Biodiversity Express Survey

Gura Ferda forest

August 2018

Biodiversity Inventory for Conservation

Biodiversity Express Survey 8

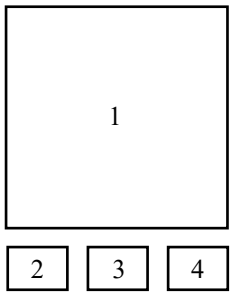
Biodiversity Express Survey (BES) 8, Gura Ferda forest, Ethiopia, 2018
15 September 2018
Biodiversity Inventory for Conservation (BINCO)
http://www.binco.eu
info@binco.eu

Editor:
Dr. Matthias De Beenhouwer (matthias.debeenhouwer@binco.eu)

Contributing authors:
Ruben Foquet and Abeje Kassie

Lay out:
Jan Mertens (jan.mertens@binco.eu)

Publication date:
v8.0 30/04/2019



Picture covers:
1. Bibita Forest boundary - photo courtesy of Ruben Foquet 2. *Leptopelis vannutellii* (Dime Forest Tree Frog) - photo courtesy of M. De Beenhouwer 3. *Dendropicos obsoletus* (Brown-backed Woodpecker) - photo courtesy of M. De Beenhouwer 4. *Trioceros affinis* (Beardless Ethiopian Mountain Chameleon) - photo courtesy of Ruben Foquet

BINCO Express Surveys (BES) are snapshot biodiversity studies of carefully selected regions. Expeditions typically target understudied and/or threatened areas with an urgent need for more information on the occurring fauna and flora. The results are presented in an Express Report (ER) that is made publicly available online for anybody to use and can be found at www.BINCO.eu. Teams consist of a small number of international specialists and local scientists. Results presented in Express Reports are dynamic and will be updated as new information on identifications from the survey and from observations in the area become available.

Suggested citation:

Foquet, R., Kassie, A., De Beenhouwer M. (2019) Express Biodiversity Survey in Gura-Ferda Forest, Ethiopia. BINCO Express Report 8. Biodiversity Inventory for Conservation. Glabbeek, Belgium, 24 pp.

Index

EXPEDITION FACT SHEET

Location

Gura-Ferda woreda, Bench-Maji Zone, SNNPR, Southwest Ethiopia.
Basecamp: Magentaya, 35°11'51" E, 6°46'45"N

Date

Wet season expedition: 25th July – 29th August 2018

Expedition Members – Expertise

Abeje Kassie – Ethiopian Biodiversity Institute – Amphibians and Reptiles
Ruben Foquet – BINCO – Birds, Amphibians and Mammals
Matthias De Beenhouwer – BINCO – Birds, Amphibians, Reptiles and Mammals

Permits

A research permit was obtained from the Ethiopian Wildlife Conservation Authority
A sampling and export permit was obtained from the Ethiopian Biodiversity Institute

Cooperation

This expedition was made possible with help of:

MELCA-Ethiopia
Local Kebele Leaders
Gura-Ferda woreda office
Ethiopian Biodiversity Institute

Acknowledgements

We greatly acknowledge the Rufford Foundation and Stiftung Artenschutz for financially supporting this project. EBI is also acknowledged for logistical support as well as technical advice. We acknowledge David Gower and Simon Loader from NHML for technical advice on the area. Furthermore, we thank all local authorities for permission. We thank Zerihun Dubale, Boris and Wondeme for sharing their local knowledge on the forest with us.

Stiftung Artenschutz

The Rufford Foundation
www.rufford.org

Part of the team in Coffee forest habitat near Bebeka, Gura-Ferda woreda - photo courtesy of Ruben Foquet.

QUICK OVERVIEW OF RESULTS

Table 1. An overview of the taxa identified at this point and the survey and collecting techniques used: Opportunistic observations (OO), Active survey (AS), Camera trapping (CT).

Taxa	# Species	Survey Technique
Mammals	26	CT and OO
Amphibians	18	AS and OO
Reptiles	17	OO
Birds	157	AS and OO
Butterflies	43	OO

