI	direct impact area
F	
FR	forest reserve
G	
GR	game reserve
H	
ha	hectare
I	
IIA	indirect impact area
IBA	Important Bird Area, identified by BirdLife International as being of global importance for the conservation of bird populations, using an internationally agreed set of criteria
IFC	International Finance Corporation
IUCN	International Union for Conservation of Nature
K	
keystone species	one that has a disproportionate effect on its environment relative to its biomass and whose removal initiates significant changes in ecosystem structure and loss of biodiversity
km	kilometre
KP	kilometre point

M	
m	metre
MST	marine storage terminal
N	
NFR	Nature Forest Reserve
sclerophyll	a woody plant with evergreen leaves that are tough and thick in order to reduce water loss.
sp and spp.	abbreviation of species, singular and plural

A3 AVIFAUNA BIODIVERSITY BASELINE REPORT

A3.1 Introduction

This baseline report describes the avifauna biodiversity:

- area of influence (AOI) and study area boundaries
- methods
- baseline conditions:
  - main avifauna habitat features
  - trends affecting habitat condition and their sensitivity to change
  - avifauna species
  - trends affecting species and their sensitivity to change
  - ecosystem services provided
  - sensitivity rankings
- key considerations.

The report concludes with ranking the sensitivity of the sites and species and a summary of the key considerations arising from the baseline study.

A3.2 Area of Influence and Study Area Boundaries

A3.2.1 Area of Influence Boundary

The area of influence (AOI) for the avifauna study is a 2 km-corridor centred on the pipeline alignment as this encompasses the area that has the potential for direct impacts during construction and operation. This is extended at certain locations where possible pathways exist to sites designated specifically for avifauna (e.g., a watercourse crossing upstream of an Important Bird Area).

The temporal AOI for avifauna habitats of conservation importance is defined as the duration of the project construction phase extended by the time required for the habitat to recover to its pre-project potential (i.e., the habitat can support the species diversity and abundance, and ecological processes of the habitat in its pre-project condition). In the case of some new access roads and construction facilities that will be left in situ for third party use once the project is completed, the impacts associated with these will be considered as permanent. For AGIs (MST and other AGIs), the temporal AOI for avifauna species of conservation importance is the duration of operation where these have the potential to cause noise or visual disturbance.

The AOI of the coating facility (CF) was determined based on the impact area as either a direct impact area (DIA), which is the approximate 40 ha required for the site, and the indirect impact area (IIA). In terms of avifauna, the IIA is defined as up to 100 km from the CF site from KP600 to KP800.

A3.2.2 Study Area Boundary

The desk-based study area comprises a minimum 30 km-corridor centred on the pipeline alignment in order to provide regional context to the data acquired during the field surveys. This 30 km-corridor took into account the mobility and range of bird species, a broader region, which is a study area larger than the AOI to provide regional context.

The study area for the field surveys is the same as the AOI (i.e., a 2 km-corridor), as it provides data over a sufficient area to assess the potential effects of the project.

A3.3 Methods

A3.3.1 Secondary Data

The desktop study for the avifauna biodiversity baseline included a review of secondary data sources:

- IUCN Red List of Threatened Species
- National Policy for the Conservation and Management of Wetlands
- citation sheets and management plans for protected areas, where available
- environmental and social impact assessments (ESIAs) and other technical studies relevant to the AOI
- scientific and grey literature[1] referenced throughout.

The desk-based study focussed on identifying species that are known to occur in the AOI or are considered likely to occur in the AOI. The secondary data were used to define the baseline survey methodology and, in combination with satellite imagery, was also used to identify potential survey locations.

A3.3.2 Field Surveys

The proposed survey sites were agreed with in-country ornithologists familiar with the habitats affected by the project. Surveys were undertaken during June and July 2017 (wet season), and January and February 2018 (dry season); undertaking surveys during varying seasons enabled a robust dataset to be gathered to inform the impact assessment.

The wet season largely coincides with the passage and over-wintering of Palearctic migrants and the breeding season for many Afrotropical birds.

A drive through by project ecologists supplemented information gained from the secondary data (especially the Important Bird Areas book for Tanzania (Baker and Baker 2002) and Bird Atlas data); information returned from the drive through was used to further refine the field survey plan in terms of habitat to be targeted, allowing the field surveys to target specific sites in terms of defined habitats; these are detailed in Section A3.4.

[1] Grey literature refers to literature that is produced on all levels of government, academia, business and industry in print and electronic forms, but which is not controlled by commercial publishers

Google Earth was used to identify commutable tracks that crossed the proposed pipeline corridor that would allow access to the targeted survey locations Survey sites were prioritised according to habitats that presented the greatest likelihood of identifying species of conservation importance within the AOI. Survey results are presented below with species lists provided in Attachment A3.3. The map provided in Attachment A3.1 illustrates the AOI boundaries and survey locations.

Field surveys comprised point counts or total counts (at wetland sites) of avifauna species. Point counts are undertake using trained observers to record all avifauna species seen and heard from a point count station; this can include several stations along a transect within a given site. This was used to confirm the presence or likely presence of species. Total counts were undertaken at more open wetland sites where visibility allowed for detailed counts of species to be undertaken.

A3.3.3 Data Analysis

Information on endemism and conservation status was obtained from the International Union for Conservation of Nature (IUCN). No other data analysis was necessary for the avifauna scope of work.

A3.3.3.1 Sensitivity Ranking

The sensitivity of the avifauna biodiversity receptors has been ranked according to the tables in Appendix D.

A3.3.4 Data Considerations

Field survey data provide a snapshot in time and are unlikely to represent the full diversity of species supported at a site. Baseline assessments therefore include secondary data and data gathered during field surveys. Where there is uncertainty as to whether a particular habitat is supporting particular avifauna species then a precautionary approach has been taken, in keeping with the International Finance Corporation (IFC) Performance Standard 6 (PS6) and the accompanying Guidance Note.

The following data considerations are accounted for in this baseline:

- some species that inhabit dense vegetation and thickets may be undetected during the field survey and therefore these species may be under-recorded
- although wet and dry season field surveys were completed, the level of rainfall from year to year can affect the number and diversity of species that are present. The route passes through at least three rainfall zones and in 2017 the main rains failed south of Lake Victoria, adding to uncertainties of what species would be present
- within the AOI, there was less survey time spent where habitat suggested that birds of conservation importance would not be present; see Section A3.3.2.

A3.4 Habitats of Conservation Importance

The following sections of this report provide:

- an overview of the habitats of conservation importance to avifauna in the study area based on secondary data
- a description of the habitat at the surveyed sites.

Attachment A3.1 provides a map illustrating the locations of these sites and Important Bird Areas (IBAs) relevant to the AOI.

A3.4.1 Overview

The Tanzania Bird Atlas database holds nearly 1.2 million records (of which 360,000 are geo-referenced) but there are many knowledge gaps. With a bird list of 1154, Tanzania hosts more species than any other African country.

An IBA is an area identified as being globally important for the conservation of bird populations, determined by an internationally agreed set of criteria. These include globally threatened species, range-restricted species, biome-restricted species and congregatory species. As bird populations have been shown to be effective indicators of wider biodiversity, many IBAs are likely to also be KBAs for other animal and plant spices (BirdLife International 2018, Internet Site). From west to east, the pipeline corridor crosses four IBAs as recognised by BirdLife International:

- Minziro Nature Forest Reserve IBA
- Burigi-Biharamulo Game Reserve IBA
- the Wembere Steppe IBA
- Singida lakes IBA.

Table A3.4-1 provides additional information for these IBAs, including the reason for the designation.

None of these sites of conservation importance for birds fall into the coating facility (CF) immediate AOI. The habitat at the CF site and within the indirect impact area (IIA) (up to 100 km from the CF site – KP600 to KP800) was categorised as 'not of significant bird value'. This was primarily due to the disturbed natural habitat with farms, Terminalia Scrub (at KP725) and settlements leaving scattered vegetation patches.

Table A3.4-1 Important Bird Areas

IBA Code	Name	IBA Categories*			
		A1	**A2**	**A3**	**A4**
14	Burigi-Biharamulo GR	Shoebill (VU) Red-faced Barbet (NT)	Secondary Endemic Bird Area s057 – Dry Woodlands west of Lake Victoria. Red-faced Barbet (NT)	Lake Victoria – 27% of the country's species that are confined to this biome are present in this IBA. Another 3 species are expected.	N/A
34	Singida Lakes	Lesser Kestrel (LC) Lesser Flamingo (NT)	N/A	N/A	*i.* Great White Pelican Greater Flamingo Red-billed Teal Red-knobbed Coot Caspian Plover Black-tailed Godwit Gull-billed Tern *iii* >20,000 water birds recorded.
43	Wembere Steppe	Karamoja Apalis (VU)	Endemic Bird Area 108 – Serengeti plains. Fischer's Lovebird (NT) Karamoja Apalis (VU) Rufous-tailed Weaver (LC)	Somali-Masai – 26% of the country's species that are confined to this biome are present in this IBA. Another 15 species are likely.	*i.* Reed Cormorant African Darter Night Heron Squacco Heron Cattle Egret Little Egret Great White Egret Yellow-billed Stork Open-billed Stork Sacred Ibis African Spoonbill *iii. >20,000 water birds recorded.*

Table A3.4-1 Important Bird Areas

IBA Code	Name	IBA Categories*			
		A1	**A2**	**A3**	**A4**
75	Minziro Nature Forest Reserve	Blue Sparrow (VU) Papyrus Gonolek (NT)	N/A	Guinea-Congo Forests biome – 83% of the country's species that are confined to this biome are present in this IBA. The biome extends from Senegal to Tanzania, encompassing 278 species and 26 countries. Tanzania is on the outer fringes of this biome. Lake Victoria Basin biome – 27% of the country's species that are confimed to this biome are present in this IBA, including papyrus gonolek, northern brown-throated weaver and white-collared oliveback. The habitats are suitable for at least 4 more species, including papyrus yellow warbler.	N/A

NOTES: * IBAs and categories are outlined by Baker & Baker (2002), a short summary of which is below:

Category A1: Site regularly holds significant numbers of a globally threatened species.

Category A2: Site known or thought to hold a significant component of the group of species whose distributions define an Endemic Bird Area (EBA).

Category A3: Site known or thought to hold a significant component of the group of species whose distributions are largely or wholly confined within one biome.

Category A4: Site known or thought to hold more than 1% of a biogeographical population of a water bird species.

Site known or thought to hold more than 1% of the global population of a congregatory nonwater bird species.

Site known or thought to hold more than 20,000 water birds or 10,000 sea birds for one or more species.

Site known or thought to exceed thresholds set for migratory species at bottleneck sites.

A3.4.2 Minziro Nature Forest Reserve (Important Bird Area 75)

A3.4.2.1 Baseline Condition

The Minziro Nature Forest Reserve (NFR) qualifies as an IBA under criterion A3: biome restricted species. The site is known or thought to hold a significant component of groups of species whose distributions are largely or wholly confined to one biome (BirdLife International 2018d). The 'significant component' term in the criterion is intended to avoid selecting sites solely on the presence of one or more biome-restricted species that are common and adaptable and that therefore occur at other sites.

Minziro NFR (KP302–312) forest is contiguous with the Malabigambo Forest Reserve in Uganda and is similar in vegetation and structure to other Sango Bay forests north of the border. The majority of the reserve (total area 25,717 ha) can be broadly classified as *Baikiaea-Podocarpus* seasonal swamp forest (Davenport and Howard 1996). The remainder of the reserve is seasonally flooded grassland with pockets of predominantly *Acacia polycantha* woodland and papyrus on the river edge (Baker 2000). Bird species in the Minziro NFR are well documented in the Tanzanian Bird Atlas and has received regular surveys by the team producing the Atlas during 1984, 1987, 1993, 2000 and July 2016 (Baker and Hirslund 1987, Baker 2000).

Minziro NFR includes substantial grasslands within its boundary from approximately KP290 to KP313. These grasslands are under pressure from the establishment of informal sugar plantations along the western edge of the forest and from regular burning by pastoralists who informally graze their cattle within the reserve. Large parts of the Minziro NFR have been affected by logging and an extensive network of footpaths is used within the reserve by pedestrians, bicycles and motorcycles. The pipeline will pass west of the forest habitat but approximately 330 m of pipeline will pass within the boundary of the Minziro NFR. Invasive plants such as pines and *Lantana camara* are present in Minziro NFR but the full extent of these populations is not yet known (Tanzania Forest Services Agency 2016).

Minziro NFR is the only groundwater forest of this type in Tanzania and as such holds several bird species unknown south of the Kagera River (BirdLife International 2018c). The site is of considerable importance nationally, with at least 23 bird species not occurring elsewhere in Tanzania. A full list of species recorded during both surveys is included in Attachment A3.3.

The only globally threatened species recorded in the Minziro NFR was the blue swallow, *Hirundo atrocaerulea* (IUCN vulnerable), which winters in the grasslands around the northern and northwestern edge of Lake Victoria, including within Minziro NFR. Additional information on the blue swallow is provided in Section A3.5.1.1.

A3.4.2.2 Trend in Condition and Sensitivity to Change

The Minziro NFR Management Plan (Tanzania Forest Services Agency 2016) identifies that a lack of systematic management to date has led to the threats outlined above. Of the 25,717 ha of reserve area, it is estimated that there are 10

ha of forest 'gaps' resulting from illegal fires, grazing or timber cutting. The Management Plan states that these areas will be targeted for active forest restoration, while elsewhere within the reserve degraded areas will be encouraged to regenerate naturally with minimal intervention. The Management Plan outlines a range of measures intended to be undertaken to restore, conserve and enhance the biodiversity of the Minziro NFR for the period 2016/17 to 2020/21. Assuming the Management Plan is implemented as intended, the condition of the forest habitat in Minziro NFR is anticipated to improve.

There is a declining trend in the condition of wintering grassland habitat for the blue swallow found in the Minziro NFR and this is likely to continue without tighter controls on informal sugar cane farming and seasonal fires started by pastoralists with the objective to refresh grazing.

Although approximately 330 m of the pipeline passes through semi-natural habitat within the NFR that has been disturbed by human activity, this site has international recognition for its avifauna species, most notably the blue swallow. This species winters in the NFR and destruction of its nonbreeding habitats will continue to lead to a decline in its population. Minziro NFR is therefore considered to have a high sensitivity to change.

A3.4.3 Lake Ikimba

A3.4.3.1 Baseline Condition

Before the avifauna survey, only the northeast corner of Lake Ikimba (KP350) had been visited by the Tanzanian Bird Atlas team; project field surveys indicated lower abundance of bird species in the northeast of the lake than other areas.

On the north and northeast shoreline only a narrow fringe of papyrus is present due to the steeply rising topography from the lake. The shallower western and southern shores support larger areas of papyrus and swamp with a wide fringe of lilies (which is an indicator of good water quality). Although much of the shoreline has human habitation and is used for small scale agriculture, the semi-natural habitat fringing the lake and the few islands support a high diversity of birds.

The following bird species of conservation importance were identified during the field survey:

- shoebill, *Balaeniceps rex* (IUCN vulnerable); the condition of the habitat suggested that breeding could be supported. The species typically nests on a mound of floating vegetation, often among dense stands of papyrus.
- grey crowned cranes, *Balaerica regulorum* (IUCN endangered) were seen along the eastern shoreline; the condition of the habitat suggested that breeding could be supported. The preferred nesting habitat is tall emergent vegetation in or along the margins of wetlands.
- papyrus yellow warbler, *Calamonastides gracilirostris*, (IUCN vulnerable); restricted habitat with small range. The species is mainly found in papyrus swamps but occasionally in other marshy habitats, especially reeds. Very little has been documented about the ecology and reproductive biology of the species.

- hooded vulture, *Necrosyrtes monachus* (IUCN critically endangered); experiencing an extremely rapid decline across its range. The ecology of the hooded vulture is poorly understood in East Africa, but it is reliant on large trees alongside freshwater for nesting.

Additional information on these species is provided in Section A3.5.1. A full list of species encountered during both surveys is included in Attachment A3.3.

A3.4.3.2 Trend in Condition and Sensitivity to Change

Before the baseline field surveys there was little information addressing bird species, diversity and abundance of Lake Ikimba and hence there is a lack of information with which to characterise the trend in condition of the habitat. However, as Lake Ikimba is not legally protected, internationally or nationally recognised, there is a risk that urbanisation and agriculture may continue to develop around the lake edge, leading to a decline in habitat quality for the waterbirds supported.

As this area comprises semi-natural habitat that provides breeding habitat for IUCN critically endangered, endangered and vulnerable species, it is considered to have high sensitivity to change.

A3.4.4 Burigi-Biharamulo Game Reserve (Important Bird Area 14)

A3.4.4.1 Baseline Condition

The Burigi-Biharamulo Game Reserve (GR) (KP438–472) qualifies as an IBA under criterion A1 (globally threatened species), A2 (restricted-range species) and A3 (biome restricted species) (BirdLife International 2018e). The IBA is 350,000 ha, with the Burigi and Biharamulo GRs wholly contained within the IBA.

The GR comprises undulating hills forming the northern limit of Miombo woodland in Tanzania. Vegetation includes forest, thickets, woodland, bushland, grassland and swamps. There are also small patches of old-growth woodland on several of the ridges within the reserve. Access to game reserves is typically controlled and there is little existing information on the birdlife of this area. The species list included in Attachment A3.3 is therefore only a snapshot of the potential of this area.

Birdlife abundance was generally poor as is often the case in habitat dominated by Miombo woodland but the diversity is considered to be high, especially among the top bird predators. During the field surveys, twenty-one species of diurnal raptors were recorded including the steppe eagle, *Aquila nipalensis* (IUCN endangered, migratory and congregatory), the white-backed vulture, *Gyps Africanus* (IUCN critically endangered) and the crowned eagle, *Stephanoaetus coronatus* (IUCN near threatened). All the raptor species are considered as keystone species. Additional information on the steppe eagle and white-backed vulture, including habitat requirements, is provided in Section A3.5.1.

Burigi-Biharamulo GR is one of only two known sites in Tanzania where six species of owl were recorded (out of 15 species found in Tanzania), in old-growth (relict) sclerophyll woodland on one of the ridges within the reserve. While the owl species recorded are not globally threatened, the species diversity is indicative of high-quality habitat for these keystone species.

The habitat within Burigi-Biharamulo GR represents the northern limits in Tanzania of several species restricted to Miombo woodland including:

- Ruaha chat, *Myrmecocichla collaris* (IUCN not assessed)
- miombo rock thrush, *Monticola angolensis* (IUCN least concern)
- yellow-throated (white-browed) petronia, *Petronia superciliaris*, syn. *Gymnoris superciliaris* (IUCN least concern).

Following the Rwandan civil war, a large number of refugees established camps in and immediately surrounding the game reserve. Poaching for bushmeat and demand for fuel wood increased greatly and resulted in high levels of woodland degradation. Although the situation has improved considerably and most of the refugees have returned to Rwanda, the potential for further problems remains (BirdLife International 2018e). With only 67 rangers to cover the combined area of Burigi-Biharamulo GR and the adjacent Kimisi GR, protecting this habitat is extremely difficult. Informal logging and charcoal production activities are evident along the southern and southeastern areas of the reserve. Snares and traplines within the reserve also provide evidence of illegal bushmeat hunting.

A3.4.4.2 Trend in Condition and Sensitivity to Change

Burigi-Birahamulo GR is affected by encroachment which is anticipated to continue without additional ranger support. Illegal bushmeat hunting is anticipated to continue and could reduce prey availability for the high diversity of owl and raptor species inhabiting the reserve. Informal logging is also likely to continue and could affect the availability of mature trees that these species require for nesting.

Burigi-Biharamulo GR comprises natural habitat that supports high avifauna diversity, particularly owls and diurnal raptors. Some of these species are listed as IUCN critically endangered or IUCN endangered and many of them are keystone species. The old-growth woodland on ridges within the reserve is a highly threatened and unique ecosystem. The Burigi–Biharamulo GR has very high sensitivity to change.

A3.4.5 Wembere Steppe (Important Bird Area 43)

A3.4.5.1 Baseline Condition

The Wembere Steppe qualifies as an IBA under criterion A1 (globally threatened species), A2 (restricted-range species), A3 (biome restricted species) and A4 (congregations) (BirdLife International 2018f). The Wembere Steppe is 90 km long and 20 km wide, covering 160,000 ha; it is a vast swamp during and immediately following the wet season and is of importance to waterbirds. The majority of the Wembere Step is now in agricultural use which has transformed this area from natural wetland cover. The remaining natural and modified water courses have become even more important habitats for bird species in this IBA.

The proposed pipeline corridor crosses Wembere Steppe at KP829–841 and again at KP845–868. The pipeline corridor roughly parallels the main east-west road running across the northern edge of the Wembere floodplain.

The main swamp and Changana heronries of the Wembere Steppe are upstream of the pipeline corridor. Lake Kitangire (IBA 26) is about 25 km downstream of the pipeline corridor. The mixed heronry held an estimated 100,000 birds in 1962, which contributed to the area's recognition as an IBA (Stronach 1968).

The Wembere Steppe is also listed on Wetlands International Critical Site Network Tool with eight qualifying bird species:

- fulvous whistling duck (*Dendrocygna bicolour*) IUCN least concern: 3276 nonbreeding individuals (1% of the flyway)
- yellow-billed stork (*Mycteria ibis*) IUCN least concern: 2000 breeding pairs (2% of the flyway)
- African openbill (*Anastomas lamelligerus*) IUCN least concern: 2000 breeding pairs (0% of the flyway)
- African sacred ibis (*Threskiornis aethiopicus*) IUCN least concern: 2000 breeding pairs (0% of the flyway)
- cattle egret (*Bubulcus ibis*) IUCN least concern: 10,000 breeding pairs (0% of the flyway)
- little egret (*Egretta garzetta*) IUCN least concern: 1500 breeding pairs (0% of the flyway)
- long-tailed cormorant (*Microcarbo Africanus*) IUCN least concern: 10,000 breeding pairs (1% of the flyway)
- African darter (*Anhinga rufa*) IUCN least concern: 8000 breeding pairs (8% of the flyway).

Whistling thorn (*Acacia drepanolobium*) woodland exists throughout the Wembere Steppe and this is the favoured habitat of the Karamoja apalis, *Apalis karamojae* (IUCN vulnerable and endemic); a pair of Karamoja apalis was observed in whistling thorn woodland during both surveys. A study *of Karamoja apalis* in the Wembere Steppe estimated that 66% of all woody stems were whistling thorn (Shaw and Mungaya 2006). The study also suggests that the species feeds almost exclusively in whistling thorn, preferring the tallest, densest stands. Additional information on the *Karamoja apalis* is provided in Section A3.5.1.8.

In February 2018 a single grey-breasted spurfowl (syn. grey-breasted francolin, *Pternistis rufopictus*) (IUCN least concern and endemic to Tanzania), was observed in the hills adjacent to the Wembere Steppe. These birds may well use the steppe during the dry season.

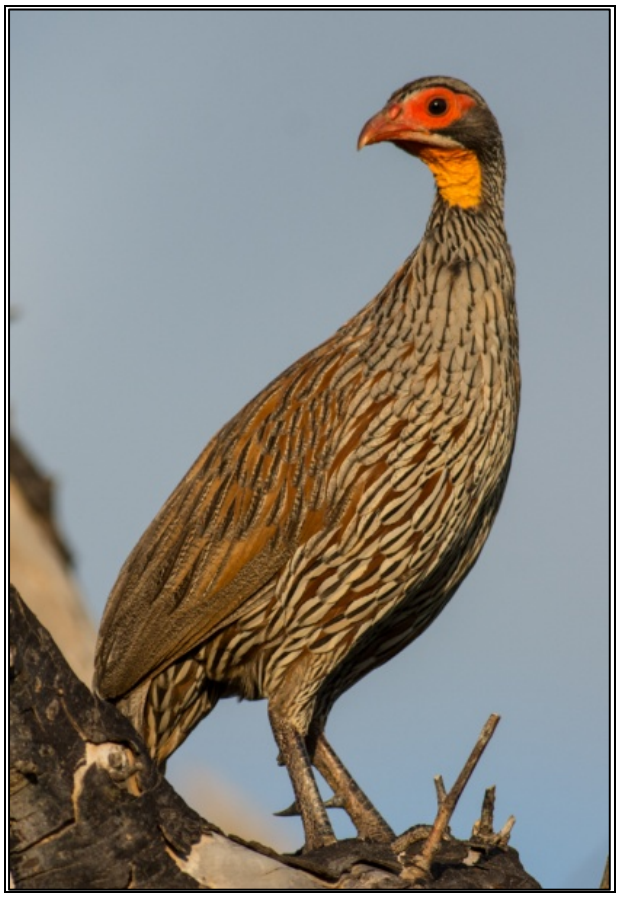


Figure A3.4-1 Grey-Breasted Spurfowl

There has been extensive habitat destruction and alteration such that there are now far fewer trees and increased incidence of erosion. However, during periods of heavy rain the area becomes inaccessible to local communities and livestock, and this is when the waterbirds breed. The whistling thorn woodland is threatened by overgrazing and repeated burning (BirdLife International 2018f).