ABSTRACT

Ethiopia's Southwestern forested area consists of most of the forest remaining in the country. The Gura-Ferda Forest close to the border with Sudan is situated within the Eastern Afromontane Biodiversity Hotspot and comprises an isolated block of montane forest as well as an extended patch of tropical lowland forest. Relatively little is known about its biodiversity. An accurate documentation of what species are there and how they are distributed is therefore a crucial first step towards effective forest protection. For conservation purposes it would also be important to know what the extent of herpetofauna and birds, endemic to Ethiopia, is in these forest patches. We completed a rapid biodiversity survey looking at a selected number of taxa (amphibians, mammals and birds) to better understand the richness, complexity and gradients of biodiversity across different habitats as well as the importance of the montane forest block for Ethiopian endemics. We used a combination of camera traps, visual encounter surveys and opportunistic observations. Provisionally, we identified 26 mammal, 18 amphibian, 17 reptile, 157 bird and 43 butterfly species including a large number of IUCN listed species (12 globally threatened species). We recorded several substantial range extensions and a new bird species, not previously documented for Ethiopia. Species identification is ongoing and this survey report will be updated as more information becomes available. This rapid survey does not only illustrate the conservation value of the region but it also illustrates the need for more in depth surveys ideally during different times of the year and assessing other taxa. The region is particularly valuable due to the high diversity in ecosystems, partly due to a strong gradient of elevation. Moreover, our findings highlight an acute need for a better insight in the occurring fauna and flora, illustrated by the several species unknown for the area or the country. Since human disturbance is increasing throughout the region, we also recommend the initiation of a species protection plan and long-term monitoring protocol to enable the detection of changes related to encroachment, habitat conversion and climate change.

1 Introduction

Ethiopia is the country with the second highest human population on the African continent. Threats to the Ethiopian forests are numerous as a result of the rapidly growing population. Deforestation is widespread and associated with increasing demand for new settlements and agricultural lands reinforced by a lack of urban development policies and uncontrolled private investment. A growing international demand for coffee and tea stimulates the expansion of plantations at the cost of the natural forests. This intensification of coffee production together with a deterioration of forest protection culture that was present in the villages are two examples that affect forest conservation locally. In addition, local forest exploitation for short term needs such as timber, fuel wood and bush meat are omnipresent in the remaining forests with unknown effects on Ethiopia's flora and fauna.

Forests represent some of the most species rich ecosystems on Earth and are often crucial for a specific set of forest dependent species. Natural forests in Ethiopia can predominantly be found in the Southwest. Forests in southwestern Ethiopia occur along a wide biogeographical gradient and include diverse types. In the highlands, there is predominantly Afromontane rainforest which grows at altitudes from 1500 to 2400 m, whereas in the lowlands transitional rainforests (500–1500 m) are predominant, together with the dry Guineo-Congolian forests (450–600 m). Above 2400 m, highland bamboo forest becomes predominant (Friis, 1992).

Ethiopia is recognized as one of the 25 most biodiversity rich countries in the world and its biodiversity is renowned, mainly for its high percentage of endemism. The highland forests in the SW of Ethiopia are part of the Eastern Afromontane Biodiversity Hotspot (Mittermeier et al., 2004). Moreover, Ethiopia is the center of origin for around 38 crop plants, of which coffee (*Coffea arabica*), teff (*Eragrostis tef*), cardamom (*Aframomum cororima*) and ensete (*Ensete ventricosum*) are among the most important. Most of the plant species recorded in the area have one or more types of local use.

The Gura-Ferda administrative woreda is situated within the Bench Maji zone in the SNNPR (Southern Nations, Nationalities and Peoples) regional state, which borders both the Gambela regional state in the West and the Oromia regional state in the East. It consists of a number of municipalities or *kebele's* (the smallest administrative division). The woreda is one of the areas in Ethiopia where traditional beliefs and ecological knowledge have aided the conservation of forests up to now. As a result, local communities have developed a long tradition of sustainable forest management. Nowadays, however, population pressure, immigration and investors are increasing pressure on the remaining forest. The process of forest allocation for plantation conversion by investors is still ongoing, with few assessments of the impact on local economy, culture and environment (though see Woldemariam & Fetene, 2007).

The area contains a high habitat diversity with highland broadleaf forest, wetland, moorland, riverine forest, evergreen lowland forest, agricultural land and rural areas all adding up to a diverse landscape matrix, crucial for the conservation of thousands of species. Moreover, it covers a unique biogeographic gradient from hot and dry lowland areas up to cold and wet highlands. The dominant forest type in the region, between 1,600 and 2,300 m above sea level (asl), is Afromontane rainforest. This forest is characterized by canopy dwellers from the genera *Podocarpus* and *Pouteria*. It is in this forest type that wild *Coffea arabica* shrubs are occurring in the understorey.

Initially we were unaware that in June 2018 two independent expeditions were conducted by the Natio-

nal History Museum London and the New York University Abu Dhabi, both with a focus on Amphibian diversity. We have since then been in contact with both parties to share knowledge and experience. As such, this is one of the first surveys of faunal diversity of this isolated but threatened forest (estimated at 40,000 ha) close to the border with South Sudan. The forest has, apart from these recent expeditions, only seen a plant inventory (Denu, 2006, M.Sc. Thesis). Because of the remoteness, a survey of other taxa remained absent for so long. Indication on whether the Gura-Ferda forest could be assessed as a Key Biodiversity Area (KBA) will draw international donors towards the forest and can increase support for this forest at local, national and international level. For now, distribution maps of most endemic amphibian species do not include Gura-Ferda forest, despite being the right habitat and elevation (**Fig. 1**). We therefore believe that this forest can reveal interesting discoveries that merit further study.