Much of the Wembere Steppe habitat has been converted to rice paddies in recent decades.

A full list of species encountered during both surveys is included in Attachment A3.3.

A3.4.5.2 Trend in Condition and Sensitivity to Change

The current condition of this site is not anticipated to improve and could decline (further habitat loss to urbanisation) in the future, particularly as the area has no legal protection.

As the Wembere Steppe supports important feeding and breeding grounds for endemic as well as IUCN vulnerable species, it is considered to have high sensitivity to change.

A3.4.6 Singida Lakes (Important Bird Area 34)

A3.4.6.1 Baseline Condition

The Singida Lakes IBA qualifies under criterion A1 (globally threatened species) and criterion A4 (congregations) (BirdLife International 2018g). The first national waterbird census in Tanzania was in January 1995 (Baker 1997) when only lakes Sigidani and Kandai were surveyed. During the 1997–98 El Nino event, three large lakes were created to the north of Singida as well as a fourth smaller one. These new lakes are not included in the IBA boundary but are equally important for avifauna as the lakes included in the citation considering the species that are supported. The IBA is 1100 ha in size. The pipeline corridor (KP935 to KP940) passes between the lakes and crosses a major stream close to the central lake. The pipeline is 1.5 km from the closest of the lakes.

The Singida Lakes has been identified as a 'shadow' Ramsar site[2] of international importance under the Ramsar Convention. It is also listed on the Wetlands International Critical Site Network Tool with seven qualifying species:

- red-billed teal (*Anas erythrorhyncha*) IUCN least concern: 30,000 wintering individuals
- greater flamingo (*Phoenicopterus roseus*) IUCN least concern: 2000 wintering individuals
- lesser flamingo (*Phoeniconaias minor*) IUCN near threatened: 20,000 wintering individuals
- red-knobbed coot (*Fulica cristata*) IUCN least concern: 10,000 wintering individuals
- Caspian plover (*Charadrius asiaticus*) IUCN least concern: 2100 wintering individuals
- black-tailed godwit (*Limosa limosa*) IUCN near threatened: 7000 wintering individuals
- common gull-billed tern (*Gelochelidon nilotica*) IUCN least concern: 2000 individuals.

A flock of 12,000–20,000 greater flamingo, *Phoenicopterus roseus* (IUCN least concern, migratory and congregatory) was observed during surveys on Lake Sigidani on 10 January 2018. This represents about 50% of the East African population (Waterbird Population Estimates, 5th Edition 35,000). Only 1% of a population (350 birds) is required to justify shadow Ramsar status.

From irregular observations over the years, it is clear that there is constant movement of birds between these lakes.

There are counts[3] exceeding 1% levels for lesser flamingo (not included in the IBA citation), *Phoeniconiais minor* (IUCN near threatened, migratory and congregatory); 5% for southern pochard, *Netta erythrophthalma* (IUCN least concern, congregatory) and; 3% for chestnut-banded sandplover, *Charadrius pallidus* (IUCN

[2] Wetlands that would qualify as Ramsar sites but have not yet been designated as such are referred to as shadow Ramsar sites. Lists for shadow Ramsar sites in Africa have been prepared as part of BirdLife International's IBA assessment process.

[3] Counts refer to data acquired during previous survey efforts and compared to East African populations.

near threatened, congregatory). There are also nationally important populations of great crested grebe, *Podiceps cristatus* (IUCN least concern, migratory and congregatory) and black-necked grebe, *Podiceps nigricollils* (IUCN least concern, migratory and congregatory).

Lesser flamingo breeds mainly in the Rift Valley lakes of East Africa.

There is considerable community development occurring around the Singida Lakes and this reaches the high-water shoreline of the lakes in places. Trapping of large waterbirds (including greater flamingo and lesser flamingo) for international trade is a problem (BirdLife International 2018g). Both species of flamingo are listed in Appendix II of the Convention for the International Trade of Endangered Species on Wild Fauna and Flora (CITES), indicating that these species are not necessarily threatened with extinction, but their trade must be controlled in order to avoid over-exploitation.

Figure A3.4-2 Greater Flamingo, Singida Lakes

A3.4.6.2 Trend in Condition and Sensitivity to Change

The community development contributing to degradation of habitat in this area is anticipated to continue. Global populations of lesser flamingo are in decline, due to habitat degradation and disturbance (BirdLife International 2016a). It is not possible to predict the trend in condition with any certainty.

The Singida Lakes IBA comprises natural habitat that provides important feeding and breeding habitat for a range of avifauna species. It is listed as a shadow Ramsar site and supports large numbers of migratory and congregatory species. As Singida Lakes qualifies as an IBA under Criterion A4 (congregations), it has high sensitivity to change.

A3.4.7 Swaga Swaga Game Reserve

A3.4.7.1 Baseline Condition

The Swaga Swaga Game Reserve (GR) mostly comprises thicket and scattered scrub, with some acacia and open woodland; there is virtually no secondary data on the birdlife of this reserve. The pipeline corridor borders the northern boundary of Swaga Swaga GR.

The species list from the two surveys is included in Attachment A3.3. The remnant Miombo woodland north of the pipeline route is the northernmost location for racquet-tailed roller, *Coracias spatulatus* (IUCN least concern) in eastern Tanzania. The woodland in the reserve and well south of the pipeline route supports Ruaha hornbill, *Tockus ruahae* (IUCN not assessed) and ashy starling, *Lamprotornis unicolor* (IUCN least concern), two Tanzania endemics that are quite widespread.

The Swaga Swaga GR provides intact (natural) habitat that is considered useful to birds in terms of breeding, feeding and resting despite encroaching agriculture to the north and east.

A3.4.7.2 Trend in Condition and Sensitivity to Change

Little was known of this site before the surveys and there is insufficient information available to comment on its trend in condition.

Swaga Swaga GR comprises natural habitat and has high sensitivity to change.

A3.4.8 The Masai Steppe

A3.4.8.1 Baseline Condition

The Masai Steppe forms the southern range limits for many birds associated with the dry eastern Kenya-Somali biome. In general terms, the birdlife of this area is quite well known although there are many localised knowledge gaps. Species ranging from orange-bellied parrot, *Poicephalus rufiventris* (IUCN least concern), Pringle's puffback, *Dryoscopus pringlii* (IUCN least concern) and parrot-billed sparrow, *Passer gongonensis* (IUCN least concern) are found at their southern limits near to the pipeline corridor. Other species of conservation importance noted during field surveys include the martial eagle, *Polemaetus bellicosus* (IUCN vulnerable) and Levant sparrowhawk, *Accipiter brevipes* (IUCN least concern, migratory and congregatory). Additional information on the martial eagle, including its habitat requirements, is provided in Section A3.5.1.9.

The pipeline crosses through the Acacia-Commiphora woodlands of the southern Masai Steppe, however for the most part it cuts through habitat already much disturbed and degraded by agriculture.

Figure A3.4-3 Martial Eagle, Masai Steppe (left) and Levant Sparrowhawk, Masai Steppe (right)

A3.4.8.2 Trend in Condition and Sensitivity to Change

Habitat loss, fragmentation and reduction in habitat quality as a consequence of agricultural activity is likely to continue given the area has no legal protection.

The pipeline corridor within the Masai Steppe is considered to have moderate sensitivity to change as the habitats have been modified by human activity.

A3.5 Avifauna Species of Conservation Importance

Based on secondary data and the results from the field surveys, species of conservation importance within the AOI are presented below.

A3.5.1 Globally Threatened Species

Species of conservation importance are defined as those that are listed as vulnerable, endangered or critically endangered on the IUCN Red List; those that are migratory or congregatory; and those that are range-restricted or endemic. Keystone species are also considered to be of conservation importance.

IUCN threat categories are defined as follows:

- critically endangered – a species is critically endangered when the best available evidence indicates that it is facing an extremely high risk of extinction in the wild. Critically endangered species are considered to have a very high sensitivity to change.
- endangered – a species is endangered when the best available evidence indicates that it is considered to be facing a very high risk of extinction in the wild. Endangered species are considered to have a very high sensitivity to change.
- vulnerable – a species is vulnerable when the best available evidence indicates that it is considered to be facing a high risk of extinction in the wild. Vulnerable species are considered to have a high sensitivity to change.

- near threatened – a species is near threatened when it has been evaluated against the criteria and does not qualify for critically endangered, endangered or vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future. Near threatened species are considered to have a low sensitivity to change.
- least concern – a species is least concern when it has been evaluated against the criteria and does not qualify for critically endangered, endangered, vulnerable or near threatened. Widespread and abundant taxa are included in this category. Least concern species are considered to have a low sensitivity to change.

Listing in the categories of not evaluated and data deficient indicates that no assessment of extinction risk has been made, though for different reasons. Until such time as an assessment is made, taxa listed in these categories should not be treated as if they were nonthreatened (IUCN 2012).

A3.5.1.1 Blue Swallow

Baseline Condition

The blue swallow is an intra-African migratory species breeding in high rainfall, montane habitat in southern Africa (including south-western Tanzania) during the rainy season and migrating to open grassland with bushes and trees in east and central Africa during the nonbreeding season (typically May to October).

Blue swallows are highly territorial, monogamous and feed on the wing catching small insects. The species is threatened by destruction and degradation of its grassland and wetland habitats on both its breeding and nonbreeding grounds caused by:

- increasing incidence and intensity of human settlements
- conversion of grasslands to monoculture such as sugar-cane plantations
- afforestation of grassland
- alien invasive species altering the plant mix
- seasonal burning by pastoralists in an effort to regenerate grazing

The pipeline corridor crosses through blue swallow wintering grassland habitat west of the forest habitat within the Minziro NFR IBA.

Trend in Condition and Sensitivity to Change

Loss of natural habitat has led to a rapid reduction in blue swallow populations, which is projected to continue unless conservation action is taken across its breeding and nonbreeding range.

The species is IUCN vulnerable and hence has high sensitivity to change.

A3.5.1.2 Shoebill

Baseline Condition

The shoebill was recorded during surveys at Lake Ikimba. While the species has a large range, it is only found in small-localised populations concentrated around swamps and wetlands. A very solitary bird, even within a pair, male and female will

often feed at opposite ends of their territory. Shoebills both breed and forage in seasonally flooded marshes, dominated by a mixture of papyrus, reeds and grasses – though they may utilise separate habitats for foraging and breeding.

The shoebill usually forages in shallow water where it makes use of clear channels created by the movement of large animals. It is reported to prefer water that is poorly oxygenated, thus forcing fish closer to the surface and as such more easily caught. The shoebill has a variable diet of fish, amphibians, water snakes and young crocodiles.

Shoebill nests are grassy constructions, up to 3 m wide on a mound of floating vegetation or a small island, often among dense stands of papyrus. Shoebills are monogamous, with a maximum clutch size of three but in most occasions only one chick reaches fledging.

Main threats to the population of shoebills include:

- habitat loss and destruction for conversion to cultivation and pasture, and there are incidents of cattle trampling nest sites
- destruction of nest and breeding areas by fire
- hunting for food, trade (local and international) and cultural reasons

Trend in Condition and Sensitivity to Change

Shoebill populations are declining in Tanzania, Zambia and Rwanda, and possibly also Uganda (BirdLife International 2016c). This trend is expected to continue.

The shoebill is IUCN vulnerable and hence has high sensitivity to change.

A3.5.1.3 Grey Crowned Cranes

Baseline Condition

Grey crowned cranes (IUCN endangered) were recorded during field surveys at Lake Ikimba. The species inhabits wetlands such as marshes, pans and dams with tall emergent vegetation, riverbanks, open riverine woodland, shallowly flooded plains and temporary pools with adjacent grasslands, open savannas, croplands, pastures, fallow fields and irrigated areas. The nest is a circular platform of uprooted grasses and sedges concealed in tall emergent vegetation in or along the margins of wetlands. The species nests in solitary pairs, but often flocks together and roosts communally at night in groups of 20–200 individuals during dry periods.

The grey crowned crane has a varied diet consisting of seed heads, new tips of grasses, pulses, nuts and grains, insects, frogs, lizards and crabs.

Main threats to the grey crowned crane include:

- loss and degradation of wetland breeding areas through drought-related changes in land use, drainage and overgrazing
- illegal captive trade relating to the pet trade, captive facilities and informal zoos
- hunting and egg capture
- disturbance via proximity to people due to human population pressures.

Trend in Condition and Sensitivity to Change

BirdLife International estimated a population decline of 50% over a period of 19 years (1985–2004) (BirdLife International 2016b). This trend is expected to continue.

Grey crowned cranes are IUCN endangered and hence have very high sensitivity to change.

A3.5.1.4 Papyrus Yellow Warbler

Baseline Condition

The papyrus yellow warbler is IUCN vulnerable and was recorded at Lake Ikimba. It is mainly found in papyrus-swamps but occasionally in other marshy habitats, especially reeds. Very little has been documented about the ecology and reproductive biology of the species but observations (both during project surveys and more generally) have been of single birds, or pairs, foraging for tiny insects among papyrus (Birdlife International 2017c). BirdLife International estimate the population decline over three generations would fall in the range of 30–49%.

Main threats to the species are:

- drainage of wetland sites to provide land for agriculture
- alien invasive species, such as the water hyacinth has caused the collapse of Lake Victoria fisheries, forcing people to seek other sources of income including the exploitation of papyrus for fuel and other uses
- papyrus swamps are burnt by hunters in order to drive game out.

Trend in Condition and Sensitivity to Change

The papyrus yellow warbler is believed to have undergone, and continues to undergo, rapid population decline as a result of extensive habitat loss (BirdLife International 2017c).

The papyrus yellow warbler is IUCN vulnerable and hence has high sensitivity to change.

A3.5.1.5 Hooded Vulture

Baseline Condition

The hooded vulture is largely restricted to the major protected areas. There is an urban population in the northwest of Tanzania, with more than 40 birds reportedly roosting in Bunazi. It was recorded during field surveys at Lake Ikimba and Burigi-Biharamulo GR.

The hooded vulture is often associated with human settlements north of the equator, but is also widespread in sub-Saharan Africa, found in open grassland, forest edge, wooded savanna, desert and along coasts and tends to occur at higher densities in areas where populations of larger vultures are low or non-existent. It feeds mainly on carrion, but also takes insects. Breeding occurs between May-June, with nests occurring in trees with a clutch of one egg. Data and observations suggest that the species is undergoing a very rapid decline in its global population

with an estimated 83% decline (range 64–93%) over three generations (BirdLife International 2017d).

Main threats to the species include:

- conversion of habitat to agro-pastoralism, loss of nesting sites and reduced abundance of available food (primarily ungulate kills)
- poisoning, either intentionally by poachers (as vultures signal a kill) or unintentionally if the vultures ingest an anti-inflammatory drug administered to cattle or ingest agricultural pesticides
- hunting for bush-meat and body parts for traditional medicine
- a single egg per year in a single breeding season with shared nesting means that the loss of one of the parents will often result in the loss of the offspring.

Trend in Condition and Sensitivity to Change

The hooded vulture has experienced rapid population decline and this is anticipated to continue as the main threats to the species continue.

The hooded vulture is IUCN critically endangered and hence has very high sensitivity to change.

A3.5.1.6 Steppe Eagle

Baseline Condition

The steppe eagle was recorded during field surveys at the Burigi-Biharamulo GR.

The species inhabits areas of steppe and semi-desert. When wintering in East Africa, it feeds primarily on mole rats. Migrants leave their breeding grounds between August and October, returning between January and May.

The steppe eagle is subject to habitat destruction (especially conversion of steppe habitat to agriculture), deliberate persecution and collision with power lines (BirdLife International 2017a).

Trend in Condition and Sensitivity to Change

Combined population totals from across the steppe eagle's range suggest a decline of 58.6% between 1997–2011 and 2013–2015 (BirdLife International 2017a). This trend is anticipated to continue.

The steppe eagle is IUCN endangered and hence has very high sensitivity to change.

A3.5.1.7 White-backed Vulture

Baseline Condition

A group of about 60 white-backed vultures was recorded during field surveys in the Burigi-Biharamulo GR. White-backed vultures nest in tall trees and prefer open, wooded savannah; nests are a platform of dry sticks lined with grass and leaves. White-backed vultures lay a single egg per year and both male and female tend the egg and the hatchling. Young fledge at about 6 months. White-backed vultures are

typically monogamous and are known to nest in colonies of up to 10 breeding pairs with nests spaced between 50 and 200 m. Breeding occurs during the dry season.

White-backed vultures are typical scavengers and opportunists feeding on the prey left by other animals; they are not migratory but have extensive ranges.

Main threats to the population of the white-backed vulture include:

- conversion of habitat to agro-pastoralism, loss of nesting sites and reduced abundance of available food primarily ungulate kills
- poisoning, either intentionally by poachers (as vultures signal a kill) or unintentionally if the vultures ingest an anti-inflammatory drug administered to cattle or ingest agricultural pesticides
- hunting for bush-meat and body parts for traditional medicine
- a single egg per year in a single breeding season with shared nesting means that the loss of one of the parents will often result in the loss of the offspring.

Trend in Condition and Sensitivity to Change

Data on this species' population suggests the species has declined very rapidly, with a median estimated decline of 90% (BirdLife International 2017e); this trend is likely to continue in Tanzania and other countries in west, east and southern Africa.

The white-backed vulture is IUCN critically endangered and hence has very high sensitivity to change.

A3.5.1.8 Karamoja Apalis

Baseline Condition

In Tanzania, the Karamoja apalis is encountered almost exclusively in whistling thorn woodland. This is a highly habitat-specific species and the rate of habitat loss at its two main sites in Tanzania – the Serengeti and Wembere Steppe – is high. Suitable habitat occurs in riverine areas, along seasonal watercourses and in seasonally inundated land. Although feeding and breeding ecology is largely unknown, it has been seen to forage in small family parties, mainly for invertebrates.

Main threats to the species are:

- habitat loss linked to expanding human population, especially in Tanzania and because much of its restricted range lies outside protected areas
- whistling thorn woodland being cleared in the Wembere Steppe region for cultivation, cut and pruned for firewood and hedging material, browsed by goats and trampled by cattle.

Trend in Condition and Sensitivity to Change

The population increased substantially in the Serengeti ecosystem during the 1990s and 2000s, but anecdotal evidence suggests that the species may now also be declining in the Serengeti. The species appears to have declined at its other main Tanzanian site, the Wembere Steppe, due to clearance and degradation of its habitat. Pressures in the Wembere Steppe are expected to intensify in future as

human and livestock populations increase, Thus a rapid future decline is precautionarily predicted (BirdLife International 2017f).

The Karamoja apalis is IUCN vulnerable and hence has high sensitivity to change.

A3.5.1.9 Martial Eagle

Baseline Condition

The martial eagle was recorded during field surveys in the Masai Steppe.

A species endemic to Africa, it occurs widely south of the Sahel in a range of habitats, found mostly in open woodland and wooded savannah, bushy grassland, thornbush and more open country. Depending on their habitat, breeding martial eagles maintain territories ranging from 125 km^2 to 300 km^2, but a territory of up to 990 km^2 has been recorded in Zimbabwe (Ferguson-lees and Christie 2001). It is believed that juveniles will remain nomadic until a territory is established. Inter nesting distances ranges from 11 km to 35 km depending on the habitat (Ferguson-lees and Christie 2001).

Martial eagle nests are made of sturdy sticks and can be 2 m across and 2 m deep as they get older with a 40–50 cm central depression line with leaves (Ferguson-Lees and Christie 2001). Nests are usually on large enough trees, but have been seen on electrical pylons. Breeding tends to be annual or biennial but is known to be erratic and influenced by factors such as prey availability. A single egg is laid, with the breeding season differing due to locality. Its main prey comprises sizeable mammals – normally less than 5 kg but they have been known to take animals up to the size of a common duiker – birds and reptiles (Ferguson-lees and Christie 2001). Prey species will differ between location and habitat depending on natural occurrence, availability and abundance of different species.

Trend in Condition and Sensitivity to Change

The species has undergone rapid decline during the past three generations due to deliberate and incidental poisoning, habitat loss, reduction in prey, pollution and collision with power lines (BirdLife International 2017b). This trend is anticipated to continue.

The martial eagle is IUCN vulnerable and hence has high sensitivity to change.

A3.5.2 Tanzanian Endemics and Restricted-Range Species

There are 41 accepted endemic birds in Tanzania with at least one near-endemic. Of these, the following occupy habitat along the proposed pipeline route. All are widespread and tolerant of low-level human disturbance.

A3.5.2.1 Grey-breasted Spurfowl

A single grey-breasted spurfowl (IUCN least concern) was observed on both surveys however the species map (Figure Att3.2-1 in Attachment A3.2) illustrates that the pipeline route is well south of the core population.

A3.5.2.2 Ruaha Hornbill

The Ruaha hornbill is a locally common bird throughout its range apart from the "hornbill gap" to the west of Maswa GR (which borders the Serengeti). As shown on the species map (Figure Att3.2-2 in Attachment A3.2) the pipeline route passes through the centre of the range.

A3.5.2.3 Fischer's Lovebird

Fischer's lovebird, *Agapornis fischeri* (IUCN near threatened) is a widespread endemic west of the Rift Valley, especially near Borassus palms. As shown on the species map (Figure Att3.2-3 in Attachment 3.2) the pipeline route passes through the southern extent of the range.

A3.5.2.4 Yellow-Collared Lovebird

Yellow-collared lovebird, *Agapornis personatus* (IUCN least concern) is a widespread endemic east of the Rift Valley especially where mature Baobab trees grow. As shown on the species map (Figure Att3.2-4 in Attachment A3.2) the pipeline route passes through the centre of the range.

A3.5.2.5 Ashy Starling

Ashy Starling (IUCN least concern) is a widespread endemic recorded across the Rift Valley. As shown on the species map (Figure Att3.2-5 in Attachment A3.2) the pipeline route passes through the centre of the range.

A3.5.2.6 Rufous-Tailed Weaver

From the distribution map (Figure Att3.2-6 in Attachment A3.2) it is clear that the pipeline route only just enters the range of the rufous-tailed weaver, *Histurgops ruficauda* (IUCN least concern).

A3.5.2.7 Karamoja Apalis

The Karamoja apalis is classified as IUCN vulnerable due to habitat degradation. Its favoured habitat, whistling thorn woodland, still exists in Wembere Steppe. As shown on the species map (Figure Att3.2-7 in Attachment A3.2) the pipeline route passes through the southern end of the range.

A3.5.2.8 Orange-Bellied Parrot

Orange-bellied parrot (IUCN least concern) is included as an example of a restricted-range species in Tanzania that prefers arid landscape; recorded within the Masai Steppe. As shown on the species map (Figure Att3.2-8 in Attachment A3.2) the pipeline route passes through the southern extent of its range.

A3.6 Ecosystem Services Provided

The habitats described in this report, with the avifauna species they support, generate a range of ecosystem services as set out below.

Provisioning services:

- food (bushmeat hunting and egg gathering).

Regulating services:

- as noted in this report, many of the bird species (raptors, vultures and owls) within the AOI are keystone species that provide pest control and other regulating services.

Cultural services:

- eco-tourism, particularly in protected areas
- use of feathers, bones and other body parts in ceremonial rituals.

Habitat and species support:

- the habitats described in this report provide important refuge, feeding, watering, breeding and nursery areas for a range of bird species.

Supporting services:

- pollination and seed dispersal.

A3.7 Sensitivity Rankings

Based on the survey results, the trend in condition and sensitivity to change, the sensitivity of the receptors has been ranked and is shown in Table A3.7-1.

Table A3.7-1 Avifauna Receptors and Sensitivity Ranking

Avifauna Receptor	Sensitivity Ranking	Rationale for Ranking
Minziro Forest Nature Reserve (IBA 75)		
Legally protected, internationally or nationally recognised areas	High (4)	Internationally recognised Important Bird Area
Flora and fauna species of conservation importance	High (4)	Supports IUCN vulnerable species: • blue swallow
Habitats of conservation importance (terrestrial and aquatic)	High (4)	Habitats providing important wintering/feeding grounds for several bird species, including the IUCN vulnerable blue swallow
Lake Ikimba		
Flora and fauna species of conservation importance	Very high (5)	Supports IUCN critically endangered, endangered and vulnerable species: • hooded vulture (IUCN critically endangered) • grey crowned crane (IUCN endangered) • shoebill (IUCN vulnerable) • papyrus yellow warbler (IUCN vulnerable)

Table A3.7-1 Avifauna Receptors and Sensitivity Ranking

Avifauna Receptor	Sensitivity Ranking	Rationale for Ranking
Habitats of conservation importance (terrestrial and aquatic)	High (4)	Semi-natural habitat that provides important feeding and breeding grounds for several species of conservation importance, see above
Burigi-Biharamulo Game Reserve (IBA 14)		
Legally protected, internationally or nationally recognised areas	High (4)	Internationally recognised Important Bird Area
Flora and fauna species of conservation importance	Very high (5)	Supports IUCN critically endangered and endangered species: • white-backed vulture (IUCN critically endangered) • steppe eagle (IUCN endangered) Supports 21 species of diurnal raptor and 6 species of owl, all of which are considered keystone species.
Habitats of conservation importance (terrestrial and aquatic)	High (4) to very high (5)	Natural habitat supporting a high diversity of avifauna, including keystone species, critically endangered and endangered species The old-growth woodland on ridges within the reserve is a highly threatened and unique ecosystem
Wembere Steppe (IBA 43)		
Legally protected, internationally or nationally recognised areas	High (4)	Internationally recognised Important Bird Area
Flora and fauna species of conservation importance	High (4)	Designated an IBA in accordance with Criterion A4 (congregations) Supports several endemic and/or range-restricted species Supports IUCN vulnerable species: • Karamoja apalis
Habitats of conservation importance (terrestrial and aquatic)	High (4)	Modified habitat providing important feeding grounds for endemic and IUCN vulnerable species

Table A3.7-1 Avifauna Receptors and Sensitivity Ranking

Avifauna Receptor	Sensitivity Ranking	Rationale for Ranking
Singida lakes (IBA 34)		
Legally protected, internationally or nationally recognised areas	High (4)	Internationally recognised Important Bird Area
Flora and fauna species of conservation importance	High (4)	Designated an IBA in accordance with Criterion A4 (congregations)
Habitats of conservation importance (terrestrial and aquatic)	High (4)	Natural habitat that provides important feeding and breeding habitat for a range of migratory and congregatory bird species
Swaga Swaga Game Reserve		
Flora and fauna species of conservation importance	High (4)	Supports endemic and/or range-restricted species: • Ruaha hornbill • ashy starling
Habitats of conservation importance (terrestrial and aquatic)	High (4)	Natural habitat that provides important feeding and breeding habitat for several endemic and/or range-restricted species
Masai Steppe		
Flora and fauna species of conservation importance	High (4)	Supports IUCN vulnerable species: • martial eagle Supports endemic and/or range-restricted species: • orange-bellied parrot
Habitats of conservation importance (terrestrial and aquatic)	Moderate (3)	Modified habitat disturbed by human activity
Avifauna Species		
Flora and fauna species of conservation importance	Very high (5)	IUCN endangered and critically endangered species: • hooded vulture (critically endangered) • white-backed vulture (critically endangered) • grey crowned crane (endangered) • steppe eagle (endangered) IUCN vulnerable species: • shoebill • blue swallow • martial eagle Endemic and/or range-restricted species: • Karamoja apalis • grey-breasted spurfowl

Table A3.7-1 Avifauna Receptors and Sensitivity Ranking

Avifauna Receptor	Sensitivity Ranking	Rationale for Ranking
		• Ruaha hornbill • Fischer's lovebird • yellow-collared lovebird • ashy starling • rufous-tailed weaver • orange-bellied parrot Migratory and congregatory species: • lesser flamingo

A3.8 Key Considerations

A3.8.1.1 Habitats

Based on the outcomes of the avifauna biodiversity study, and particularly the known or likely presence of species of conservation importance, the following areas are identified as sensitive receptors:

- Minziro Forest Nature Reserve (IBA 75)
- Lake Ikimba
- Burigi-Biharamulo Game Reserve (IBA 14)
- Wembere Steppe (IBA 43)
- Singida lakes (IBA 34)
- Swaga Swaga Game Reserve
- the Masai Steppe.

A3.8.1.2 Avifauna

Several avifauna species of conservation importance were recorded during the field surveys that are key considerations for the impact assessment. These species are important because they are listed as IUCN critically endangered, endangered or vulnerable; some are migratory and congregatory; and some are endemic to Tanzania or range-restricted.

The key considerations for the impact assessment on avifauna species will be:

- loss of habitat
- disturbance to nesting and foraging, both of which occur throughout the year.

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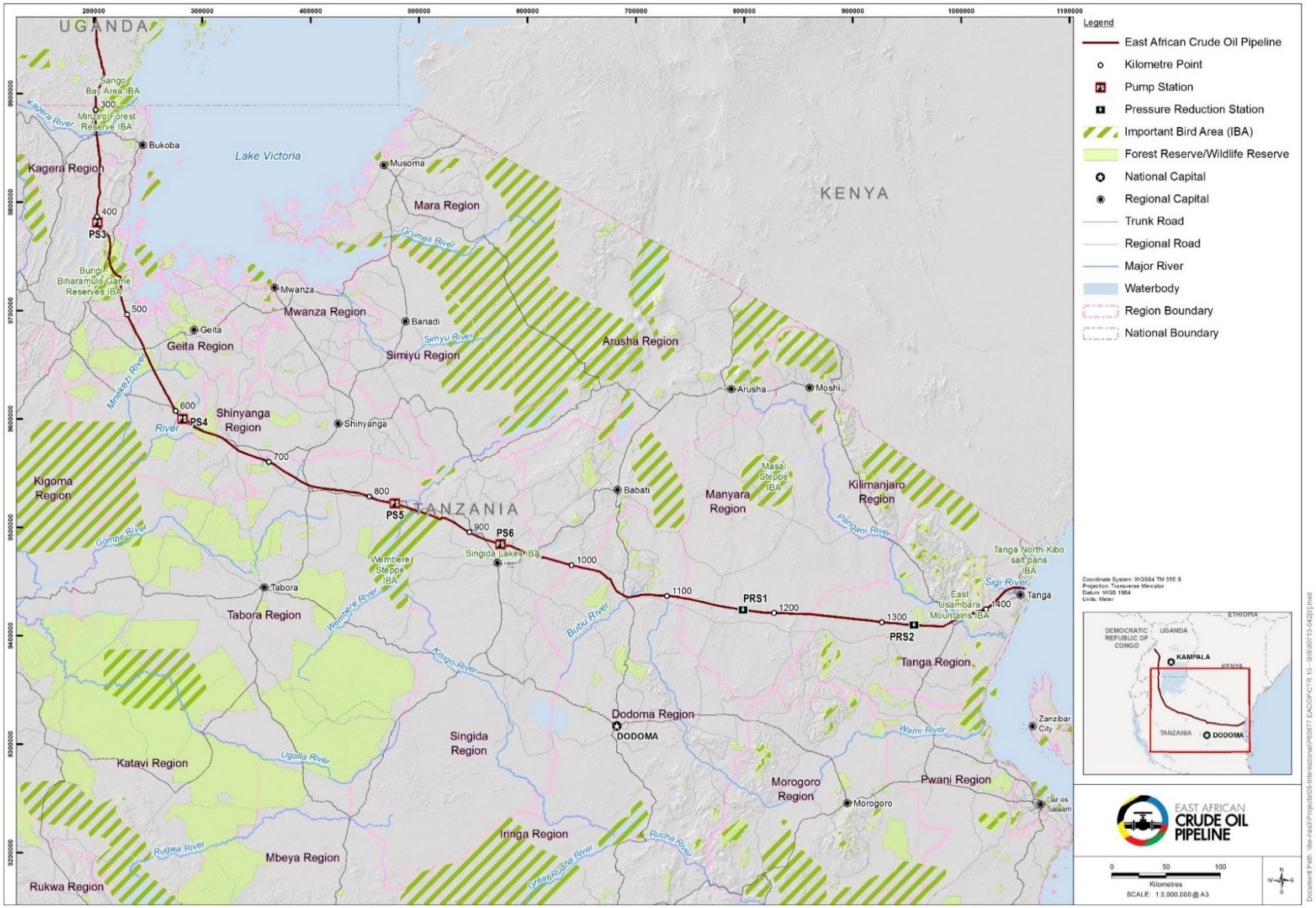
ATTACHMENT A3.1 SURVEY SITES AND IMPORTANT BIRD AREAS


UGANDA
KENYA
TANZANIA
Lake Victoria
Legend
East African Crude Oil Pipeline
Kilometre Point
Pump Station
Pressure Reduction Station
Important Bird Area (IBA)
Forest Reserve/Wildlife Reserve
National Capital
Regional Capital
Trunk Road
Regional Road
Major River
Waterbody
Region Boundary
National Boundary
Sango Bay Area IBA
Minziro Forest Reserve IBA
Bukoba
Kagera Region
Musoma
Mara Region
Burigi Biharamulo Game Reserves IBA
Mwanza
Mwanza Region
Bariadi
Simiyu Region
Geita
Geita Region
Arusha Region
Arusha
Moshi
Shinyanga Region
Shinyanga
Kigoma Region
Babati
Manyara Region
Masai Steppe IBA
Kilimanjaro Region
Wembere Steppe IBA
Singida Lakes I IBA
Tanga North-Kibo salt pans IBA
Tabora
Tabora Region
East Usambara Mountains IBA
Tanga
Tanga Region
Dodoma Region
DODOMA
Singida Region
Zanzibar City
Katavi Region
Morogoro Region
Morogoro
Pwani Region
Dar es Salaam
Iringa Region
Mbeya Region
Rukwa Region
PS1
PS2
PS3
PS4
PS5
PS6
PRS1
PRS2
EAST AFRICAN CRUDE OIL PIPELINE
Kilometres
SCALE: 1:3,000,000 @ A3

ATTACHMENT A3.2 DISTRIBUTION MAPS FOR ENDEMIC AND RANGE-RESTRICTED SPECIES

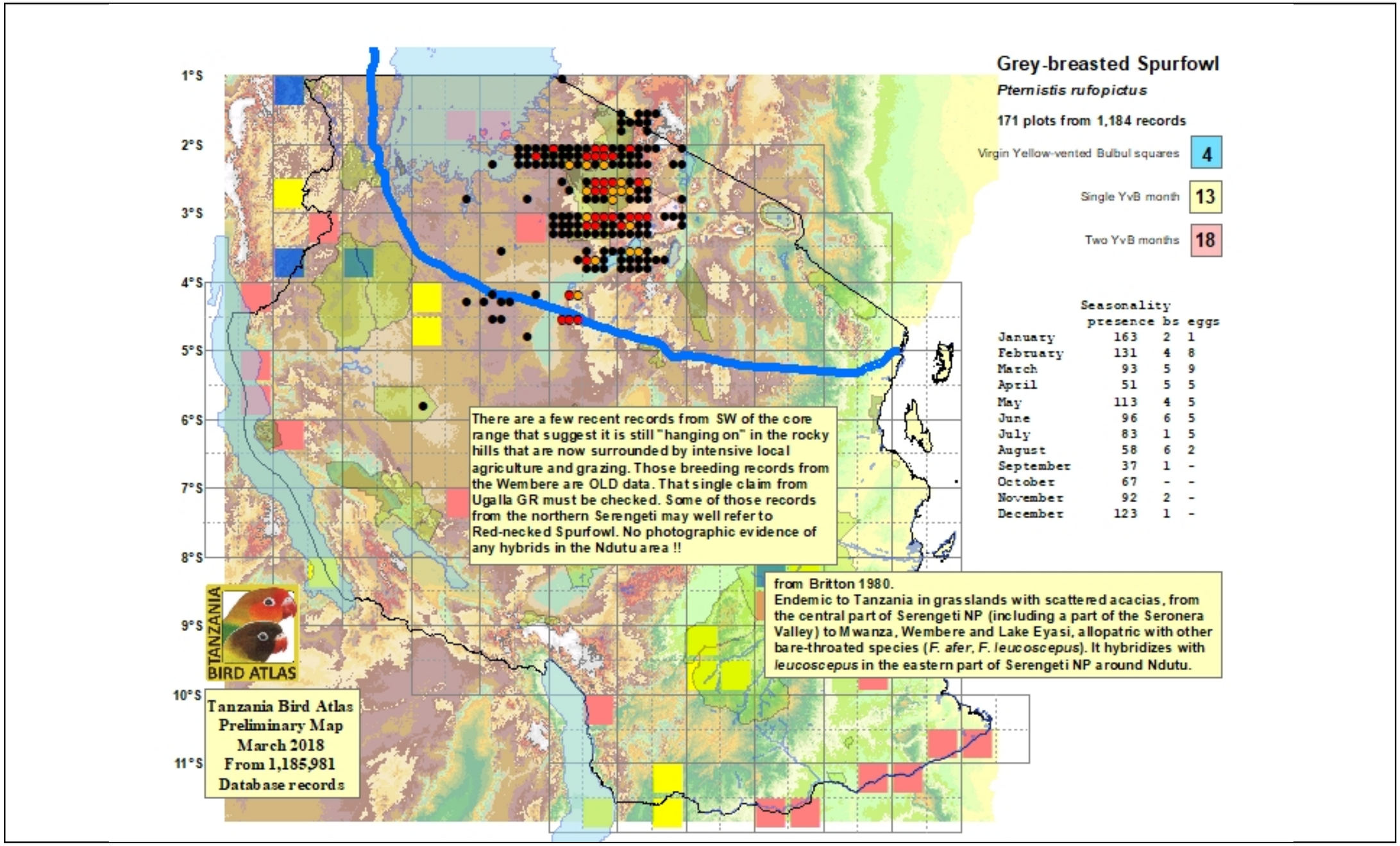


Figure Att3.2-1 Grey-breasted Spurfowl Distribution

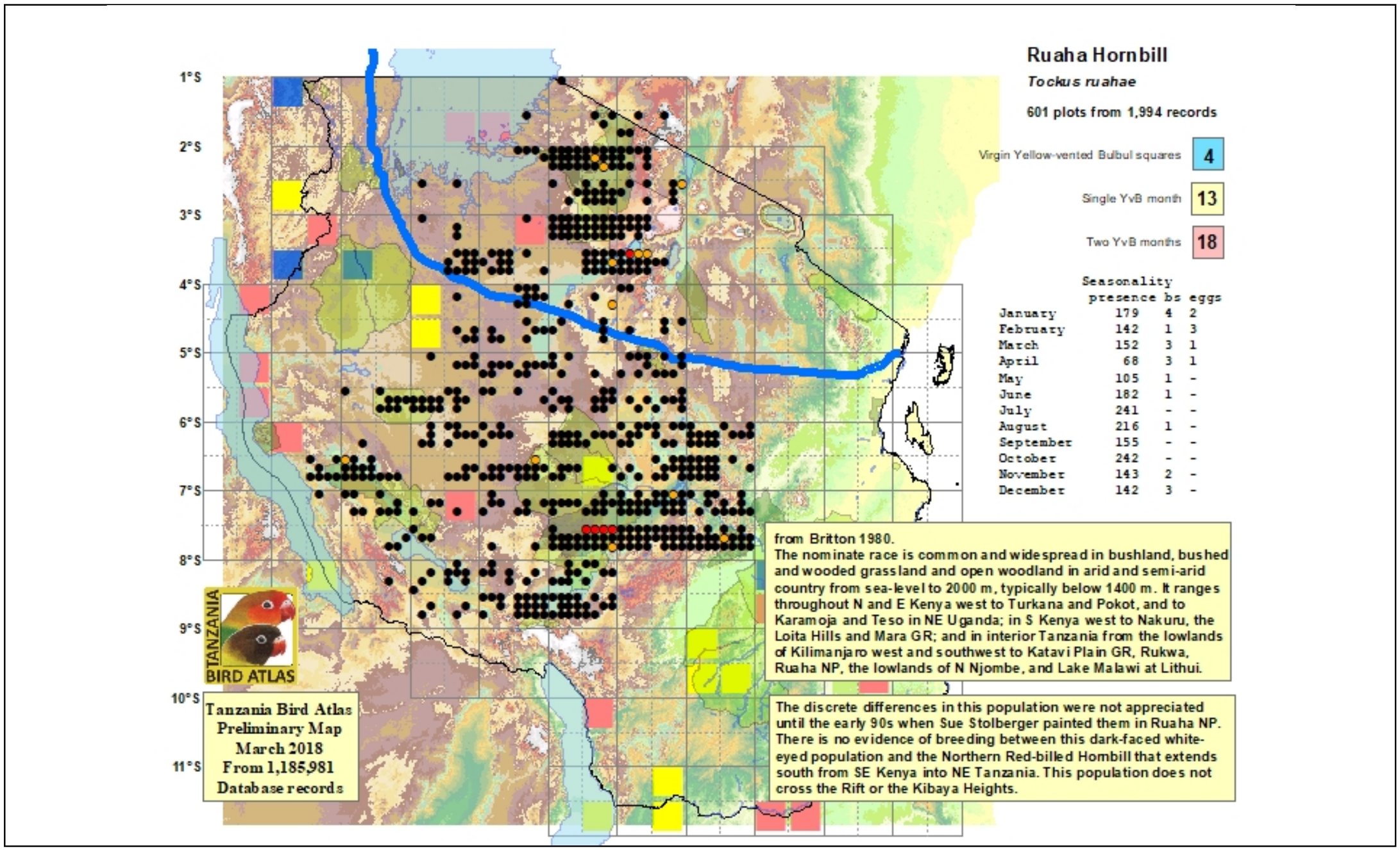


Figure Att3.2-2 Ruaha Hornbill Distribution

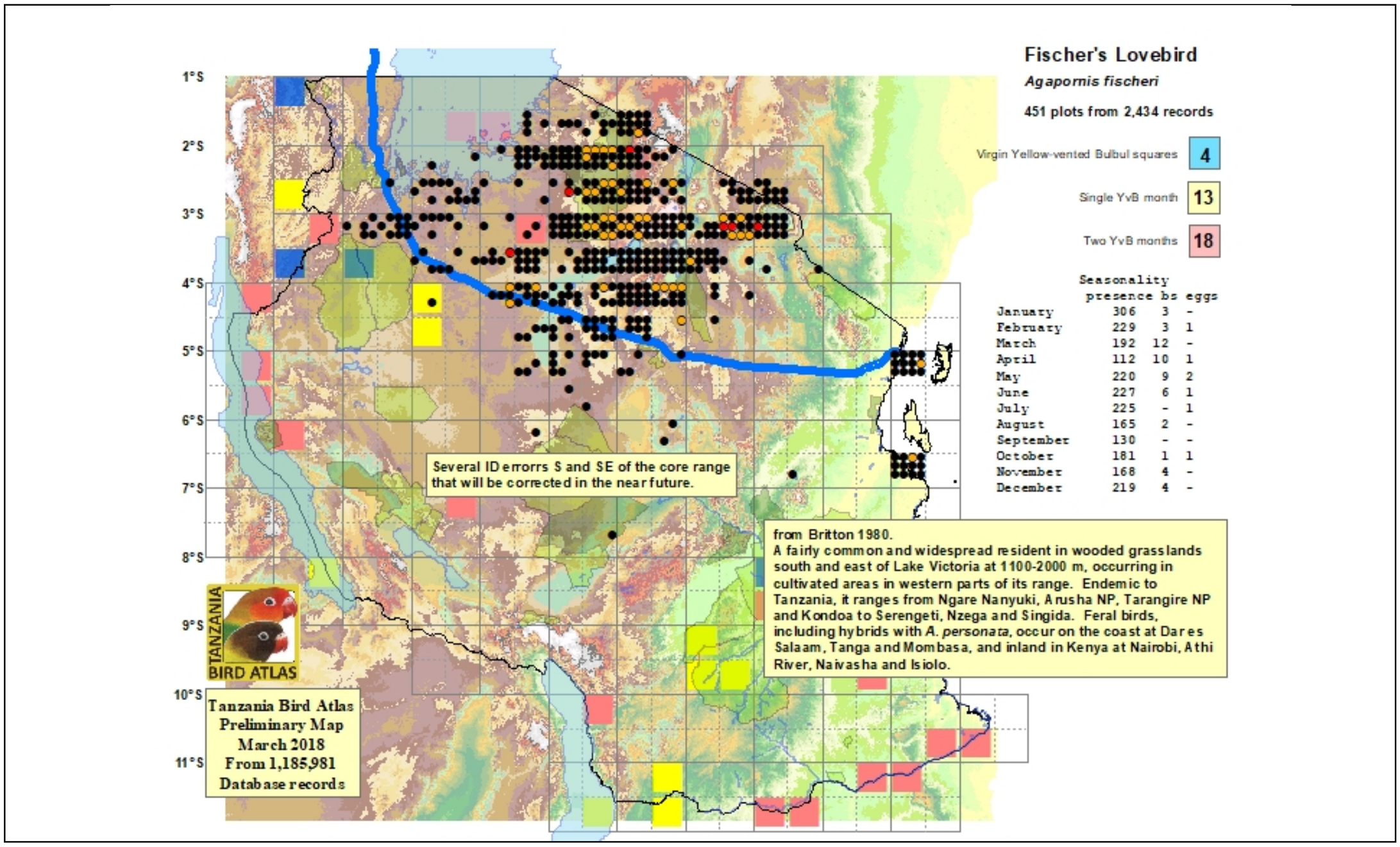


Figure Att3.2-3 Fischer's Lovebird Distribution

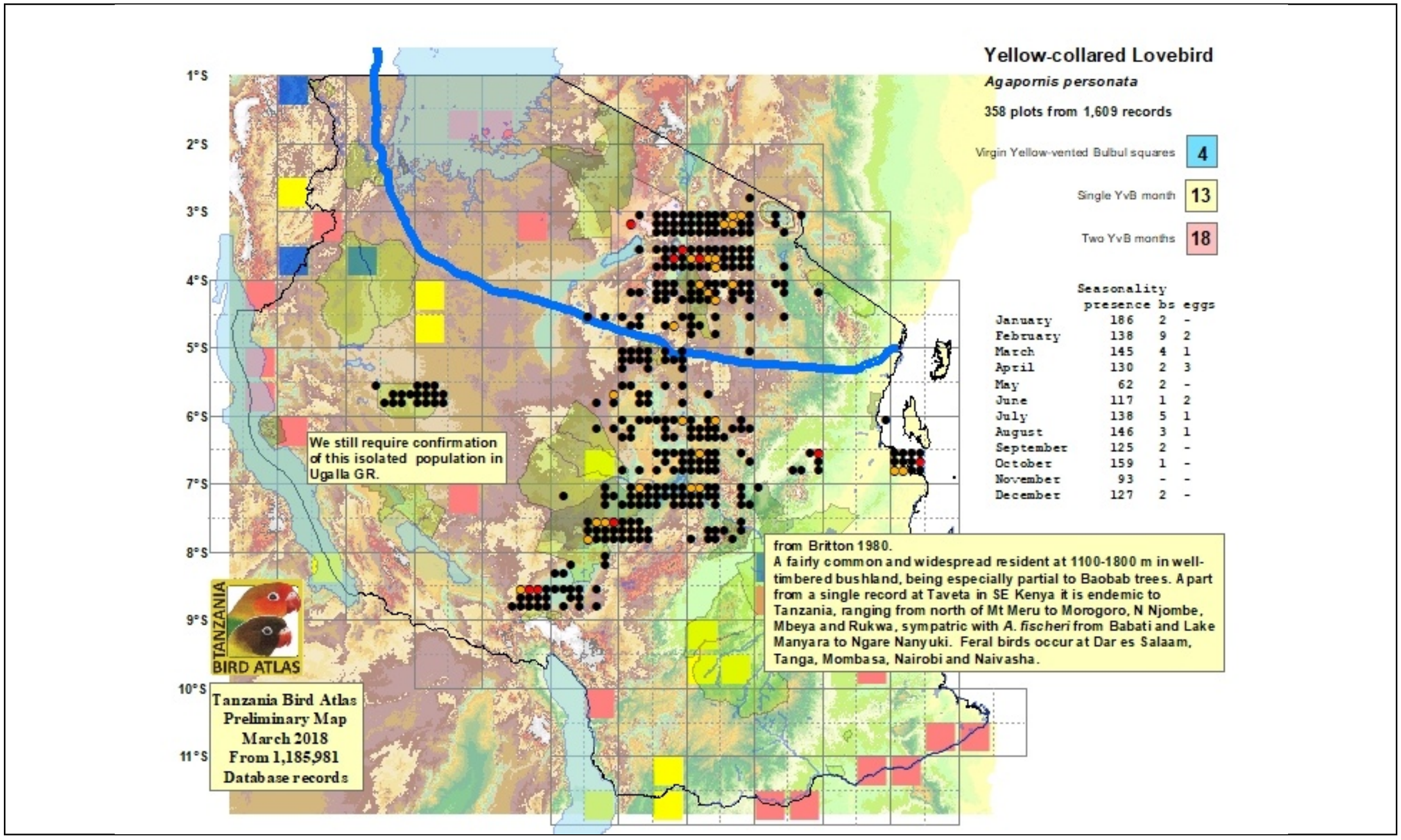


Figure Att3.2-4 Yellow-Collared Lovebird Distribution

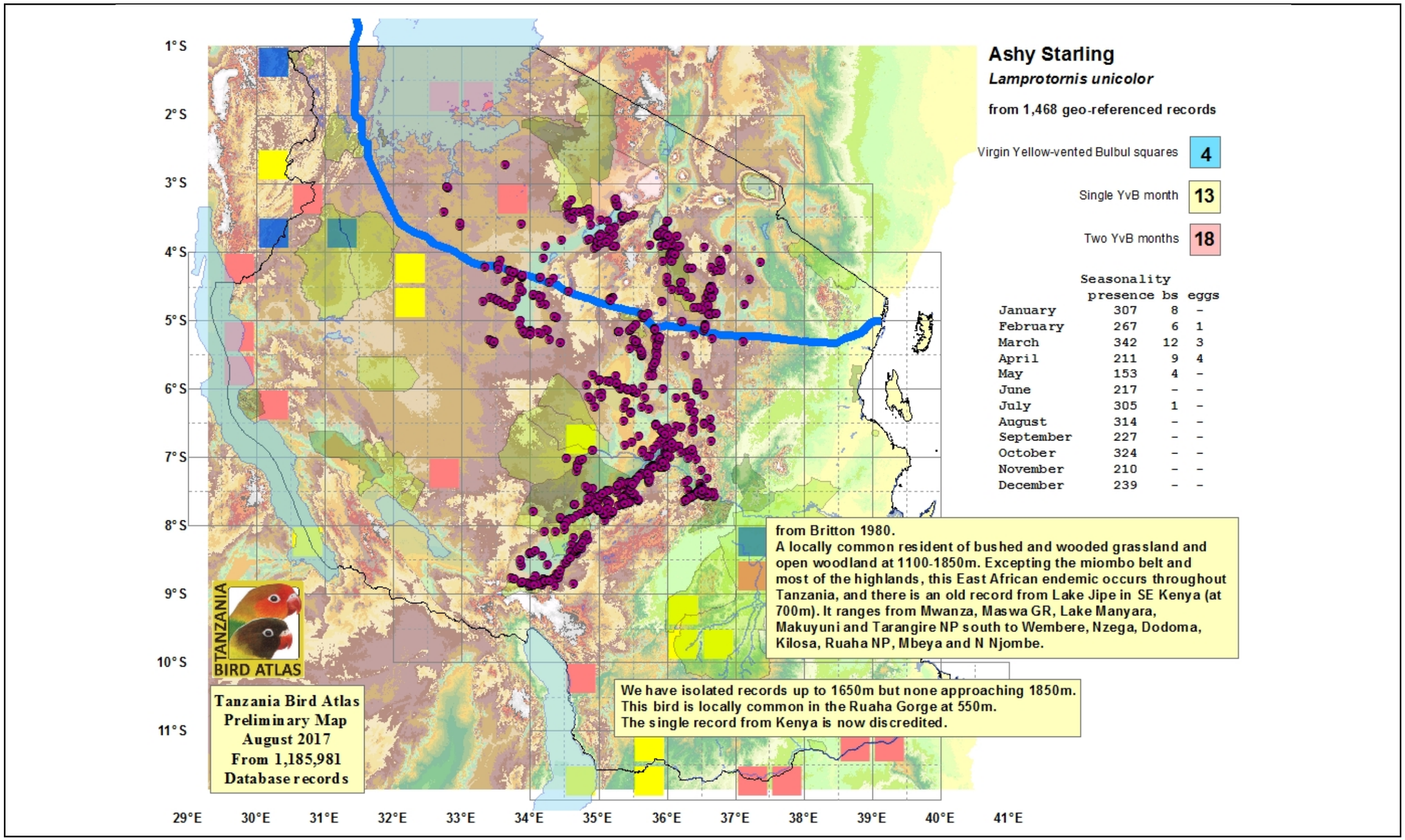


Figure Att3.2-5 Ashy Starling Distribution

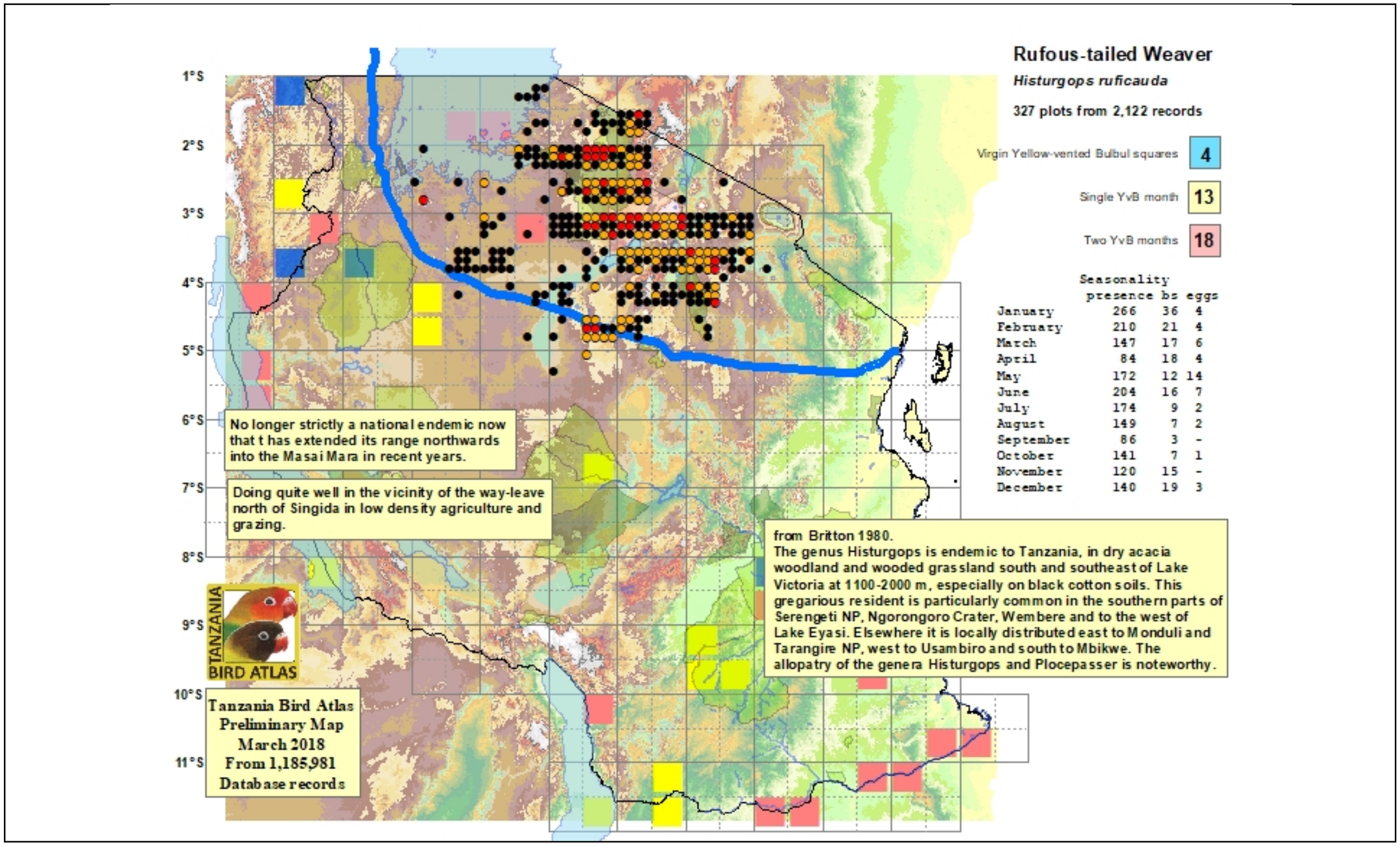


Figure Att3.2-6 Rufous-Tailed Weaver Distribution

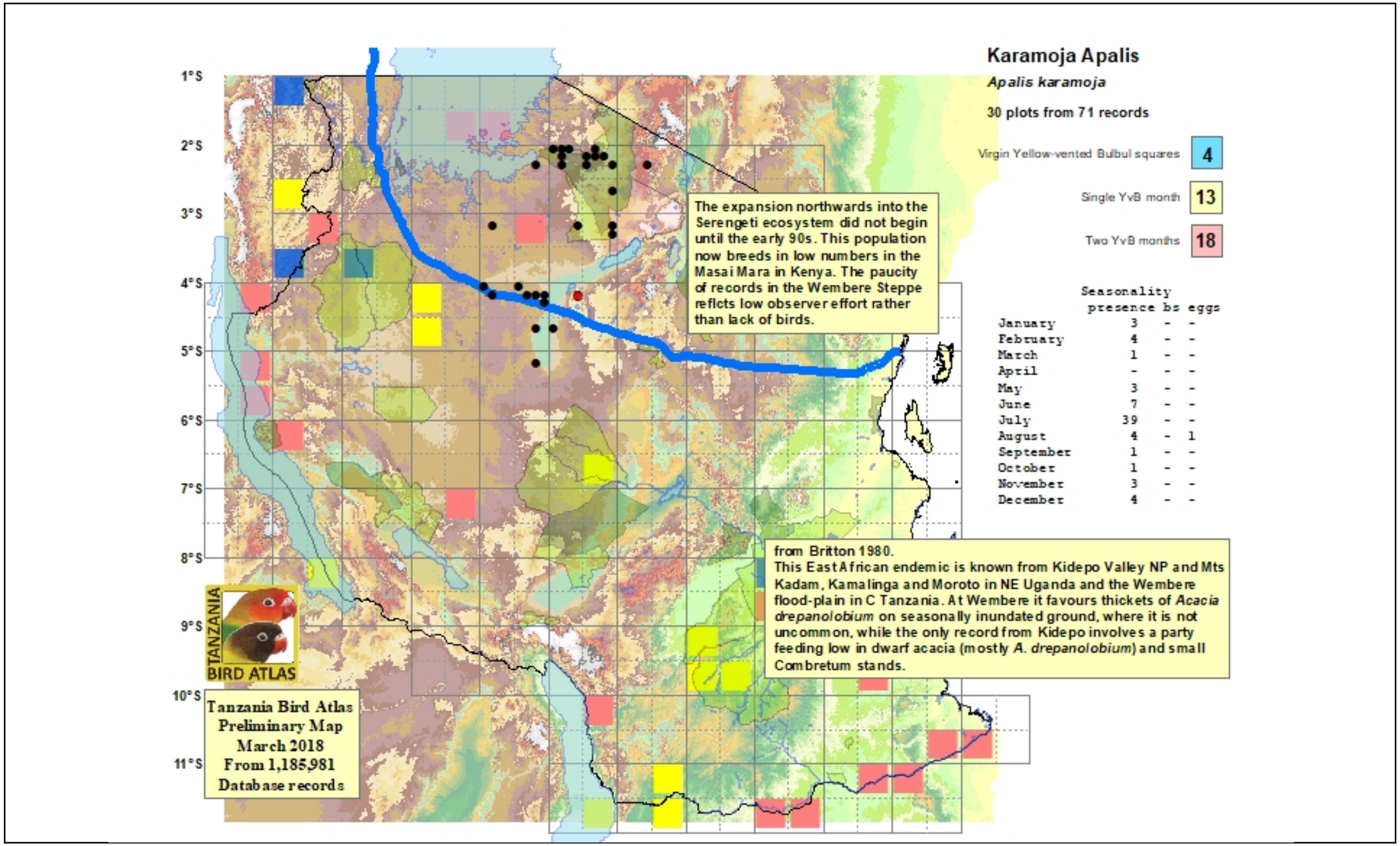


Figure Att3.2-7 Karamoja Apalis Distribution

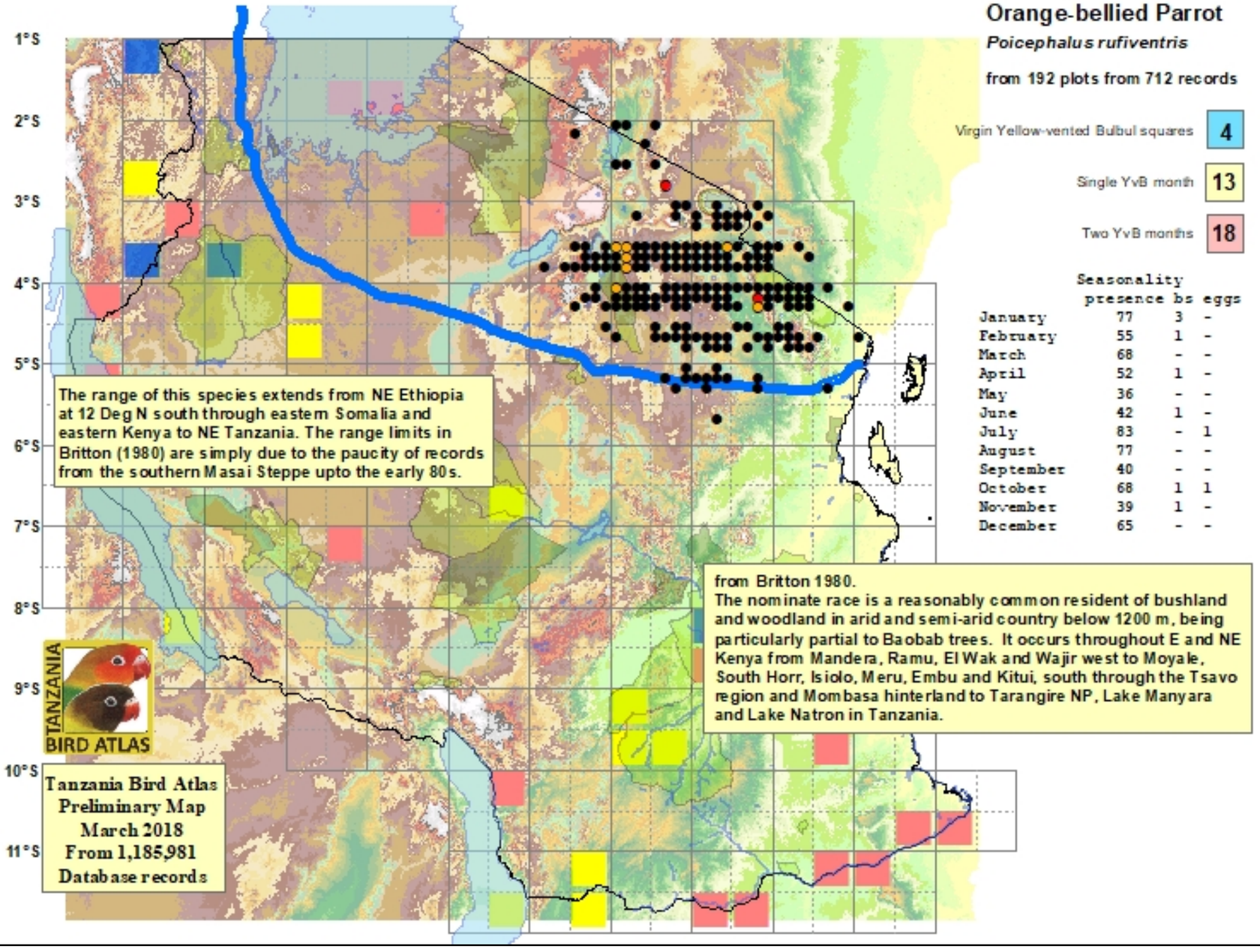


Figure Att3.2-8 Orange-Bellied Parrot Distribution

ATTACHMENT A3.3 SITE SPECIES LISTS

Table Att3.3-1 Minziro Nature Forest Reserve

Species	Status[4]	Locality	Square	Day	Month	Year	Count[5]	Latitude	Longitude	Alt	Card[6]	Obs[7]
sooty chat	/	Minziro grasslands	3101A	12	6	2017		-1.09087	31.40576	1167	9173	9
grey-backed fiscal	/	Minziro grasslands	3101A	12	6	2017		-1.08979	31.41082	1164	9173	9
crested francolin	/	Minziro grasslands	3101A	12	6	2017		-1.08894	31.41279	1168	9173	9
trilling cisticola	/	Minziro grasslands	3101A	12	6	2017		-1.08894	31.41279	1168	9173	9
palm-nut vulture	/	Minziro grasslands	3101A	12	6	2017		-1.08894	31.41279	1168	9173	9
tawny-flanked prinia	/	Minziro grasslands	3101A	12	6	2017		-1.08894	31.41279	1168	9173	9
black and white casqued hornbill	/	Minziro grasslands	3101A	12	6	2017		-1.08894	31.41279	1168	9173	9
yellow-vented bulbul	/	Minziro grasslands	3101A	12	6	2017		-1.08894	31.41279	1168	9173	9
red-billed firefinch	/	Minziro grasslands	3101A	12	6	2017		-1.08894	31.41279	1168	9173	9
red-eyed dove	/	Minziro grasslands	3101A	12	6	2017		-1.08894	31.41279	1168	9173	9
crowned hornbill	/	Minziro grasslands	3101A	12	6	2017		-1.08894	31.41279	1168	9173	9
brown parrot	/	Minziro grasslands	3101A	12	6	2017		-1.08899	31.41499	1166	9173	9
helmeted guineafowl	/	Minziro grasslands	3101A	12	6	2017		-1.08899	31.41499	1166	9173	9
Levaillant's cuckoo	/	Minziro grasslands	3101A	12	6	2017		-1.08899	31.41499	1166	9173	9
speckled mousebird	/	Minziro grasslands	3101A	12	6	2017		-1.08899	31.41499	1166	9173	9
black-bellied bustard	/	Minziro grasslands	3101A	12	6	2017		-1.08899	31.41499	1166	9173	9

[4] Key
/ = presence
X = breeding season
B = eggs in nest
[5] The count column is left blank if only presence of species was recorded. Values for certain species represent the number recorded.
[6] This refers to the data sheet paper hard copy which is filed – allows cross reference and transfer with the Tanzania Bird Atlas.
[7] The observer (each was assigned an individual number)

Table Att3.3-1 Minziro Nature Forest Reserve

Species	Status[4]	Locality	Square	Day	Month	Year	Count[5]	Latitude	Longitude	Alt	Card[6]	Obs[7]
broad-tailed warbler	/	Minziro grasslands	3101A	12	6	2017		-1.08899	31.41499	1166	9173	9
white-browed robin chat	/	Minziro grasslands	3101A	12	6	2017		-1.08899	31.41499	1166	9173	9
little bee-eater	/	Minziro grasslands	3101A	12	6	2017		-1.08899	31.41499	1166	9173	9
scarlet-chested Sunbird	/	Minziro grasslands	3101A	12	6	2017		-1.08899	31.41499	1166	9173	9
amethyst sunbird	/	Minziro grasslands	3101A	12	6	2017		-1.08899	31.41499	1166	9173	9
yellow-breasted apalis	/	Minziro grasslands	3101A	12	6	2017		-1.08899	31.41499	1166	9173	9
African thrush	/	Minziro grasslands	3101A	12	6	2017		-1.08899	31.41499	1166	9173	9
black-lored babbler	/	Minziro grasslands	3101A	12	6	2017		-1.08938	31.41778	1167	9173	9
yellow-throated longclaw	/	Minziro grasslands	3101A	12	6	2017		-1.08938	31.41778	1167	9173	9
glossy ibis	/	Minziro FR grassland	3101A	13	6	2017	54	-1.08953	31.41989	1161	9173	9
rufous-naped lark	/	Minziro FR grassland	3101A	13	6	2017		-1.08953	31.41989	1161	9173	9
fan-tailed widowbird	/	Minziro FR grassland	3101A	13	6	2017		-1.08953	31.41989	1161	9173	9
tawny-flanked prinia	/	Minziro FR grassland	3101A	13	6	2017		-1.08953	31.41989	1161	9173	9
grey-backed fiscal	/	Minziro FR grassland	3101A	13	6	2017		-1.08953	31.41989	1161	9173	9
gymnogene	/	Minziro FR western edge	3101A	13	6	2017		-1.08988	31.42728	1155	9173	9
emerald-spotted wood dove	/	Minziro FR western edge	3101A	13	6	2017		-1.08988	31.42728	1155	9173	9
stout cisticola	/	Minziro FR western edge	3101A	13	6	2017		-1.08988	31.42728	1155	9173	9
common waxbill	/	Minziro FR western edge	3101A	13	6	2017		-1.08988	31.42728	1155	9173	9
Angola swallow	/	Minziro FR western edge	3101A	13	6	2017		-1.08988	31.42728	1155	9173	9
yellow-throated longclaw	/	Minziro FR western edge	3101A	13	6	2017		-1.08988	31.42728	1155	9173	9
red-necked spurfowl	/	Minziro FR western edge	3101A	13	6	2017		-1.08988	31.42728	1155	9173	9
glossy ibis	/	Minziro FR western edge	3101A	13	6	2017	23	-1.08988	31.42728	1155	9173	9

Table Att3.3-1 Minziro Nature Forest Reserve

Species	Status[4]	Locality	Square	Day	Month	Year	Count[5]	Latitude	Longitude	Alt	Card[6]	Obs[7]
nubian woodpecker	/	Minziro FR western edge	3101A	13	6	2017		-1.08988	31.42728	1155	9173	9
red-chested cuckoo	/	Minziro FR western edge	3101A	13	6	2017		-1.08988	31.42728	1155	9173	9
stonechat	/	Minziro FR western edge	3101A	13	6	2017		-1.08988	31.42728	1155	9173	9
black-throated wattle-eye	/	Minziro FR western edge	3101A	13	6	2017		-1.08988	31.42728	1155	9173	9
sulphur-breasted bush shrike	/	Minziro FR western edge	3101A	13	6	2017		-1.08988	31.42728	1155	9173	9
red-faced crombec	/	Minziro FR western edge	3101A	13	6	2017		-1.08988	31.42728	1155	9173	9
grassland pipit	/	Minziro FR western edge	3101A	13	6	2017		-1.08988	31.42728	1155	9173	9
broad-billed roller	/	Minziro FR western edge	3101A	13	6	2017		-1.08988	31.42728	1155	9173	9
white-headed roughwing	/	Minziro FR western edge	3101A	13	6	2017		-1.08988	31.42728	1155	9173	9
African thrush	/	Minziro FR western edge	3101A	13	6	2017		-1.08988	31.42728	1155	9173	9
olive-bellied sunbird	/	Minziro FR western edge	3101A	13	6	2017		-1.08988	31.42728	1155	9173	9
Levaillant's cuckoo	/	Minziro FR western edge	3101A	13	6	2017		-1.08988	31.42728	1155	9173	9
western nicator	/	Minziro FR western edge	3101A	13	6	2017		-1.08988	31.42728	1155	9173	9
yellow-throated leafove	/	Minziro FR	3101A	13	6	2017		-1.08988	31.42728	1155	9173	9
western yellowbill	/	Minziro FR	3101A	13	6	2017		-1.08988	31.42728	1155	9173	9
blue-headed coucal	/	Minziro FR	3101A	13	6	2017		-1.08988	31.42728	1155	9173	9
green-headed sunbird	/	Minziro FR	3101A	13	6	2017		-1.08988	31.42728	1155	9173	9
yellow-vented bulbul	/	Minziro FR	3101A	13	6	2017		-1.08988	31.42728	1155	9173	9
copper sunbird	/	Minziro FR	3101A	13	6	2017		-1.08988	31.42728	1155	9173	9
cardinal quelea ?	/	Minziro FR	3101A	13	6	2017		-1.08988	31.42728	1155	9173	9
moustached warbler	/	Minziro FR	3101A	13	6	2017		-1.08988	31.42728	1155	9173	9
spectacled weaver	/	Minziro FR	3101A	13	6	2017		-1.08988	31.42728	1155	9173	9

Table Att3.3-1 Minziro Nature Forest Reserve

Species	Status[4]	Locality	Square	Day	Month	Year	Count[5]	Latitude	Longitude	Alt	Card[6]	Obs[7]
cattle egret	/	Minziro FR grassland	3101A	13	6	2017		-1.08953	31.41989	1161	9173	9
holub's golden weaver	/	Minziro FR grassland	3101A	13	6	2017		-1.08953	31.41989	1161	9173	9
speckled mousebird	/	Minziro FR grassland	3101A	13	6	2017		-1.08953	31.41989	1161	9173	9
white-browed coucal	/	Minziro FR grassland	3101A	13	6	2017		-1.08953	31.41989	1161	9173	9
red-eyed dove	/	Minziro FR grassland	3101A	13	6	2017		-1.08953	31.41989	1161	9173	9
yellow-vented bulbul	/	Minziro FR grassland	3101A	13	6	2017		-1.08953	31.41989	1161	9173	9
yellow-throated longclaw	/	Minziro FR grassland	3101A	13	6	2017		-1.08953	31.41989	1161	9173	9
broad-tailed warbler	/	Minziro FR grassland	3101A	13	6	2017		-1.08953	31.41989	1161	9173	9
grey-backed fiscal	/	Minziro FR grassland	3101A	13	6	2017		-1.08953	31.41989	1161	9173	9
bronze sunbird	/	Minziro FR grassland	3101A	13	6	2017		-1.08953	31.41989	1161	9173	9
red-chested cuckoo	/	Minziro FR grassland	3101A	13	6	2017		-1.08953	31.41989	1161	9173	9
little bee-eater	/	Minziro FR grassland	3101A	13	6	2017		-1.08953	31.41989	1161	9173	9
fan-tailed widowbird	/	Minziro FR grassland	3101A	13	6	2017		-1.08953	31.41989	1161	9173	9
black-headed gonolek	/	Minziro FR grassland	3101A	13	6	2017		-1.08953	31.41989	1161	9173	9
black coucal	/	Minziro FR grassland	3101A	13	6	2017		-1.08953	31.41989	1161	9173	9
tawny-flanked prinia	/	Minziro FR grassland	3101A	13	6	2017		-1.08953	31.41989	1161	9173	9
white-faced whistling duck	/	Minziro FR grassland	3101A	13	6	2017		-1.08953	31.41989	1161	9173	9
bare-faced go-away bird	/	Minziro FR grassland	3101A	13	6	2017		-1.08953	31.41989	1161	9173	9
amythest sunbird	/	Minziro FR grassland	3101A	13	6	2017		-1.08953	31.41989	1161	9173	9
gymnogene	/	Minziro FR grassland	3101A	13	6	2017		-1.08953	31.41989	1161	9173	9
crowned hornbill	/	Minziro FR grassland	3101A	13	6	2017		-1.08953	31.41989	1161	9173	9
red-faced crombec	/	Minziro FR grassland	3101A	13	6	2017		-1.08953	31.41989	1161	9173	9

Table Att3.3-1 Minziro Nature Forest Reserve

Species	Status[4]	Locality	Square	Day	Month	Year	Count[5]	Latitude	Longitude	Alt	Card[6]	Obs[7]
drongo	/	Minziro FR grassland	3101A	13	6	2017		-1.08953	31.41989	1161	9173	9
African pied wagtail	/	Minziro FR grassland	3101A	13	6	2017		-1.08953	31.41989	1161	9173	9
black-lored babbler	/	Minziro FR grassland	3101A	13	6	2017		-1.08953	31.41989	1161	9173	9
trilling cisticola	/	Minziro FR grassland	3101A	13	6	2017		-1.08953	31.41989	1161	9173	9
variable sunbird	/	Minziro FR grassland	3101A	13	6	2017		-1.08953	31.41989	1161	9173	9
long-crested eagle	/	Minziro FR grassland	3101A	13	6	2017		-1.08953	31.41989	1161	9173	9
brown parrot	/	Minziro FR grassland	3101A	13	6	2017		-1.08953	31.41989	1161	9173	9
red-necked spurfowl	/	Minziro FR grassland	3101A	13	6	2017		-1.08953	31.41989	1161	9173	9
Angola swallow	/	Minziro FR grassland	3101A	13	6	2017		-1.08953	31.41989	1161	9173	9
red-necked spurfowl	/	Minziro FR grassland	3101A	13	6	2017		-1.08953	31.41989	1161	9173	9
rufous-bellied heron	/	Minziro FR grassland	3101A	13	6	2017		-1.08953	31.41989	1161	9173	9
eastern grey plantain-eater	/	Minziro FR grassland	3101A	13	6	2017		-1.08953	31.41989	1161	9173	9
splendid starling	/	Minziro FR grassland	3101A	13	6	2017		-1.08953	31.41989	1161	9173	9
siffling cisticola	/	Minziro FR grassland	3101A	13	6	2017		-1.08953	31.41989	1161	9173	9
black-lored babbler	/	Minziro grassland	3101A	27	1	2018		-1.08875	31.41299	1171	9182	9
cinnamon rock bunting	/	Minziro grassland	3101A	27	1	2018		-1.08875	31.41299	1171	9182	9
Wahlberg's eagle	/	Minziro grassland	3101A	27	1	2018	2	-1.08875	31.41299	1171	9182	9
fan-tailed widowbird	/	Minziro grassland	3101A	27	1	2018		-1.08875	31.41299	1171	9182	9
whinchat	/	Minziro grassland	3101A	27	1	2018		-1.08899	31.41614	1159	9182	9
fan-tailed widowbird	X	Minziro grassland	3101A	27	1	2018		-1.08899	31.41614	1159	9182	9
stonechat	/	Minziro grassland	3101A	27	1	2018		-1.08899	31.41614	1159	9182	9
bronze mannikin	/	Minziro grassland	3101A	27	1	2018		-1.08899	31.41614	1159	9182	9

Table Att3.3-1 Minziro Nature Forest Reserve

Species	Status[4]	Locality	Square	Day	Month	Year	Count[5]	Latitude	Longitude	Alt	Card[6]	Obs[7]
broad-tailed warbler	/	Minziro grassland	3101A	27	1	2018		-1.08899	31.41614	1159	9182	9
sooty chat	/	Minziro grassland	3101A	27	1	2018		-1.08899	31.41614	1159	9182	9
blue-naped mousebird	/	Minziro grassland	3101A	27	1	2018		-1.08899	31.41614	1159	9182	9
tawny-flanked prinia	/	Minziro grassland	3101A	27	1	2018		-1.08899	31.41614	1159	9182	9
speckled mousebird	/	Minziro grassland	3101A	27	1	2018		-1.08899	31.41614	1159	9182	9
ring-necked dove	/	Minziro grassland	3101A	27	1	2018		-1.08899	31.41614	1159	9182	9
wattled plover	/	Minziro grassland	3101A	27	1	2018	2	-1.08899	31.41614	1159	9182	9
grey-backed fiscal	/	Minziro grassland KP	3101A	27	1	2018		-1.08958	31.41994	1159	9182	9
black and white casqued hornbill	/	Minziro grassland KP	3101A	27	1	2018		-1.08958	31.41994	1159	9182	9
fan-tailed widowbird	/	Minziro grassland KP	3101A	27	1	2018		-1.08958	31.41994	1159	9182	9
fawn-breasted waxbill	/	Minziro grassland KP	3101A	27	1	2018		-1.08958	31.41994	1159	9182	9
yellow-throated longclaw	/	Minziro grassland KP	3101A	27	1	2018		-1.08958	31.41994	1159	9182	9
crowned hornbill	/	Minziro grassland KP	3101A	27	1	2018		-1.08958	31.41994	1159	9182	9
great blue turaco	/	Minziro FR	3101A	27	1	2018		-1.08969	31.42936	1160	9182	9
ross's turaco	/	Minziro FR	3101A	27	1	2018		-1.08969	31.42936	1160	9182	9
yellow-spotted barbet	/	Minziro FR	3101A	27	1	2018		-1.08969	31.42936	1160	9182	9
green pigeon	/	Minziro FR	3101A	27	1	2018		-1.08969	31.42936	1160	9182	9
Eurasian bee-eater	/	Minziro FR	3101A	27	1	2018		-1.08969	31.42936	1160	9182	9
white-throated bee-eater	/	Minziro FR	3101A	27	1	2018		-1.08969	31.42936	1160	9182	9
red-headed bluebill	/	Minziro FR	3101A	27	1	2018		-1.08969	31.42936	1160	9182	9
purple-throated cuckoo shrike	/	Minziro FR	3101A	27	1	2018		-1.08969	31.42936	1160	9182	9
olive sunbird	/	Minziro FR	3101A	27	1	2018		-1.08969	31.42936	1160	9182	9

Table Att3.3-1 Minziro Nature Forest Reserve

Species	Status[4]	Locality	Square	Day	Month	Year	Count[5]	Latitude	Longitude	Alt	Card[6]	Obs[7]
Vieillot's black weaver	/	Minziro FR	3101A	27	1	2018		-1.08969	31.42936	1160	9182	9
spotted greenbul	/	Minziro FR	3101A	27	1	2018		-1.08969	31.42936	1160	9182	9
crowned hornbill	/	Minziro FR	3101A	27	1	2018		-1.08969	31.42936	1160	9182	9
green-headed sunbird	/	Minziro FR	3101A	27	1	2018		-1.08969	31.42936	1160	9182	9
yellow-rumped tinkerbird	/	Minziro FR	3101A	27	1	2018		-1.08969	31.42936	1160	9182	9
common swift	/	Minziro FR	3101A	27	1	2018		-1.08969	31.42936	1160	9182	9
snowy-crowned robinchat	/	Minziro FR	3101A	27	1	2018		-1.08969	31.42936	1160	9182	9
barn swallow	/	Minziro FR	3101A	27	1	2018		-1.08969	31.42936	1160	9182	9
African wood owl	/	Minziro FR	3101A	28	1	2018		-1.08969	31.42936	1160	9182	9
great blue turaco	/	Minziro FR	3101A	28	1	2018		-1.08969	31.42936	1160	9182	9
spotted greenbul	/	Minziro FR	3101A	28	1	2018		-1.08969	31.42936	1160	9182	9
white-throated bee-eater	/	Minziro FR	3101A	28	1	2018		-1.08969	31.42936	1160	9182	9
ross's turaco	/	Minziro FR	3101A	28	1	2018		-1.08969	31.42936	1160	9182	9
barn swallow	/	Minziro FR	3101A	28	1	2018		-1.08969	31.42936	1160	9182	9
green pigeon	/	Minziro FR	3101A	28	1	2018		-1.08969	31.42936	1160	9182	9
tambourine dove	/	Minziro FR	3101A	28	1	2018		-1.08969	31.42936	1160	9182	9
black roughwing	/	Minziro FR	3101A	28	1	2018		-1.08969	31.42936	1160	9182	9
black and white casqued hornbill	/	Minziro FR	3101A	28	1	2018		-1.08969	31.42936	1160	9182	9
red-eyed dove	/	Minziro FR	3101A	28	1	2018		-1.08969	31.42936	1160	9182	9
grey-rumped swallow	/	Minziro FR	3101A	28	1	2018		-1.08969	31.42936	1160	9182	9
yellow-spotted barbet	/	Minziro FR	3101A	28	1	2018		-1.08969	31.42936	1160	9182	9
western yellowbill	/	Minziro FR	3101A	28	1	2018		-1.08969	31.42936	1160	9182	9

Table Att3.3-1 Minziro Nature Forest Reserve

Species	Status[4]	Locality	Square	Day	Month	Year	Count[5]	Latitude	Longitude	Alt	Card[6]	Obs[7]
western nicator	/	Minziro FR	3101A	28	1	2018		-1.08969	31.42936	1160	9182	9
brown-capped weaver	/	Minziro FR	3101A	28	1	2018		-1.08969	31.42936	1160	9182	9
black-necked weaver	/	Minziro FR	3101A	28	1	2018		-1.08969	31.42936	1160	9182	9
African thrush	/	Minziro FR	3101A	28	1	2018		-1.08969	31.42936	1160	9182	9
violet-backed starling	/	Minziro FR	3101A	28	1	2018		-1.08969	31.42936	1160	9182	9
collared sunbird	/	Minziro FR	3101A	28	1	2018		-1.08969	31.42936	1160	9182	9
grey-chinned sunbird	/	Minziro FR	3101A	28	1	2018		-1.08969	31.42936	1160	9182	9
afep pigeon	/	Minziro FR	3101A	28	1	2018		-1.08969	31.42936	1160	9182	9
sulphur-breasted bush shrike	/	Minziro FR	3101A	28	1	2018		-1.08969	31.42936	1160	9182	9
yellow-vented bulbul	/	Minziro FR	3101A	28	1	2018		-1.08969	31.42936	1160	9182	9
willow warbler	/	Minziro FR	3101A	28	1	2018		-1.08969	31.42936	1160	9182	9
black-throated apalis	/	Minziro FR	3101A	28	1	2018		-1.08969	31.42936	1160	9182	9
snowy-crowned robinchat	/	Minziro FR	3101A	28	1	2018		-1.08969	31.42936	1160	9182	9
slender-billed greenbul	/	Minziro FR	3101A	28	1	2018		-1.08969	31.42936	1160	9182	9
little green sunbird	/	Minziro FR	3101A	28	1	2018		-1.08969	31.42936	1160	9182	9
grey-backed fiscal	/	Minziro grasslands	3101A	28	1	2018		-1.08962	31.42094	1160	9182	9
Ruppell's starling	/	Minziro grasslands	3101A	28	1	2018		-1.08962	31.42094	1160	9182	9
mariqua sunbird	/	Minziro grasslands	3101A	28	1	2018		-1.08958	31.41809	1165	9182	9
yellow-fronted canary	/	Minziro grasslands	3101A	28	1	2018		-1.08958	31.41809	1165	9182	9
bronze mannikin	/	Minziro grasslands	3101A	28	1	2018		-1.08958	31.41809	1165	9182	9
yellow-vented bulbul	/	Minziro grasslands	3101A	28	1	2018		-1.08958	31.41809	1165	9182	9
speckled mousebird	/	Minziro grasslands	3101A	28	1	2018		-1.08958	31.41809	1165	9182	9

Table Att3.3-1 Minziro Nature Forest Reserve

Species	Status[4]	Locality	Square	Day	Month	Year	Count[5]	Latitude	Longitude	Alt	Card[6]	Obs[7]
village weaver	/	Minziro grasslands	3101A	28	1	2018		-1.08958	31.41809	1165	9182	9
gymnogene	/	Minziro grasslands	3101A	28	1	2018		-1.08958	31.41809	1165	9182	9
red-billed firefinch	/	Minziro grasslands	3101A	28	1	2018		-1.08958	31.41809	1165	9182	9
brimstone canary	/	Minziro grasslands	3101A	28	1	2018		-1.08958	31.41809	1165	9182	9
bare-faced go-away bird	/	Minziro grasslands	3101A	28	1	2018		-1.08958	31.41809	1165	9182	9
stonechat	/	Minziro grasslands	3101A	28	1	2018		-1.08958	31.41809	1165	9182	9
tawny-flanked prinia	/	Minziro grasslands	3101A	28	1	2018		-1.08958	31.41809	1165	9182	9
grey-backed camaroptera	/	Minziro grasslands	3101A	28	1	2018		-1.08958	31.41809	1165	9182	9
ring-necked dove	/	Minziro grasslands	3101A	28	1	2018		-1.08958	31.41809	1165	9182	9
red-faced cisticola	/	Minziro grasslands	3101A	28	1	2018		-1.08958	31.41809	1165	9182	9
barn swallow	/	Minziro grasslands	3101A	28	1	2018		-1.08958	31.41809	1165	9182	9
palm-nut vulture	/	Minziro grasslands	3101A	28	1	2018		-1.08958	31.41809	1165	9182	9
great reed warbler	/	Minziro grasslands	3101A	28	1	2018		-1.08958	31.41809	1165	9182	9
black-lored babbler	/	Minziro grasslands	3101A	28	1	2018		-1.08958	31.41809	1165	9182	9
sooty chat	/	Minziro grasslands	3101A	28	1	2018		-1.08958	31.41809	1165	9182	9
yellow-throated longclaw	/	Minziro grasslands	3101A	28	1	2018		-1.08958	31.41809	1165	9182	9
copper sunbird	/	Minziro grasslands	3101A	28	1	2018		-1.08958	31.41809	1165	9182	9
pin-tailed whydah	/	Minziro grasslands	3101A	28	1	2018		-1.08958	31.41809	1165	9182	9
marsh tchagra	/	Minziro grasslands	3101A	28	1	2018		-1.08878	31.41403	1163	9182	9
speckled mousebird	/	Minziro grasslands	3101A	28	1	2018		-1.08878	31.41403	1163	9182	9
tropical boubou	/	Minziro grasslands	3101A	28	1	2018		-1.08878	31.41403	1163	9182	9
eastern grey plantain-eater	/	Minziro grasslands	3101A	28	1	2018		-1.08878	31.41403	1163	9182	9

Table Att3.3-1 Minziro Nature Forest Reserve

Species	Status[4]	Locality	Square	Day	Month	Year	Count[5]	Latitude	Longitude	Alt	Card[6]	Obs[7]
northern grey-headed Sparrow	/	Minziro grasslands	3101A	28	1	2018		-1.08878	31.41403	1163	9182	9
laughing dove	/	Minziro grasslands	3101A	28	1	2018		-1.08878	31.41403	1163	9182	9
cinnamon rock bunting	/	Minziro grasslands	3101A	28	1	2018		-1.08693	31.41392	1184	9182	9
rufous-naped lark	/	Minziro grasslands	3101A	28	1	2018		-1.08539	31.41354	1215	9182	9
red-eyed dove	/	Minziro grasslands	3101A	28	1	2018		-1.08990	31.41006	1165	9182	9

Table Att3.3-2 Lake Ikimba: Dry Season Avifauna Survey

Species	Status	Locality	Square	Day	Month	Year	Count	Latitude	Longitude	Alt	Card	Obs
African marsh harrier	X	Lake Ikimba	3101B	13	6	2017		-1.47364	31.50510	1166	9173	9
long-toed plover	/	Lake Ikimba	3101B	13	6	2017	4	-1.47364	31.50510	1166	9173	9
hadada ibis	/	Lake Ikimba	3101B	13	6	2017		-1.47364	31.50510	1166	9173	9
purple heron	/	Lake Ikimba	3101B	13	6	2017	7	-1.47364	31.50510	1166	9173	9
palm-nut vulture	/	Lake Ikimba	3101B	13	6	2017	17	-1.47364	31.50510	1166	9173	9
grey-backed fiscal	/	Lake Ikimba	3101B	13	6	2017		-1.47364	31.50510	1166	9173	9
fish eagle	/	Lake Ikimba	3101B	13	6	2017		-1.47364	31.50510	1166	9173	9
gabar goshawk	/	Lake Ikimba	3101B	13	6	2017		-1.47364	31.50510	1166	9173	9
jacana	/	Lake Ikimba	3101B	13	6	2017		-1.47364	31.50510	1166	9173	9
malachite kingfisher	/	Lake Ikimba	3101B	13	6	2017		-1.47364	31.50510	1166	9173	9
squacco heron	/	Lake Ikimba	3101B	13	6	2017		-1.47364	31.50510	1166	9173	9
dwarf bittern	/	Lake Ikimba	3101B	13	6	2017		-1.47364	31.50510	1166	9173	9
little egret	/	Lake Ikimba	3101B	13	6	2017		-1.47596	31.50912	1172	9173	9
long-toed plover	/	Lake Ikimba	3101B	13	6	2017		-1.47596	31.50912	1172	9173	9
malachite kingfisher	/	Lake Ikimba	3101B	13	6	2017		-1.47596	31.50912	1172	9173	9
jacana	/	Lake Ikimba	3101B	13	6	2017		-1.47596	31.50912	1172	9173	9
yellow-vented bulbul	/	Lake Ikimba	3101B	13	6	2017		-1.47596	31.50912	1172	9173	9
lesser swamp warbler	/	Lake Ikimba	3101B	13	6	2017		-1.47596	31.50912	1172	9173	9
African pied wagtail	/	Lake Ikimba	3101B	13	6	2017		-1.47596	31.50912	1172	9173	9
black-lored babbler	/	Lake Ikimba	3101B	13	6	2017		-1.47596	31.50912	1172	9173	9
red-faced cisticola	/	Lake Ikimba	3101B	13	6	2017		-1.47596	31.50912	1172	9173	9
purple heron	/	Lake Ikimba	3101B	13	6	2017		-1.47596	31.50912	1172	9173	9

Table Att3.3-2 Lake Ikimba: Dry Season Avifauna Survey

Species	Status	Locality	Square	Day	Month	Year	Count	Latitude	Longitude	Alt	Card	Obs
tropical boubou	/	Lake Ikimba	3101B	13	6	2017		-1.47596	31.50912	1172	9173	9
marsh tchagra	/	Lake Ikimba	3101B	13	6	2017		-1.47596	31.50912	1172	9173	9
white-faced whistling duck	/	Lake Ikimba	3101B	13	6	2017		-1.47596	31.50912	1172	9173	9
red-chested sunbird	/	Lake Ikimba	3101B	13	6	2017		-1.47596	31.50912	1172	9173	9
grey crowned crane	/	Lake Ikimba	3101B	13	6	2017		-1.47596	31.50912	1172	9173	9
black-headed gonolek	/	Lake Ikimba	3101B	13	6	2017		-1.47596	31.50912	1172	9173	9
grassland pipit	/	Lake Ikimba	3101B	13	6	2017		-1.47596	31.50912	1172	9173	9
purple gallinule	/	Lake Ikimba	3101B	13	6	2017		-1.47596	31.50912	1172	9173	9
fan-tailed widowbird	X	Lake Ikimba	3101B	13	6	2017		-1.47596	31.50912	1172	9173	9
yellow-throated longclaw	/	Lake Ikimba	3101B	13	6	2017		-1.47596	31.50912	1172	9173	9
stonechat	/	Lake Ikimba	3101B	13	6	2017		-1.47596	31.50912	1172	9173	9
eastern grey plantain-eater	/	Lake Ikimba	3101B	13	6	2017		-1.47596	31.50912	1172	9173	9
pied kingfisher	/	Lake Ikimba	3101B	13	6	2017		-1.47596	31.50912	1172	9173	9
common waxbill	/	Lake Ikimba	3101B	13	6	2017		-1.47596	31.50912	1172	9173	9
grey-backed fiscal	/	Lake Ikimba	3101B	13	6	2017		-1.47596	31.50912	1172	9173	9
ruppell's starling	/	Lake Ikimba	3101B	13	6	2017		-1.47596	31.50912	1172	9173	9
papyrus canary	/	Lake Ikimba	3101B	13	6	2017		-1.47596	31.50912	1172	9173	9
long-tailed cormorant	/	Lake Ikimba	3101B	13	6	2017		-1.47596	31.50912	1172	9173	9
golden-backed weaver	X	Lake Ikimba	3101B	13	6	2017		-1.47596	31.50912	1172	9173	9
little rush warbler	/	Lake Ikimba	3101B	13	6	2017		-1.47596	31.50912	1172	9173	9
rufous-bellied heron	/	Lake Ikimba	3101B	13	6	2017		-1.47596	31.50912	1172	9173	9
great white egret	/	Lake Ikimba	3101B	13	6	2017		-1.47596	31.50912	1172	9173	9

Table Att3.3-2 Lake Ikimba: Dry Season Avifauna Survey

Species	Status	Locality	Square	Day	Month	Year	Count	Latitude	Longitude	Alt	Card	Obs
cattle egret	/	Lake Ikimba	3101B	13	6	2017		-1.47596	31.50912	1172	9173	9
swamp nightjar	/	Lake Ikimba	3101B	13	6	2017		-1.47596	31.50912	1172	9173	9
hamerkop	/	Lake Ikimba	3101B	14	6	2017		-1.47596	31.50912	1172	9173	9
bronze mannikin	/	Lake Ikimba	3101B	14	6	2017		-1.47596	31.50912	1172	9173	9
zebra waxbill	/	Lake Ikimba	3101B	14	6	2017		-1.47596	31.50912	1172	9173	9
rufous-chested swallow	/	Lake Ikimba	3101B	14	6	2017		-1.47596	31.50912	1172	9173	9
allen's gallinule	/	Lake Ikimba	3101B	14	6	2017		-1.47596	31.50912	1172	9173	9
green-backed heron	/	Lake Ikimba	3101B	14	6	2017		-1.47596	31.50912	1172	9173	9
yellow-billed duck	/	Lake Ikimba	3101B	14	6	2017		-1.47596	31.50912	1172	9173	9
winding cisticola	/	Lake Ikimba	3101B	14	6	2017		-1.47596	31.50912	1172	9173	9
pygmy goose	/	Lake Ikimba	3101B	14	6	2017		-1.47596	31.50912	1172	9173	9
lesser jacana	/	Lake Ikimba	3101B	14	6	2017		-1.47596	31.50912	1172	9173	9
drongo	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.52936	31.47840	1195	9173	9
long-crested eagle	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.52936	31.47840	1195	9173	9
hooded vulture	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.55743	31.46262	1205	9173	9
gabar goshawk	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.56166	31.46285	1189	9173	9
African pied wagtail	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.56166	31.46285	1189	9173	9
brown parrot	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.56166	31.46285	1189	9173	9
red-eyed dove	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.56166	31.46285	1189	9173	9
variable sunbird	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.56166	31.46285	1189	9173	9
pied kingfisher	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.57316	31.48397	1165	9173	9
little egret	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.57316	31.48397	1165	9173	9

Table Att3.3-2 Lake Ikimba: Dry Season Avifauna Survey

Species	Status	Locality	Square	Day	Month	Year	Count	Latitude	Longitude	Alt	Card	Obs
fan-tailed widowbird	X	Lake Ikimba - southern edge	3101C	14	6	2017		-1.57316	31.48397	1165	9173	9
grey-backed fiscal	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.57316	31.48397	1165	9173	9
white-headed roughwing	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.57316	31.48397	1165	9173	9
Angola swallow	/	Lake Ikimba - southern edge	3101D	14	6	2017		-1.59937	31.52009	1165	9173	9
red-eyed dove	/	Lake Ikimba - southern edge	3101D	14	6	2017		-1.59937	31.52009	1165	9173	9
sooty chat	/	Lake Ikimba - southern edge	3101D	14	6	2017		-1.61963	31.53556	1284	9173	9
palm-nut vulture	/	Lake Ikimba - southern edge	3101D	14	6	2017	3	-1.61963	31.53556	1284	9173	9
yellow-vented bulbul	/	Lake Ikimba - southern edge	3101D	14	6	2017		-1.61963	31.53556	1284	9173	9
fan-tailed widowbird	X	Lake Ikimba - southern edge	3101D	14	6	2017		-1.61963	31.53556	1284	9173	9
stonechat	/	Lake Ikimba - southern edge	3101D	14	6	2017		-1.61963	31.53556	1284	9173	9
little swift	/	Lake Ikimba - southern edge	3101D	14	6	2017		-1.63548	31.52615	1360	9173	9
white-headed roughwing	/	Lake Ikimba - southern edge	3101D	14	6	2017		-1.63548	31.52615	1360	9173	9
yellow-vented bulbul	/	Lake Ikimba - southern edge	3101D	14	6	2017		-1.63548	31.52615	1360	9173	9
speckled mousebird	/	Lake Ikimba - southern edge	3101D	14	6	2017		-1.63548	31.52615	1360	9173	9
little bee-eater	/	Lake Ikimba - southern edge	3101D	14	6	2017		-1.63548	31.52615	1360	9173	9
yellow-throated longclaw	/	Lake Ikimba - southern edge	3101D	14	6	2017		-1.64589	31.52161	1348	9173	9
lilac-breasted roller	/	Lake Ikimba - southern edge	3101D	14	6	2017		-1.65342	31.51816	1306	9173	9
eastern grey plantain-eater	/	Lake Ikimba - southern edge	3101D	14	6	2017		-1.65963	31.51564	1313	9173	9
sooty chat	/	Lake Ikimba - southern edge	3101D	14	6	2017		-1.68182	31.50990	1282	9173	9
variable sunbird	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.72911	31.49782	1256	9173	9
drongo	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.74523	31.49398	1366	9173	9
yellow-billed kite	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.75837	31.49264	1430	9173	9

Table Att3.3-2 Lake Ikimba: Dry Season Avifauna Survey

Species	Status	Locality	Square	Day	Month	Year	Count	Latitude	Longitude	Alt	Card	Obs
rufous-naped lark	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.75837	31.49264	1430	9173	9
tropical boubou	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.75837	31.49264	1430	9173	9
ring-necked dove	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.75837	31.49264	1430	9173	9
common fiscal	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.76735	31.49270	1377	9173	9
lilac-breasted roller	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.76735	31.49270	1377	9173	9
yellow-vented bulbul	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.76735	31.49270	1377	9173	9
grey-backed fiscal	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.77867	31.49167	1377	9173	9
yellow-vented bulbul	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.77867	31.49167	1377	9173	9
drongo	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.77867	31.49167	1377	9173	9
bare-faced go-away bird	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.77867	31.49167	1377	9173	9
ruaha chat	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.77867	31.49167	1377	9173	9
pied crow	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.77867	31.49167	1377	9173	9
blue-eared starling	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.77867	31.49167	1377	9173	9
brown-crowned tchagra	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.79033	31.48611	1387	9173	9
jacobin cuckoo	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.79882	31.47994	1357	9173	9
northern grey-headed sparrow	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.79882	31.47994	1357	9173	9
yellow-vented bulbul	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.79882	31.47994	1357	9173	9
vanga flycatcher	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.79882	31.47994	1357	9173	9
blue-spotted wood dove	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.79882	31.47994	1357	9173	9
ruaha chat	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.79327	31.46451	1449	9173	9
crested barbet	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.78823	31.46226	1465	9173	9
ruppell's starling	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.78698	31.44568	1234	9173	9

Table Att3.3-2 Lake Ikimba: Dry Season Avifauna Survey

Species	Status	Locality	Square	Day	Month	Year	Count	Latitude	Longitude	Alt	Card	Obs
grey-backed fiscal	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.79076	31.44272	1242	9173	9
white-headed barbet	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.79084	31.43993	1233	9173	9
blue-eared starling	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.79068	31.43940	1229	9173	9
grey-backed fiscal	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.79068	31.43940	1229	9173	9
pied crow	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.79068	31.43940	1229	9173	9
tropical boubou	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.79068	31.43940	1229	9173	9
lilac-breasted roller	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.80487	31.44020	1245	9173	9
African pied wagtail	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.80487	31.44020	1245	9173	9
lilac-breasted roller	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.80487	31.44020	1245	9173	9
lizard buzzard	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.80487	31.44020	1245	9173	9
mosque swallow	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.82777	31.43931	1258	9173	9
lizard buzzard	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.83343	31.44090	1245	9173	9
northern grey-headed sparrow	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.83872	31.43989	1242	9173	9
white-naped raven	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.83872	31.43989	1242	9173	9
bare-faced go-away bird	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.86773	31.43317	1275	9173	9
blue-eared starling	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.87146	31.43144	1265	9173	9
tropical boubou	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.87146	31.43144	1265	9173	9
grey-backed fiscal	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.87977	31.43245	1244	9173	9
northern grey-headed sparrow	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.88906	31.43645	1263	9173	9
bare-faced go-away bird	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.88906	31.43645	1263	9173	9
ruaha chat	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.89630	31.43836	1243	9173	9
yellow-vented bulbul	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.89630	31.43836	1243	9173	9

Table Att3.3-2 Lake Ikimba: Dry Season Avifauna Survey

Species	Status	Locality	Square	Day	Month	Year	Count	Latitude	Longitude	Alt	Card	Obs
blue-eared starling	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.91144	31.43801	1230	9173	9
bare-faced go-away bird	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.92025	31.43243	1220	9173	9
ruppell's starling	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.92145	31.43133	1216	9173	9
ruppell's starling	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.92897	31.42497	1217	9173	9
grey hornbill	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.93840	31.42119	1205	9173	9
grassland pipit	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.93840	31.42119	1205	9173	9
black cuckoo shrike	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.93840	31.42119	1205	9173	9
ring-necked dove	/	Lake Ikimba - southern edge	3101C	14	6	2017		-1.95913	31.41106	1210	9173	9
village weaver	X	Lake Ikimba	3101B	25	1	2018		-1.45321	31.58695	1155	9181	9
black-lored babbler	/	Lake Ikimba	3101B	25	1	2018		-1.45321	31.58695	1155	9181	9
pied kingfisher	/	Lake Ikimba	3101B	25	1	2018		-1.45321	31.58695	1155	9181	9
palm-nut vulture	/	Lake Ikimba	3101B	25	1	2018		-1.45321	31.58695	1155	9181	9
red-chested sunbird	/	Lake Ikimba	3101B	25	1	2018		-1.45321	31.58695	1155	9181	9
pied kingfisher	/	Lake Ikimba	3101B	25	1	2018		-1.43275	31.58640	1169	9181	9
grassland pipit	/	Lake Ikimba	3101B	25	1	2018		-1.44991	31.54881	1183	9181	9
red-chested sunbird	/	Lake Ikimba	3101B	25	1	2018		-1.45981	31.54375	1166	9181	9
carruther's cisticola	/	Lake Ikimba	3101B	25	1	2018		-1.45981	31.54375	1166	9181	9
pied kingfisher	/	Lake Ikimba	3101B	25	1	2018		-1.45981	31.54375	1166	9181	9
white-throated bee-eater	/	Lake Ikimba	3101B	25	1	2018		-1.44965	31.53874	1164	9181	9
Angola swallow	/	Lake Ikimba	3101B	25	1	2018		-1.44965	31.53874	1164	9181	9
paradise flycatcher	/	Lake Ikimba	3101B	25	1	2018		-1.44965	31.53874	1164	9181	9
village weaver	X	Lake Ikimba	3101B	25	1	2018		-1.44965	31.53874	1164	9181	9

Table Att3.3-2 Lake Ikimba: Dry Season Avifauna Survey

Species	Status	Locality	Square	Day	Month	Year	Count	Latitude	Longitude	Alt	Card	Obs
slender-billed weaver	/	Lake Ikimba	3101B	25	1	2018		-1.44965	31.53874	1164	9181	9
fan-tailed widowbird	X	Lake Ikimba	3101B	25	1	2018		-1.44965	31.53874	1164	9181	9
sooty chat	/	Lake Ikimba	3101B	25	1	2018		-1.45027	31.53545	1171	9181	9
black-lored babbler	/	Lake Ikimba	3101B	25	1	2018		-1.45027	31.53545	1171	9181	9
fan-tailed widowbird	X	Lake Ikimba	3101B	25	1	2018		-1.45027	31.53545	1171	9181	9
splendid glossy starling	/	Lake Ikimba	3101B	25	1	2018		-1.45027	31.53545	1171	9181	9
pin-tailed whydah	X	Lake Ikimba	3101B	25	1	2018		-1.45027	31.53545	1171	9181	9
brown parrot	/	Lake Ikimba	3101B	25	1	2018		-1.45419	31.53227	1174	9181	9
sooty chat	/	Lake Ikimba	3101B	25	1	2018		-1.45419	31.53227	1174	9181	9
yellow-fronted canary	/	Lake Ikimba	3101B	25	1	2018		-1.45419	31.53227	1174	9181	9
fan-tailed widowbird	/	Lake Ikimba	3101B	25	1	2018		-1.45419	31.53227	1174	9181	9
bronze mannikin	/	Lake Ikimba	3101B	25	1	2018		-1.45419	31.53227	1174	9181	9
northern grey-headed Sparrow	/	Lake Ikimba	3101B	25	1	2018		-1.45419	31.53227	1174	9181	9
village weaver	/	Lake Ikimba	3101B	25	1	2018		-1.45419	31.53227	1174	9181	9
Angola swallow	/	Lake Ikimba	3101B	25	1	2018		-1.45419	31.53227	1174	9181	9
white-browed robinchat	/	Lake Ikimba	3101B	25	1	2018		-1.45419	31.53227	1174	9181	9
yellow-throated longclaw	/	Lake Ikimba	3101B	25	1	2018		-1.45419	31.53227	1174	9181	9
yellow-throated leaflove	/	Lake Ikimba	3101B	25	1	2018		-1.45419	31.53227	1174	9181	9
pied kingfisher	/	Lake Ikimba	3101B	25	1	2018		-1.45419	31.53227	1174	9181	9
grey-backed fiscal	/	Lake Ikimba	3101B	25	1	2018		-1.45854	31.53173	1165	9181	9
African pied wagtail	/	Lake Ikimba	3101B	25	1	2018		-1.45854	31.53173	1165	9181	9
yellow-vented bulbul	/	Lake Ikimba	3101B	25	1	2018		-1.45854	31.53173	1165	9181	9

Table Att3.3-2 Lake Ikimba: Dry Season Avifauna Survey

Species	Status	Locality	Square	Day	Month	Year	Count	Latitude	Longitude	Alt	Card	Obs
northern grey-headed Sparrow	/	Lake Ikimba	3101B	25	1	2018		-1.45854	31.53173	1165	9181	9
village indigobird	/	Lake Ikimba	3101B	25	1	2018		-1.45854	31.53173	1165	9181	9
jacana	/	Lake Ikimba	3101B	25	1	2018		-1.46098	31.53176	1169	9181	9
black crake	/	Lake Ikimba	3101B	25	1	2018		-1.46098	31.53176	1169	9181	9
northern grey-headed Sparrow	/	Lake Ikimba	3101B	25	1	2018		-1.46098	31.53176	1169	9181	9
laughing dove	/	Lake Ikimba	3101B	25	1	2018		-1.46098	31.53176	1169	9181	9
red-eyed dove	/	Lake Ikimba	3101B	25	1	2018		-1.46098	31.53176	1169	9181	9
red-billed firefinch	/	Lake Ikimba	3101B	25	1	2018		-1.46098	31.53176	1169	9181	9
African thrush	/	Lake Ikimba	3101B	25	1	2018		-1.46098	31.53176	1169	9181	9
yellow bishop	/	Lake Ikimba	3101B	25	1	2018		-1.45556	31.53233	1168	9181	9
ross's turaco	/	Lake Ikimba	3101B	25	1	2018		-1.45043	31.53322	1181	9181	9
black-headed gonolek	/	Lake Ikimba	3101B	25	1	2018		-1.45094	31.53300	1182	9181	9
long-crested eagle	/	Lake Ikimba	3101B	25	1	2018		-1.44797	31.53413	1180	9181	9
Angola swallow	/	Lake Ikimba	3101B	25	1	2018		-1.44797	31.53413	1180	9181	9
lesser striped swallow	/	Lake Ikimba	3101B	25	1	2018		-1.44338	31.53465	1170	9181	9
sand martin	/	Lake Ikimba	3101B	25	1	2018		-1.43954	31.53552	1173	9181	9
barn swallow	/	Lake Ikimba	3101B	25	1	2018		-1.43954	31.53552	1173	9181	9
red-faced cisticola	/	Lake Ikimba	3101B	25	1	2018		-1.43954	31.53552	1173	9181	9
black-lored babbler	/	Lake Ikimba	3101B	25	1	2018		-1.43525	31.53661	1181	9181	9
white-browed coucal	/	Lake Ikimba	3101B	25	1	2018		-1.43377	31.53692	1176	9181	9
trilling cisticola	/	Lake Ikimba	3101B	25	1	2018		-1.43377	31.53692	1176	9181	9
tropical boubou	/	Lake Ikimba	3101B	25	1	2018		-1.43377	31.53692	1176	9181	9

Table Att3.3-2 Lake Ikimba: Dry Season Avifauna Survey

Species	Status	Locality	Square	Day	Month	Year	Count	Latitude	Longitude	Alt	Card	Obs
gymnogene	/	Lake Ikimba	3101B	25	1	2018		-1.43377	31.53692	1176	9181	9
ross's turaco	/	Lake Ikimba	3101B	25	1	2018		-1.43175	31.53734	1174	9181	9
African pied wagtail	/	Lake Ikimba	3101B	25	1	2018		-1.41991	31.54014	1193	9181	9
splendid glossy starling	/	Lake Ikimba	3101B	25	1	2018		-1.41991	31.54014	1193	9181	9
lesser striped swallow	/	Lake Ikimba	3101B	25	1	2018		-1.41991	31.54014	1193	9181	9
northern grey-headed Sparrow	/	Lake Ikimba	3101B	25	1	2018		-1.40523	31.54014	1168	9181	9
black-headed gonolek	/	Lake Ikimba	3101B	25	1	2018		-1.40430	31.53087	1203	9181	9
bare-faced go-away bird	/	Lake Ikimba	3101B	25	1	2018		-1.40430	31.53087	1203	9181	9
eastern grey plantain-eater	/	Lake Ikimba	3101B	25	1	2018		-1.40430	31.53087	1203	9181	9
eurasian bee-eater	/	Lake Ikimba	3101B	25	1	2018	5	-1.40356	31.53088	1204	9181	9
bare-faced go-away bird	/	Lake Ikimba	3101B	25	1	2018		-1.40356	31.53088	1204	9181	9
yellow-vented bulbul	/	Lake Ikimba	3101B	25	1	2018		-1.40356	31.53088	1204	9181	9
black-lored babbler	/	Lake Ikimba	3101B	25	1	2018		-1.40356	31.53088	1204	9181	9
long-billed pipit	/	Lake Ikimba	3101B	25	1	2018		-1.40356	31.53088	1204	9181	9
Angola swallow	/	Lake Ikimba	3101B	25	1	2018		-1.40356	31.53088	1204	9181	9
red-chested cuckoo	/	Lake Ikimba	3101B	25	1	2018		-1.40356	31.53088	1204	9181	9
woodland kingfisher	/	Lake Ikimba	3101B	25	1	2018		-1.40356	31.53088	1204	9181	9
laughing dove	/	Lake Ikimba	3101B	25	1	2018		-1.40356	31.53088	1204	9181	9
black-headed gonolek	/	Lake Ikimba	3101B	25	1	2018		-1.40356	31.53088	1204	9181	9
African thrush	/	Lake Ikimba	3101B	25	1	2018		-1.40356	31.53088	1204	9181	9
hadada ibis	/	Lake Ikimba	3101B	25	1	2018		-1.40356	31.53088	1204	9181	9
barn swallow	/	Lake Ikimba	3101B	25	1	2018		-1.40356	31.53088	1204	9181	9

Table Att3.3-2 Lake Ikimba: Dry Season Avifauna Survey

Species	Status	Locality	Square	Day	Month	Year	Count	Latitude	Longitude	Alt	Card	Obs
cattle egret	/	Lake Ikimba	3101B	25	1	2018		-1.40356	31.53088	1204	9181	9
grey-backed camaroptera	/	Lake Ikimba	3101B	25	1	2018		-1.40356	31.53088	1204	9181	9
white-browed scrub robin	/	Lake Ikimba	3101B	25	1	2018		-1.40356	31.53088	1204	9181	9
yellow-throated leaflove	/	Lake Ikimba	3101B	25	1	2018		-1.40356	31.53088	1204	9181	9
spot-flanked barbet	/	Lake Ikimba	3101B	25	1	2018		-1.40356	31.53088	1204	9181	9
yellow-throated longclaw	/	Lake Ikimba	3101B	25	1	2018		-1.40356	31.53088	1204	9181	9
mariqua sunbird	/	Lake Ikimba	3101B	25	1	2018		-1.40356	31.53088	1204	9181	9
wahlberg's eagle	/	Lake Ikimba	3101B	25	1	2018	2	-1.40356	31.53088	1204	9181	9
tawny-flanked prinia	/	Lake Ikimba	3101B	25	1	2018		-1.40356	31.53088	1204	9181	9
black-chested snake eagle	/	Lake Ikimba	3101B	25	1	2018		-1.40356	31.53088	1204	9181	9
bare-faced go-away bird	/	Lake Ikimba	3101B	25	1	2018		-1.40214	31.51528	1161	9181	9
black-lored babbler	/	Lake Ikimba	3101B	25	1	2018		-1.40214	31.51528	1161	9181	9
northern grey-headed Sparrow	/	Lake Ikimba	3101B	25	1	2018		-1.40214	31.51528	1161	9181	9
laughing dove	/	Lake Ikimba	3101B	25	1	2018		-1.40214	31.51528	1161	9181	9
house sparrow	/	Katoro village	3101A	25	1	2018		-1.39913	31.49911	1167	9181	9
wahlberg's eagle	/	Katoro village	3101A	25	1	2018		-1.39913	31.49911	1167	9181	9
northern grey-headed Sparrow	/	Katoro village	3101A	25	1	2018		-1.39913	31.49911	1167	9181	9
lesser striped swallow	/	Katoro village	3101A	25	1	2018		-1.39913	31.49911	1167	9181	9
northern grey-headed Sparrow	/	Lake Ikimba	3101A	25	1	2018		-1.42050	31.47913	1173	9181	9
yellow-throated longclaw	/	Lake Ikimba	3101A	25	1	2018		-1.42472	31.48014	1162	9181	9
white-throated bee-eater	/	Lake Ikimba	3101A	25	1	2018		-1.43975	31.48523	1174	9181	9
yellow-vented bulbul	/	Lake Ikimba	3101A	25	1	2018		-1.43975	31.48523	1174	9181	9

Table Att3.3-2 Lake Ikimba: Dry Season Avifauna Survey

Species	Status	Locality	Square	Day	Month	Year	Count	Latitude	Longitude	Alt	Card	Obs
white-headed roughwing	/	Lake Ikimba	3101A	25	1	2018		-1.43975	31.48523	1174	9181	9
northern brown-throated weaver	/	Lake Ikimba	3101A	25	1	2018		-1.43975	31.48523	1174	9181	9
scarlet-chested sunbird	/	Lake Ikimba	3101A	25	1	2018		-1.43975	31.48523	1174	9181	9
splendid glossy starling	/	Lake Ikimba	3101A	25	1	2018		-1.43975	31.48523	1174	9181	9
tropical boubou	/	Lake Ikimba	3101A	25	1	2018		-1.43975	31.48523	1174	9181	9
sand martin	/	Lake Ikimba	3101A	25	1	2018		-1.43975	31.48523	1174	9181	9
speckled mousebird	/	Lake Ikimba	3101A	25	1	2018		-1.43975	31.48523	1174	9181	9
palm-nut vulture	/	Lake Ikimba	3101A	25	1	2018		-1.43975	31.48523	1174	9181	9
shoebill	/	Lake Ikimba	3101A	25	1	2018		-1.43975	31.48523	1174	9181	9
village weaver	/	Lake Ikimba	3101A	25	1	2018		-1.43975	31.48523	1174	9181	9
grey crowned crane	/	Lake Ikimba	3101A	25	1	2018		-1.43975	31.48523	1174	9181	9
African marsh harrier	/	Lake Ikimba	3101A	25	1	2018		-1.43975	31.48523	1174	9181	9
black-headed heron	/	Lake Ikimba	3101A	25	1	2018		-1.43975	31.48523	1174	9181	9
blue-spotted wood dove	/	Lake Ikimba	3101A	25	1	2018		-1.42574	31.48054	1161	9181	9
lesser striped swallow	/	Lake Ikimba	3101A	25	1	2018		-1.40723	31.46267	1157	9181	9
yellow-throated longclaw	/	Lake Ikimba	3101A	25	1	2018		-1.41461	31.45573	1161	9181	9
bronze mannikin	/	Lake Ikimba	3101A	25	1	2018		-1.41461	31.45573	1161	9181	9
peters' twinspot	/	Lake Ikimba	3101A	25	1	2018		-1.41461	31.45573	1161	9181	9
speckled mousebird	/	Lake Ikimba	3101A	25	1	2018		-1.41461	31.45573	1161	9181	9
grey-backed fiscal	/	Lake Ikimba	3101A	25	1	2018		-1.41916	31.45520	1163	9181	9
black-chested snake eagle	/	Lake Ikimba	3101A	25	1	2018		-1.41916	31.45520	1163	9181	9
Ruhunga Village		Ruhunga village						-1.47946	31.43782	1166	9181	9

Table Att3.3-2 Lake Ikimba: Dry Season Avifauna Survey

Species	Status	Locality	Square	Day	Month	Year	Count	Latitude	Longitude	Alt	Card	Obs
speckled mousebird	/	Lake Ikimba	3101A	25	1	2018		-1.49915	31.44432	1175	9181	9
white-throated bee-eater	/	Lake Ikimba	3101A	25	1	2018		-1.49915	31.44432	1175	9181	9
Angola swallow	/	Lake Ikimba	3101A	25	1	2018		-1.49915	31.44432	1175	9181	9
eurasian bee-eater	/	Lake Ikimba	3101A	25	1	2018		-1.49915	31.44432	1175	9181	9
village weaver	/	Mbya-Kasikizi village	3101C	25	1	2018	40	-1.51913	31.44930	1209	9181	9
lilac-breasted roller	/	Lake Ikimba	3101C	25	1	2018		-1.52873	31.45298	1189	9181	9
yellow-vented bulbul	/	Lake Ikimba	3101C	25	1	2018		-1.54259	31.45313	1230	9181	9
ruppell's starling	/	Lake Ikimba	3101C	25	1	2018		-1.54259	31.45313	1230	9181	9
African rock martin	/	Lake Ikimba	3101C	25	1	2018		-1.51467	31.48814	1194	9181	9
laughing dove	/	Lake Ikimba	3101C	25	1	2018		-1.51467	31.48814	1194	9181	9
village weaver	/	Lake Ikimba	3101C	25	1	2018	20	-1.50983	31.49072	1189	9181	9
pied crow	/	Lake Ikimba	3101C	25	1	2018		-1.50110	31.49504	1190	9181	9
house sparrow	/	Lake Ikimba	3101A	25	1	2018		-1.49131	31.49751	1189	9181	9
white-headed roughwing	/	Lake Ikimba	3101A	25	1	2018		-1.48858	31.49809	1190	9181	9
grey-backed fiscal	/	Lake Ikimba	3101A	25	1	2018		-1.48858	31.49809	1190	9181	9
grey-backed fiscal	/	Lake Ikimba camp	3101B	25	1	2018		-1.47371	31.50518	1158	9181	9
red-chested sunbird	/	Lake Ikimba camp	3101B	25	1	2018		-1.47371	31.50518	1158	9181	9
African marsh harrier	/	Lake Ikimba camp	3101B	25	1	2018		-1.47371	31.50518	1158	9181	9
whinchat	/	Lake Ikimba camp	3101B	25	1	2018		-1.47371	31.50518	1158	9181	9
baglafecht weaver	/	Lake Ikimba camp	3101B	25	1	2018		-1.47371	31.50518	1158	9181	9
stonechat	/	Lake Ikimba camp	3101B	25	1	2018		-1.47371	31.50518	1158	9181	9
fish eagle	/	Lake Ikimba camp	3101B	25	1	2018	2	-1.47371	31.50518	1158	9181	9

Table Att3.3-2 Lake Ikimba: Dry Season Avifauna Survey

Species	Status	Locality	Square	Day	Month	Year	Count	Latitude	Longitude	Alt	Card	Obs
palm-nut vulture	/	Lake Ikimba camp	3101B	25	1	2018	3	-1.47371	31.50518	1158	9181	9
wattled plover	/	Lake Ikimba camp	3101B	25	1	2018		-1.47371	31.50518	1158	9181	9
black-headed gonolek	/	Lake Ikimba camp	3101B	25	1	2018		-1.47371	31.50518	1158	9181	9
red-faced cisticola	/	Lake Ikimba camp	3101B	25	1	2018		-1.47371	31.50518	1158	9181	9
purple heron	/	Lake Ikimba camp	3101B	25	1	2018		-1.47371	31.50518	1158	9181	9
long-tailed cormorant	/	Lake Ikimba camp	3101B	25	1	2018		-1.47371	31.50518	1158	9181	9
yellow-vented bulbul	/	Lake Ikimba camp	3101B	25	1	2018		-1.47371	31.50518	1158	9181	9
sand martin	/	Lake Ikimba camp	3101B	25	1	2018		-1.47371	31.50518	1158	9181	9
squacco heron	/	Lake Ikimba camp	3101B	25	1	2018		-1.47371	31.50518	1158	9181	9
fan-tailed widowbird	/	Lake Ikimba camp	3101B	25	1	2018		-1.47371	31.50518	1158	9181	9
white-throated bee-eater	/	Lake Ikimba camp	3101B	25	1	2018		-1.47371	31.50518	1158	9181	9
gabar goshawk	/	Lake Ikimba camp	3101B	25	1	2018		-1.47371	31.50518	1158	9181	9
hadada ibis	/	Lake Ikimba camp	3101B	25	1	2018		-1.47371	31.50518	1158	9181	9
bronze mannikin	/	Lake Ikimba camp	3101B	25	1	2018		-1.47371	31.50518	1158	9181	9
grosbeak weaver	/	Lake Ikimba camp	3101B	25	1	2018		-1.47371	31.50518	1158	9181	9
yellow-throated longclaw	/	Lake Ikimba camp	3101B	25	1	2018		-1.47371	31.50518	1158	9181	9
Angola swallow	/	Lake Ikimba camp	3101B	25	1	2018		-1.47371	31.50518	1158	9181	9
black crake	/	Lake Ikimba camp	3101B	25	1	2018		-1.47371	31.50518	1158	9181	9
jacana	/	Lake Ikimba camp	3101B	25	1	2018		-1.47371	31.50518	1158	9181	9
fawn-breasted waxbill	/	Lake Ikimba camp	3101B	25	1	2018		-1.47371	31.50518	1158	9181	9
ruppell's starling	/	Lake Ikimba camp	3101B	25	1	2018		-1.47371	31.50518	1158	9181	9
lesser swamp warbler	/	Lake Ikimba camp	3101B	25	1	2018		-1.47371	31.50518	1158	9181	9

Table Att3.3-2 Lake Ikimba: Dry Season Avifauna Survey

Species	Status	Locality	Square	Day	Month	Year	Count	Latitude	Longitude	Alt	Card	Obs
yellow-mantled weaver	/	Lake Ikimba camp	3101B	25	1	2018		-1.47371	31.50518	1158	9181	9
cattle egret	/	Lake Ikimba camp	3101B	25	1	2018	470	-1.47371	31.50518	1158	9181	9
swamp nightjar	/	Lake Ikimba camp	3101B	25	1	2018		-1.47371	31.50518	1158	9181	9
red-eyed dove	/	Lake Ikimba camp	3101B	26	1	2018		-1.47371	31.50518	1158	9181	9
African marsh harrier	/	Lake Ikimba camp	3101B	26	1	2018		-1.47371	31.50518	1158	9181	9
ruppell's starling	/	Lake Ikimba camp	3101B	26	1	2018		-1.47371	31.50518	1158	9181	9
palm-nut vulture	/	Lake Ikimba camp	3101B	26	1	2018		-1.47371	31.50518	1158	9181	9
black-headed gonolek	/	Lake Ikimba camp	3101B	26	1	2018		-1.47371	31.50518	1158	9181	9
great white egret	/	Lake Ikimba camp	3101B	26	1	2018		-1.47371	31.50518	1158	9181	9
nubian woodpecker	/	Lake Ikimba camp	3101B	26	1	2018		-1.47371	31.50518	1158	9181	9
cardinal woodpecker	/	Lake Ikimba camp	3101B	26	1	2018		-1.47371	31.50518	1158	9181	9
hamerkop	/	Lake Ikimba camp	3101B	26	1	2018		-1.47371	31.50518	1158	9181	9
red-chested cuckoo	/	Lake Ikimba camp	3101B	26	1	2018		-1.47371	31.50518	1158	9181	9
hadada ibis	/	Lake Ikimba camp	3101B	26	1	2018		-1.47371	31.50518	1158	9181	9
copper sunbird	/	Lake Ikimba camp	3101B	26	1	2018		-1.47371	31.50518	1158	9181	9
blue-spotted wood dove	/	Lake Ikimba camp	3101B	26	1	2018		-1.47371	31.50518	1158	9181	9
night heron	/	Lake Ikimba camp	3101B	26	1	2018		-1.47371	31.50518	1158	9181	9
grey-backed fiscal	/	Lake Ikimba camp	3101B	26	1	2018		-1.47371	31.50518	1158	9181	9
red-headed quelea	/	Lake Ikimba camp	3101B	26	1	2018		-1.47371	31.50518	1158	9181	9
woodland kingfisher	/	Lake Ikimba camp	3101B	26	1	2018		-1.47371	31.50518	1158	9181	9
papyrus canary	/	Lake Ikimba camp	3101B	26	1	2018		-1.47371	31.50518	1158	9181	9
bronze mannikin	/	Lake Ikimba camp	3101B	26	1	2018		-1.47371	31.50518	1158	9181	9

Table Att3.3-2 Lake Ikimba: Dry Season Avifauna Survey

Species	Status	Locality	Square	Day	Month	Year	Count	Latitude	Longitude	Alt	Card	Obs
green pigeon	/	Lake Ikimba camp	3101B	26	1	2018		-1.47371	31.50518	1158	9181	9
fawn-breasted waxbill	/	Lake Ikimba camp	3101B	26	1	2018		-1.47371	31.50518	1158	9181	9
yellow-throated longclaw	/	Lake Ikimba camp	3101B	26	1	2018		-1.47371	31.50518	1158	9181	9
whinchat	/	Lake Ikimba camp	3101B	26	1	2018		-1.47371	31.50518	1158	9181	9
white-browed robinchat	/	Lake Ikimba camp	3101B	26	1	2018		-1.47371	31.50518	1158	9181	9
mariqua sunbird	/	Lake Ikimba camp	3101B	26	1	2018		-1.47371	31.50518	1158	9181	9
papyrus yellow warbler	/	Lake Ikimba camp	3101B	26	1	2018		-1.47371	31.50518	1158	9181	9
red-chested sunbird	/	Lake Ikimba camp	3101B	26	1	2018		-1.47371	31.50518	1158	9181	9
baglafecht weaver	/	Lake Ikimba camp	3101B	26	1	2018		-1.47371	31.50518	1158	9181	9
yellow-vented bulbul	/	Lake Ikimba camp	3101B	26	1	2018		-1.47371	31.50518	1158	9181	9
grey crowned crane	/	Lake Ikimba camp	3101B	26	1	2018		-1.47371	31.50518	1158	9181	9
jacana	/	Lake Ikimba camp	3101B	26	1	2018		-1.47371	31.50518	1158	9181	9
blue-headed coucal	/	Lake Ikimba camp	3101B	26	1	2018		-1.47371	31.50518	1158	9181	9
red-faced cisticola	/	Lake Ikimba camp	3101B	26	1	2018		-1.47371	31.50518	1158	9181	9
eastern grey plantain-eater	/	Lake Ikimba camp	3101B	26	1	2018		-1.47371	31.50518	1158	9181	9
fan-tailed widowbird	/	Lake Ikimba camp	3101B	26	1	2018		-1.47371	31.50518	1158	9181	9
osprey	/	Lake Ikimba camp	3101B	26	1	2018		-1.47371	31.50518	1158	9181	9
drongo	/	Lake Ikimba camp	3101B	26	1	2018		-1.47371	31.50518	1158	9181	9
barn swallow	/	Lake Ikimba camp	3101B	26	1	2018		-1.47371	31.50518	1158	9181	9
black-shouldered kite	/	Lake Ikimba camp	3101B	26	1	2018		-1.47371	31.50518	1158	9181	9
yellow-fronted canary	/	Lake Ikimba camp	3101B	26	1	2018		-1.47371	31.50518	1158	9181	9
white-throated bee-eater	/	Lake Ikimba camp	3101B	26	1	2018		-1.47371	31.50518	1158	9181	9

Table Att3.3-2 Lake Ikimba: Dry Season Avifauna Survey

Species	Status	Locality	Square	Day	Month	Year	Count	Latitude	Longitude	Alt	Card	Obs
blue-cheeked bee-eater	/	Lake Ikimba camp	3101B	26	1	2018		-1.47371	31.50518	1158	9181	9
grosbeak weaver	/	Lake Ikimba camp	3101B	26	1	2018		-1.47371	31.50518	1158	9181	9
drongo	/	Lake Ikimba	3101B	26	1	2018		-1.47564	31.50026	1187	9181	9
northern grey-headed Sparrow	/	Lake Ikimba	3101B	26	1	2018		-1.47564	31.50026	1187	9181	9
grey-backed fiscal	/	Lake Ikimba	3101A	26	1	2018		-1.48665	31.49839	1196	9181	9
brown-crowned tchagra	/	Lake Ikimba	3101A	26	1	2018		-1.49977	31.49539	1188	9181	9
yellow-throated longclaw	/	Lake Ikimba	3101C	26	1	2018		-1.57363	31.48681	1170	9181	9
village weaver	/	Kabirizi village	3101C	26	1	2018	60	-1.57785	31.49474	1218	9181	9
yellow-vented bulbul	/	Kabirizi village	3101C	26	1	2018		-1.57785	31.49474	1218	9181	9
laughing dove	/	Kabirizi village	3101C	26	1	2018		-1.57785	31.49474	1218	9181	9
ruppell's starling	/	Lake Ikimba	3101D	26	1	2018		-1.58443	31.50032	1170	9181	9
pied crow	/	Lake Ikimba	3101D	26	1	2018		-1.58897	31.50343	1186	9181	9
village weaver	/	Rubare village	3101D	26	1	2018		-1.59859	31.52041	1168	9181	9
northern grey-headed Sparrow	/	Rubare village	3101D	26	1	2018		-1.59859	31.52041	1168	9181	9
laughing dove	/	Rubare village	3101D	26	1	2018		-1.59859	31.52041	1168	9181	9
splendid glossy starling	/	Rubare village	3101D	26	1	2018		-1.59859	31.52041	1168	9181	9
sooty chat	/	Rubare village	3101D	26	1	2018		-1.59859	31.52041	1168	9181	9
wahlberg's eagle	/	Lake Ikimba	3101D	26	1	2018		-1.59022	31.52859	1188	9181	9
bare-faced go-away bird	/	Lake Ikimba	3101D	26	1	2018		-1.58498	31.53264	1182	9181	9
drongo	/	Lake Ikimba	3101D	26	1	2018		-1.58498	31.53264	1182	9181	9
yellow-vented bulbul	/	Lake Ikimba	3101D	26	1	2018		-1.58047	31.53171	1169	9181	9
bue-naped mousebird	/	Lake Ikimba	3101D	26	1	2018		-1.58047	31.53171	1169	9181	9

Table Att3.3-2 Lake Ikimba: Dry Season Avifauna Survey

Species	Status	Locality	Square	Day	Month	Year	Count	Latitude	Longitude	Alt	Card	Obs
whiskered tern	/	Lake Ikimba	3101D	26	1	2018		-1.58047	31.53171	1169	9181	9
ring-necked dove	/	Lake Ikimba	3101D	26	1	2018		-1.58047	31.53171	1169	9181	9
trilling cisticola	/	Lake Ikimba	3101D	26	1	2018		-1.58047	31.53171	1169	9181	9
pin-tailed whydah	/	Lake Ikimba	3101D	26	1	2018		-1.58047	31.53171	1169	9181	9
black-headed gonolek	/	Lake Ikimba	3101D	26	1	2018		-1.58047	31.53171	1169	9181	9
red-chested sunbird	/	Lake Ikimba	3101D	26	1	2018		-1.58047	31.53171	1169	9181	9
brimstone canary	/	Lake Ikimba	3101D	26	1	2018		-1.58047	31.53171	1169	9181	9
sooty chat	/	Lake Ikimba	3101D	26	1	2018		-1.58047	31.53171	1169	9181	9
red-cheeked cordonbleu	/	Lake Ikimba	3101D	26	1	2018		-1.58047	31.53171	1169	9181	9
ruppell's starling	/	Lake Ikimba	3101D	26	1	2018		-1.58432	31.53319	1184	9181	9
lilac-breasted roller	/	Lake Ikimba	3101D	26	1	2018		-1.57573	31.53846	1179	9181	9
ruppell's starling	/	Lake Ikimba	3101D	26	1	2018		-1.56021	31.54369	1181	9181	9
speckled mousebird	/	Lake Ikimba	3101D	26	1	2018		-1.56021	31.54369	1181	9181	9
yellow-vented bulbul	/	Lake Ikimba	3101D	26	1	2018		-1.56021	31.54369	1181	9181	9
drongo	/	Lake Ikimba	3101D	26	1	2018		-1.55280	31.54307	1172	9181	9
laughing dove	/	Lake Ikimba	3101D	26	1	2018		-1.55280	31.54307	1172	9181	9
common fiscal	/	Lake Ikimba	3101D	26	1	2018		-1.54882	31.54174	1169	9181	9
white-browed robinchat	/	Lake Ikimba	3101D	26	1	2018		-1.54568	31.54170	1164	9181	9
village weaver	/	Lake Ikimba	3101D	26	1	2018		-1.52920	31.53242	1166	9181	9
laughing dove	/	Lake Ikimba	3101D	26	1	2018		-1.52920	31.53242	1166	9181	9
ruppell's starling	/	Lake Ikimba	3101D	26	1	2018		-1.52920	31.53242	1166	9181	9
grey-backed fiscal	/	Lake Ikimba	3101D	26	1	2018		-1.55315	31.54313	1174	9181	9

Table Att3.3-2 Lake Ikimba: Dry Season Avifauna Survey

Species	Status	Locality	Square	Day	Month	Year	Count	Latitude	Longitude	Alt	Card	Obs
wahlberg's eagle	/	Lake Ikimba	3101D	26	1	2018		-1.55315	31.54313	1174	9181	9
African pied wagtail	/	Lake Ikimba	3101D	26	1	2018		-1.54127	31.55542	1200	9181	9
northern grey-headed Sparrow	/	Lake Ikimba	3101D	26	1	2018		-1.54127	31.55542	1200	9181	9
black-winged red bishop	/	Lake Ikimba	3101D	26	1	2018		-1.53604	31.55685	1193	9181	9
hadada ibis	/	Lake Ikimba	3101D	26	1	2018		-1.51517	31.57013	1199	9181	9
village indigobird	/	Lake Ikimba	3101D	26	1	2018		-1.51026	31.57212	1192	9181	9
laughing dove	/	Lake Ikimba	3101D	26	1	2018		-1.51026	31.57212	1192	9181	9
levailliant's cuckoo	/	Lake Ikimba	3101B	26	1	2018		-1.49451	31.60686	1162	9181	9
brown parrot	/	Lake Ikimba	3101B	26	1	2018		-1.49451	31.60686	1162	9181	9
ruppell's starling	/	Lake Ikimba	3101B	26	1	2018		-1.49451	31.60686	1162	9181	9
yellow-vented bulbul	/	Lake Ikimba	3101B	26	1	2018		-1.49451	31.60686	1162	9181	9
eastern grey plantain-eater	/	Lake Ikimba	3101B	26	1	2018		-1.49451	31.60686	1162	9181	9
red-chested sunbird	/	Lake Ikimba	3101B	26	1	2018		-1.49451	31.60686	1162	9181	9
grey-backed camaroptera	/	Lake Ikimba	3101B	26	1	2018		-1.49451	31.60686	1162	9181	9
ross's turaco	/	Lake Ikimba	3101B	26	1	2018		-1.49451	31.60686	1162	9181	9
yellow-rumped tinkerbird	/	Lake Ikimba	3101B	26	1	2018		-1.49451	31.60686	1162	9181	9
hadada ibis	/	Lake Ikimba	3101B	26	1	2018		-1.49451	31.60686	1162	9181	9
green pigeon	/	Lake Ikimba	3101B	26	1	2018		-1.49451	31.60686	1162	9181	9
white-headed roughwing	/	Lake Ikimba	3101B	26	1	2018		-1.49451	31.60686	1162	9181	9
olive-bellied sunbird	/	Lake Ikimba	3101B	26	1	2018		-1.49451	31.60686	1162	9181	9
cape wagtail	/	Lake Ikimba	3101B	26	1	2018		-1.49451	31.60686	1162	9181	9
double-toothed barbet	/	Lake Ikimba	3101B	26	1	2018		-1.49451	31.60686	1162	9181	9

Table Att3.3-2 Lake Ikimba: Dry Season Avifauna Survey

Species	Status	Locality	Square	Day	Month	Year	Count	Latitude	Longitude	Alt	Card	Obs
red-faced lovebird	/	Lake Ikimba	3101B	26	1	2018		-1.49451	31.60686	1162	9181	9

Table Att3.3-3 Burigi-Biharamulo Game Reserve

Species	Status	Locality	Square	Day	Month	Year	Count	Latitude	Longitude	Alt	Card	Obs
drongo	/	Biharamulo GR	3102B	15	6	2017		-2.36133	31.60528	1152	9173	9
blue-spotted wood dove	/	Biharamulo GR	3102B	15	6	2017		-2.38655	31.58877	1155	9173	9
common fiscal	/	Biharamulo GR	3102B	15	6	2017		-2.39191	31.60148	1155	9173	9
palm-nut vulture	/	Biharamulo GR	3102B	15	6	2017		-2.38992	31.60826	1154	9173	9
eastern paradise whydah	X	Biharamulo GR	3102B	15	6	2017		-2.38679	31.62096	1151	9173	9
Lesser Striped Swallow	/	Biharamulo GR	3102B	15	6	2017		-2.38079	31.63828	1144	9173	9
fish eagle	/	Biharamulo GR	3102B	15	6	2017		-2.38172	31.65975	1137	9173	9
yellow-vented bulbul	/	Biharamulo GR	3102B	15	6	2017		-2.38172	31.65975	1137	9173	9
cattle egret	/	south to Nyamirembe	3102B	15	6	2017		-2.37732	31.67491	1143	9173	9
grey-backed fiscal	/	south to Nyamirembe	3102B	15	6	2017		-2.37700	31.67944	1140	9173	9
pied kingfisher	/	south to Nyamirembe	3102B	15	6	2017		-2.37259	31.68350	1146	9173	9
yellow-billed kite	/	south to Nyamirembe	3102B	15	6	2017		-2.37259	31.68350	1146	9173	9
marabou stork	/	south to Nyamirembe	3102B	15	6	2017		-2.37259	31.68350	1146	9173	9
African pied wagtail	/	south to Nyamirembe	3102B	15	6	2017		-2.44567	31.73135	1182	9173	9
cattle egret	/	south to Nyamirembe	3102D	15	6	2017	52	-2.51955	31.70097	1146	9173	9
cattle egret	/	south to Nyamirembe	3102D	15	6	2017	30	-2.53772	31.66346	1179	9173	9
cattle egret	/	Nyamirembe-Biharamulo	3102D	15	6	2017	17	-2.56358	31.62930	1173	9173	9
bare-faced go-away bird	/	Nyamirembe-Biharamulo	3102D	15	6	2017		-2.59496	31.57630	1183	9173	9
ring-necked dove	/	Nyamirembe-Biharamulo	3102D	15	6	2017		-2.59496	31.57630	1183	9173	9
black-headed heron	/	Nyamirembe-Biharamulo	3102D	15	6	2017		-2.62326	31.52150	1229	9173	9
gymnogene	/	Nyamirembe-Biharamulo	3102D	15	6	2017		-2.62326	31.52150	1229	9173	9
African pied wagtail	/	Nyamirembe-Biharamulo	3102D	15	6	2017		-2.62326	31.52150	1229	9173	9

Table Att3.3-3 Burigi-Biharamulo Game Reserve

Species	Status	Locality	Square	Day	Month	Year	Count	Latitude	Longitude	Alt	Card	Obs
western banded snake eagle	/	Nyamirembe-Biharamulo	3102C	15	6	2017		-2.62374	31.49230	1226	9173	9
striped kingfisher	/	Nyamirembe-Biharamulo	3102C	15	6	2017		-2.62527	31.48558	1226	9173	9
striped kingfisher	/	Nyamirembe-Biharamulo	3102C	15	6	2017		-2.62943	31.47610	1231	9173	9
grosbeak weaver	/	Nyamirembe-Biharamulo	3102C	15	6	2017		-2.62926	31.42212	1294	9173	9
red-headed lovebird	/	Nyamirembe-Biharamulo	3102C	15	6	2017		-2.62926	31.42212	1294	9173	9
green-winged pytilia	/	Nyamirembe-Biharamulo	3102C	15	6	2017		-2.62926	31.42212	1294	9173	9
blue-spotted wood dove	/	Nyamirembe-Biharamulo	3102C	15	6	2017		-2.62926	31.42212	1294	9173	9
speckled mousebird	/	Nyamirembe-Biharamulo	3102C	15	6	2017		-2.62926	31.42212	1294	9173	9
white-backed vulture	/	Biharamulo GR	3102C	17	6	2017	3	-2.50750	31.41804	1329	9173	9
marabou stork	/	Kigombe Ranger Post	3102C	17	6	2017		-2.50643	31.42019	1325	9173	9
hooded vulture	/	Kigombe Ranger Post	3102C	17	6	2017	4	-2.50643	31.42019	1325	9173	9
white-backed vulture	/	Kigombe Ranger Post	3102C	17	6	2017	60	-2.50643	31.42019	1325	9173	9
white-naped raven	/	Kigombe Ranger Post	3102C	17	6	2017	2	-2.50643	31.42019	1325	9173	9
pied crow	/	Kigombe Ranger Post	3102C	17	6	2017		-2.50643	31.42019	1325	9173	9
palm-nut vulture	/	Kigombe Ranger Post	3102C	17	6	2017	1	-2.50643	31.42019	1325	9173	9
red-billed oxpecker	/	Kigombe Ranger Post	3102C	17	6	2017		-2.50643	31.42019	1325	9173	9
violet-backed starling	/	Kigombe Ranger Post	3102C	17	6	2017		-2.50643	31.42019	1325	9173	9
yellow-vented bulbul	/	Kigombe Ranger Post	3102C	17	6	2017		-2.50643	31.42019	1325	9173	9
holub's golden weaver	/	Kigombe Ranger Post	3102C	17	6	2017		-2.50643	31.42019	1325	9173	9
yellow-throated leaflove	/	Kigombe Ranger Post	3102C	17	6	2017		-2.50643	31.42019	1325	9173	9
ruaha chat	/	Kigombe Ranger Post	3102C	17	6	2017		-2.50643	31.42019	1325	9173	9
northern grey-headed sparrow	/	Kigombe Ranger Post	3102C	17	6	2017		-2.50643	31.42019	1325	9173	9

Table Att3.3-3 Burigi-Biharamulo Game Reserve

Species	Status	Locality	Square	Day	Month	Year	Count	Latitude	Longitude	Alt	Card	Obs
bateleur	/	Kigombe Ranger Post	3102C	17	6	2017		-2.50643	31.42019	1325	9173	9
western yellowbill	/	Kigombe Ranger Post	3102C	17	6	2017		-2.50643	31.42019	1325	9173	9
black and white casqued hornbill	/	Kigombe Ranger Post	3102C	17	6	2017		-2.50643	31.42019	1325	9173	9
trilling cisticola	/	Biharamulo GR	3102A	17	6	2017		-2.49218	31.44514	1331	9173	9
woodland pipit ?	/	Biharamulo GR	3102A	17	6	2017		-2.49218	31.44514	1331	9173	9
tawny-flanked prinia	/	Biharamulo GR	3102A	17	6	2017		-2.49218	31.44514	1331	9173	9
arrow-marked babbler	/	Biharamulo GR	3102A	17	6	2017		-2.49218	31.44514	1331	9173	9
white-browed scrub robin	/	Biharamulo GR	3102A	17	6	2017		-2.49218	31.44514	1331	9173	9
black-backed puffback	/	Biharamulo GR	3102A	17	6	2017		-2.49218	31.44514	1331	9173	9
cinnamon rock bunting	/	Biharamulo GR	3102A	17	6	2017		-2.49218	31.44514	1331	9173	9
yellow-vented bulbul	/	Biharamulo GR	3102A	17	6	2017		-2.49218	31.44514	1331	9173	9
plain-backed pipit ?	/	Biharamulo GR	3102A	17	6	2017		-2.43166	31.48674	1358	9173	9
drongo	/	Biharamulo GR	3102A	17	6	2017		-2.43166	31.48674	1358	9173	9
long-billed pipit ?	/	Biharamulo GR	3102A	17	6	2017		-2.43166	31.48674	1358	9173	9
souza's shrike	/	Biharamulo GR	3102A	17	6	2017		-2.43166	31.48674	1358	9173	9
crested barbet	/	Biharamulo GR	3102B	17	6	2017		-2.41974	31.52683	1312	9173	9
gymnogene	/	Biharamulo GR	3102B	17	6	2017		-2.40949	31.53309	1276	9173	9
violet-backed starling	/	Biharamulo GR	3102B	17	6	2017		-2.40044	31.54360	1347	9173	9
drongo	/	Biharamulo GR	3102B	17	6	2017		-2.40044	31.54360	1347	9173	9
white-breasted cuckoo shrike	/	Biharamulo GR	3102B	17	6	2017		-2.39906	31.54690	1370	9173	9
red-faced crombec	/	Biharamulo GR	3102B	17	6	2017		-2.39906	31.54690	1370	9173	9
chin-spot batis	/	Biharamulo GR	3102B	17	6	2017		-2.39906	31.54690	1370	9173	9

Table Att3.3-3 Burigi-Biharamulo Game Reserve

Species	Status	Locality	Square	Day	Month	Year	Count	Latitude	Longitude	Alt	Card	Obs
green-capped eremomela	/	Biharamulo GR	3102B	17	6	2017		-2.39906	31.54690	1370	9173	9
black-backed puffback	/	Biharamulo GR	3102B	17	6	2017		-2.39906	31.54690	1370	9173	9
miombo wren warbler	/	Biharamulo GR	3102B	17	6	2017		-2.39906	31.54690	1370	9173	9
grey-backed fiscal	/	Biharamulo GR	3102B	17	6	2017		-2.39906	31.54690	1370	9173	9
ring-necked dove	/	Biharamulo GR	3102B	17	6	2017		-2.39339	31.56816	1305	9173	9
crowned eagle	/	Biharamulo GR	3102B	17	6	2017		-2.39339	31.56816	1305	9173	9
greater honeyguide	/	Biharamulo GR	3102B	17	6	2017		-2.39339	31.56816	1305	9173	9
chin-spot batis	/	Biharamulo GR	3102B	17	6	2017		-2.39339	31.56816	1305	9173	9
yellow-vented bulbul	/	Biharamulo GR	3102B	17	6	2017		-2.39339	31.56816	1305	9173	9
white helmet shrike	/	Biharamulo GR	3102B	17	6	2017		-2.39339	31.56816	1305	9173	9
retz's helmet shrike	/	Biharamulo GR	3102B	17	6	2017		-2.39339	31.56816	1305	9173	9
red-headed weaver	/	Biharamulo GR	3102B	17	6	2017		-2.39339	31.56816	1305	9173	9
black cuckoo shrike	/	Biharamulo GR	3102B	17	6	2017		-2.39339	31.56816	1305	9173	9
yellow-fronted tinkerbird	/	Biharamulo GR	3102B	17	6	2017		-2.39339	31.56816	1305	9173	9
white-breasted cuckoo shrike	/	Biharamulo GR	3102B	17	6	2017		-2.39339	31.56816	1305	9173	9
pale flycatcher	/	Biharamulo GR	3102B	17	6	2017		-2.39339	31.56816	1305	9173	9
yellow-bellied hyliota	/	Biharamulo GR	3102B	17	6	2017		-2.39339	31.56816	1305	9173	9
paradise flycatcher	/	Biharamulo GR	3102B	17	6	2017		-2.39339	31.56816	1305	9173	9
cabanis's bunting	/	Biharamulo GR	3102B	17	6	2017		-2.39339	31.56816	1305	9173	9
green-capped eremomela	/	Biharamulo GR	3102B	17	6	2017		-2.39339	31.56816	1305	9173	9
miombo wren warbler	/	Biharamulo GR	3102B	17	6	2017		-2.39339	31.56816	1305	9173	9
black-collared barbet	/	Biharamulo GR	3102B	17	6	2017		-2.39339	31.56816	1305	9173	9

Table Att3.3-3 Burigi-Biharamulo Game Reserve

Species	Status	Locality	Square	Day	Month	Year	Count	Latitude	Longitude	Alt	Card	Obs
black-headed oriole	/	Biharamulo GR	3102B	17	6	2017		-2.39339	31.56816	1305	9173	9
western violet-backed sunbird ?	/	Biharamulo GR	3102B	17	6	2017		-2.39339	31.56816	1305	9173	9
miombo scrub robin ?	/	Biharamulo GR	3102B	17	6	2017		-2.39339	31.56816	1305	9173	9
amethyst sunbird	/	Biharamulo GR	3102B	17	6	2017		-2.39339	31.56816	1305	9173	9
variable sunbird	/	Biharamulo GR	3102B	17	6	2017		-2.39339	31.56816	1305	9173	9
olive sunbird	/	Biharamulo GR	3102B	17	6	2017		-2.39494	31.57589	1210	9173	9
amethyst sunbird	/	Biharamulo GR	3102B	17	6	2017		-2.39494	31.57589	1210	9173	9
ring-necked dove	/	Biharamulo GR	3102B	17	6	2017		-2.39494	31.57589	1210	9173	9
yellow-throated leaflove	/	Biharamulo GR	3102B	17	6	2017		-2.39494	31.57589	1210	9173	9
grey-backed camaroptera	/	Biharamulo GR	3102B	17	6	2017		-2.39494	31.57589	1210	9173	9
ashy flycatcher	/	Biharamulo GR	3102B	17	6	2017		-2.39494	31.57589	1210	9173	9
paradise flycatcher	/	Biharamulo GR	3102B	17	6	2017		-2.39494	31.57589	1210	9173	9
yellow-vented bulbul	/	Biharamulo GR	3102B	17	6	2017		-2.39494	31.57589	1210	9173	9
black roughwing	/	Biharamulo GR	3102B	17	6	2017		-2.39494	31.57589	1210	9173	9
red-capped robinchat	/	Biharamulo GR	3102B	17	6	2017		-2.39494	31.57589	1210	9173	9
cinnamon bee-eater	/	Biharamulo GR	3102B	17	6	2017		-2.39494	31.57589	1210	9173	9
verreaux's eagle owl	/	Biharamulo GR	3102B	17	6	2017		-2.39494	31.57589	1210	9173	9
African hawk eagle	/	Biharamulo GR	3102B	17	6	2017		-2.39494	31.57589	1210	9173	9
crowned eagle	/	Biharamulo GR	3102B	17	6	2017		-2.39494	31.57589	1210	9173	9
ayres's hawk eagle	/	Biharamulo GR	3102B	17	6	2017		-2.39494	31.57589	1210	9173	9
barred owlet	/	Biharamulo GR	3102B	17	6	2017		-2.39494	31.57589	1210	9173	9
African wood owl	/	Biharamulo GR	3102B	17	6	2017		-2.39494	31.57589	1210	9173	9

Table Att3.3-3 Burigi-Biharamulo Game Reserve

Species	Status	Locality	Square	Day	Month	Year	Count	Latitude	Longitude	Alt	Card	Obs
barn owl	/	Biharamulo GR	3102B	17	6	2017		-2.39494	31.57589	1210	9173	9
white-faced scops owl	/	Biharamulo GR	3102B	18	6	2017		-2.39494	31.57589	1210	9173	9
greater honeyguide	/	Biharamulo GR	3102B	18	6	2017		-2.39494	31.57589	1210	9173	9
freckled nightjar	/	Biharamulo GR	3102B	18	6	2017		-2.39494	31.57589	1210	9173	9
blue-spotted wood dove	/	Biharamulo GR	3102B	18	6	2017		-2.39494	31.57589	1210	9173	9
coqui francolin	/	Biharamulo GR	3102B	18	6	2017		-2.39494	31.57589	1210	9173	9
yellow-breasted apalis	/	Biharamulo GR	3102B	18	6	2017		-2.39494	31.57589	1210	9173	9
familiar chat	/	Biharamulo GR	3102B	18	6	2017		-2.39494	31.57589	1210	9173	9
tropical boubou	/	Biharamulo GR	3102B	18	6	2017		-2.39494	31.57589	1210	9173	9
brown snake eagle	/	Biharamulo GR	3102B	18	6	2017		-2.39494	31.57589	1210	9173	9
bateleur	/	Biharamulo GR	3102B	18	6	2017		-2.39494	31.57589	1210	9173	9
chin-spot batis	/	Biharamulo GR	3102B	18	6	2017		-2.39494	31.57589	1210	9173	9
drongo	/	Biharamulo GR	3102B	18	6	2017		-2.39045	31.59002	1162	9173	9
Lesser Striped Swallow	/	Biharamulo GR	3102B	18	6	2017		-2.39045	31.59002	1162	9173	9
red-headed weaver	/	Biharamulo GR	3102B		13	2017		-2.39045	31.59002	1162	9173	9
long-billed pipit ?	/	Biharamulo GR	3102B	18	6	2017		-2.39045	31.59002	1162	9173	9
Lesser Striped Swallow	/	Biharamulo GR	3102B	18	6	2017		-2.38733	31.61779	1155	9173	9
violet-backed starling	/	Biharamulo GR	3102B	18	6	2017		-2.38733	31.61779	1155	9173	9
striped kingfisher	/	Biharamulo GR	3102B	18	6	2017		-2.38733	31.61779	1155	9173	9
little egret	/	Biharamulo GR	3102B	18	6	2017		-2.38572	31.62685	1171	9173	9
drongo	/	Biharamulo GR	3102B	18	6	2017		-2.38572	31.62685	1171	9173	9
African hawk eagle	/	Biharamulo GR	3102B	18	6	2017		-2.38536	31.62838	1171	9173	9

Table Att3.3-3 Burigi-Biharamulo Game Reserve

Species	Status	Locality	Square	Day	Month	Year	Count	Latitude	Longitude	Alt	Card	Obs
African pied wagtail	/	Biharamulo GR	3102B	18	6	2017		-2.38536	31.62838	1171	9173	9
green-winged pytilia	/	Biharamulo GR	3102B	18	6	2017		-2.38536	31.62838	1171	9173	9
western banded snake eagle	/	Biharamulo GR	3102B	18	6	2017		-2.38127	31.65056	1141	9173	9
variable sunbird	/	Biharamulo GR	3102B	18	6	2017		-2.38127	31.65056	1141	9173	9
Lesser Striped Swallow	/	Biharamulo GR	3102B	18	6	2017		-2.38127	31.65056	1141	9173	9
winding cisticola	/	Biharamulo GR	3102B	18	6	2017		-2.38127	31.65056	1141	9173	9
palm-nut vulture	/	Biharamulo GR	3102B	18	6	2017		-2.38303	31.65518	1141	9173	9
marico sunbird	/	Biharamulo GR	3102B	18	6	2017		-2.38303	31.65518	1141	9173	9
western banded snake eagle	/	Biharamulo GR	3102B	18	6	2017		-2.37933	31.64509	1144	9173	9
lilac-breasted roller	/	Biharamulo GR	3102B	18	6	2017		-2.38701	31.63397	1164	9173	9
striped kingfisher	/	Biharamulo GR	3102B	18	6	2017		-2.38701	31.63397	1164	9173	9
drongo	/	Biharamulo GR	3102B	18	6	2017		-2.38701	31.63397	1164	9173	9
bateleur	/	Biharamulo GR	3102B	18	6	2017		-2.38933	31.63701	1163	9173	9
brown snake eagle	/	Biharamulo GR	3102B	18	6	2017		-2.39199	31.63972	1165	9173	9
yellow-vented bulbul	/	Biharamulo GR	3102B	18	6	2017		-2.39199	31.63972	1165	9173	9
lilac-breasted roller	/	Biharamulo GR	3102B	18	6	2017		-2.39792	31.64476	1168	9173	9
senegal plover	/	Biharamulo GR	3102B	18	6	2017	4	-2.39556	31.64564	1161	9173	9
ring-necked dove	/	Biharamulo GR	3102B	18	6	2017		-2.39556	31.64564	1161	9173	9
bare-faced go-away bird	/	Biharamulo GR	3102B	18	6	2017		-2.40542	31.64722	1152	9173	9
sulphur-breasted bush shrike	/	Biharamulo GR	3102B	18	6	2017		-2.40542	31.64722	1152	9173	9
ruppell's starling	/	Biharamulo GR	3102B	18	6	2017		-2.40542	31.64722	1152	9173	9
slate-coloured boubou	/	Biharamulo GR	3102B	18	6	2017		-2.40542	31.64722	1152	9173	9

Table Att3.3-3 Burigi-Biharamulo Game Reserve

Species	Status	Locality	Square	Day	Month	Year	Count	Latitude	Longitude	Alt	Card	Obs
arrow-marked babbler	/	Biharamulo GR	3102B	18	6	2017		-2.40542	31.64722	1152	9173	9
paradise flycatcher	/	Biharamulo GR	3102B	18	6	2017		-2.40789	31.65025	1157	9173	9
slate-coloured boubou	/	Biharamulo GR	3102B	18	6	2017		-2.40789	31.65025	1157	9173	9
marico sunbird	/	Biharamulo GR	3102B	18	6	2017		-2.40789	31.65025	1157	9173	9
spot-flanked barbet	/	Biharamulo GR	3102B	18	6	2017		-2.40789	31.65025	1157	9173	9
brown parrot	/	Biharamulo GR	3102B	18	6	2017		-2.40789	31.65025	1157	9173	9
grey-backed fiscal	/	Biharamulo GR	3102B	18	6	2017		-2.40789	31.65025	1157	9173	9
grey hornbill	/	Biharamulo GR	3102B	18	6	2017		-2.40789	31.65025	1157	9173	9
drongo	/	Biharamulo GR	3102B	18	6	2017		-2.40789	31.65025	1157	9173	9
speckled mousebird	/	Biharamulo GR	3102B	18	6	2017		-2.41623	31.65539	1170	9173	9
yellow-vented bulbul	/	Biharamulo GR	3102B	18	6	2017		-2.41623	31.65539	1170	9173	9
blue-eared starling	/	Biharamulo GR	3102B	18	6	2017		-2.42047	31.65522	1169	9173	9
lilac-breasted roller	/	Biharamulo GR	3102B	18	6	2017		-2.42047	31.65522	1169	9173	9
bare-faced go-away bird	/	Biharamulo GR	3102B	18	6	2017		-2.42047	31.65522	1169	9173	9
southern ground hornbill	/	Biharamulo GR	3102B	18	6	2017		-2.42144	31.65223	1176	9173	9
magpie shrike	/	Biharamulo GR	3102B	18	6	2017		-2.42144	31.65223	1176	9173	9
ring-necked dove	/	Biharamulo GR	3102B	18	6	2017		-2.42144	31.65223	1176	9173	9
lizard buzzard	/	Biharamulo GR	3102B	18	6	2017		-2.42253	31.64865	1184	9173	9
greater honeyguide	/	Biharamulo GR	3102B	18	6	2017		-2.42253	31.64865	1184	9173	9
bateleur	/	Biharamulo GR	3102B	18	6	2017		-2.42421	31.64499	1187	9173	9
grey hornbill	/	Biharamulo GR	3102B	18	6	2017		-2.42418	31.64424	1200	9173	9
bateleur	/	Biharamulo GR	3102B	18	6	2017		-2.42708	31.63399	1187	9173	9

Table Att3.3-3 Burigi-Biharamulo Game Reserve

Species	Status	Locality	Square	Day	Month	Year	Count	Latitude	Longitude	Alt	Card	Obs
white-breasted cuckoo shrike	/	Biharamulo GR	3102B	18	6	2017		-2.42708	31.63399	1187	9173	9
black-headed oriole	/	Biharamulo GR	3102B	18	6	2017		-2.43139	31.65275	1207	9173	9
bateleur	/	Biharamulo GR	3102B	18	6	2017	2	-2.43139	31.65275	1207	9173	9
coqui francolin	/	Biharamulo GR	3102B	18	6	2017		-2.43139	31.65275	1207	9173	9
red-faced crombec	/	Biharamulo GR	3102B	18	6	2017		-2.43139	31.65275	1207	9173	9
laughing dove	/	Biharamulo GR	3102B	18	6	2017		-2.43139	31.65275	1207	9173	9
drongo	/	Biharamulo GR	3102B	18	6	2017		-2.43139	31.65275	1207	9173	9
sooty chat	/	Biharamulo GR	3102B	18	6	2017		-2.42886	31.63055	1187	9173	9
white-browed petronia	/	Biharamulo GR	3102B	18	6	2017		-2.42886	31.63055	1187	9173	9
lilac-breasted roller	/	Biharamulo GR	3102B	18	6	2017		-2.42886	31.63055	1187	9173	9
magpie shrike	/	Biharamulo GR	3102B	18	6	2017		-2.42886	31.63055	1187	9173	9
green pigeon	/	Biharamulo GR	3102B	18	6	2017	20	-2.42065	31.64397	1183	9173	9
paradise flycatcher	/	Biharamulo GR	3102B	18	6	2017		-2.42113	31.65326	1169	9173	9
ruppell's starling	/	Biharamulo GR	3102B	18	6	2017		-2.42113	31.65326	1169	9173	9
gabar goshawk	/	Biharamulo GR	3102B	18	6	2017		-2.42109	31.65397	1169	9173	9
red-necked spurfowl	/	Biharamulo GR	3102B	18	6	2017		-2.41458	31.65475	1171	9173	9
grey-backed fiscal	/	Biharamulo GR	3102B	18	6	2017		-2.40831	31.65054	1150	9173	9
tawny-flanked prinia	/	Biharamulo GR	3102B	18	6	2017		-2.40640	31.64855	1145	9173	9
slate-coloured boubou	/	Biharamulo GR	3102B	18	6	2017		-2.40640	31.64855	1145	9173	9
grey-backed fiscal	/	Biharamulo GR	3102B	18	6	2017		-2.40640	31.64855	1145	9173	9
brown parrot	/	Biharamulo GR	3102B	18	6	2017		-2.40242	31.64641	1151	9173	9
blue-naped mousebird	/	Biharamulo GR	3102B	18	6	2017		-2.40242	31.64641	1151	9173	9

Table Att3.3-3 Burigi-Biharamulo Game Reserve

Species	Status	Locality	Square	Day	Month	Year	Count	Latitude	Longitude	Alt	Card	Obs
sooty chat	/	Biharamulo GR	3102B	18	6	2017		-2.40018	31.64556	1157	9173	9
grey hornbill	/	Biharamulo GR	3102B	18	6	2017		-2.40018	31.64556	1157	9173	9
brubru	/	Biharamulo GR	3102B	18	6	2017		-2.40018	31.64556	1157	9173	9
yellow-vented bulbul	/	Biharamulo GR	3102B	18	6	2017		-2.40018	31.64556	1157	9173	9
grey hornbill	/	Biharamulo GR	3102B	18	6	2017		-2.39340	31.64099	1162	9173	9
lilac-breasted roller	/	Biharamulo GR	3102B	18	6	2017		-2.39021	31.63804	1155	9173	9
grey hornbill	/	Biharamulo GR	3102B	18	6	2017		-2.39021	31.63804	1155	9173	9
bateleur	/	Biharamulo GR	3102B	18	6	2017		-2.37915	31.64439	1139	9173	9
African pied wagtail	/	Biharamulo GR	3102B	18	6	2017		-2.37915	31.64439	1139	9173	9
red-necked spurfowl	/	Biharamulo GR	3102B	18	6	2017		-2.38297	31.65722	1136	9173	9
pied kingfisher	/	Biharamulo GR	3102B	18	6	2017		-2.38307	31.65591	1137	9173	9
palm-nut vulture	/	Biharamulo GR	3102B	18	6	2017		-2.38307	31.65591	1137	9173	9
open-billed stork	/	BGR Lake Victoria	3102B	18	6	2017		-2.37671	31.66931	1142	9173	9
yellow-billed kite	/	BGR Lake Victoria	3102B	18	6	2017	4	-2.37671	31.66931	1142	9173	9
northern brown-throated weaver	/	BGR Lake Victoria	3102B	18	6	2017		-2.37671	31.66931	1142	9173	9
malachite kingfisher	/	BGR Lake Victoria	3102B	18	6	2017		-2.37671	31.66931	1142	9173	9
little egret	/	BGR Lake Victoria	3102B	18	6	2017	2	-2.37671	31.66931	1142	9173	9
black-headed heron	/	BGR Lake Victoria	3102B	18	6	2017		-2.37671	31.66931	1142	9173	9
long-tailed cormorant	/	BGR Lake Victoria	3102B	18	6	2017	10	-2.37671	31.66931	1142	9173	9
black crake	/	BGR Lake Victoria	3102B	18	6	2017		-2.37671	31.66931	1142	9173	9
swamp flycatcher	/	BGR Lake Victoria	3102B	18	6	2017		-2.37671	31.66931	1142	9173	9
red-billed firefinch	/	BGR Lake Victoria	3102B	18	6	2017		-2.37671	31.66931	1142	9173	9