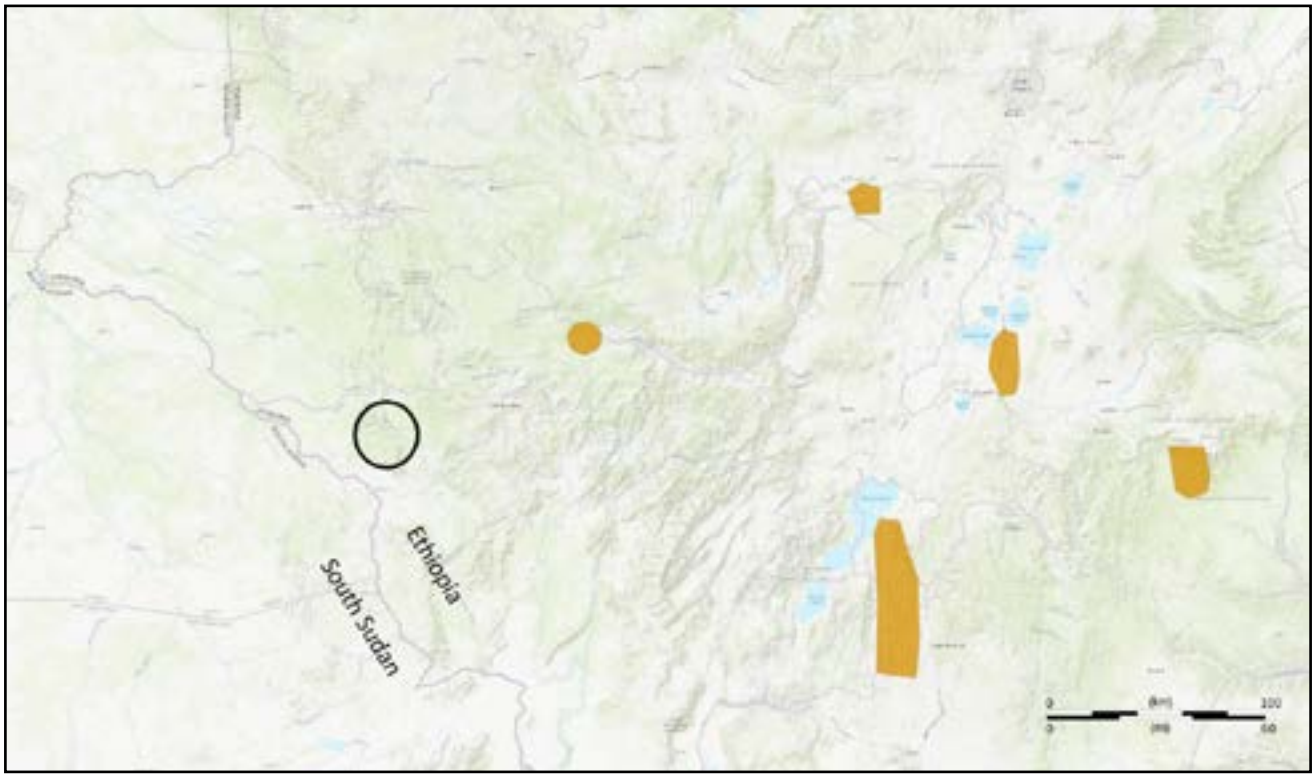


Fig. 1. Current distribution map of Ptychadena erlangeri in Ethiopia, an endemic and rare frog species of the Southern Ethiopian highlands. Orange polygons represent the current known distribution, black circle represents our study area.

2 Goal

This survey was aimed to increase the knowledge of biodiversity for a selected group of taxa in the Gura-Ferda woreda. Until recently, biodiversity surveys were limited to forest plant inventories. We have assessed birds, reptiles, amphibians and mammals. We were especially interested to make a first assessment of endemic and/or threatened birds, large mammals and amphibians in the area to highlight its potential importance from a conservation perspective. Ultimately, the goal is to assess the area for its potential as a KBA.

3 Biodiversity surveys

The data presented in this study consist of one field campaign, an extensive 6 weeks survey starting mid July 2018 in the Gura-Ferda woreda, SNNPR, where sampling ended on the 30th of August 2018. In Gura-Ferda woreda, several multi-day excursions were organized to the highland forest as well as the lowland forest. In between, opportunistic surveys were conducted in or near the village of Magentaya at an altitude of 1,050 m asl (6°46'45"N, 35°11'51"E). Eighteen camera traps were established in the highland and lowland forest. The most important sampling locations were focused on the highland forest of Gura Ferda (**Fig. 2**).

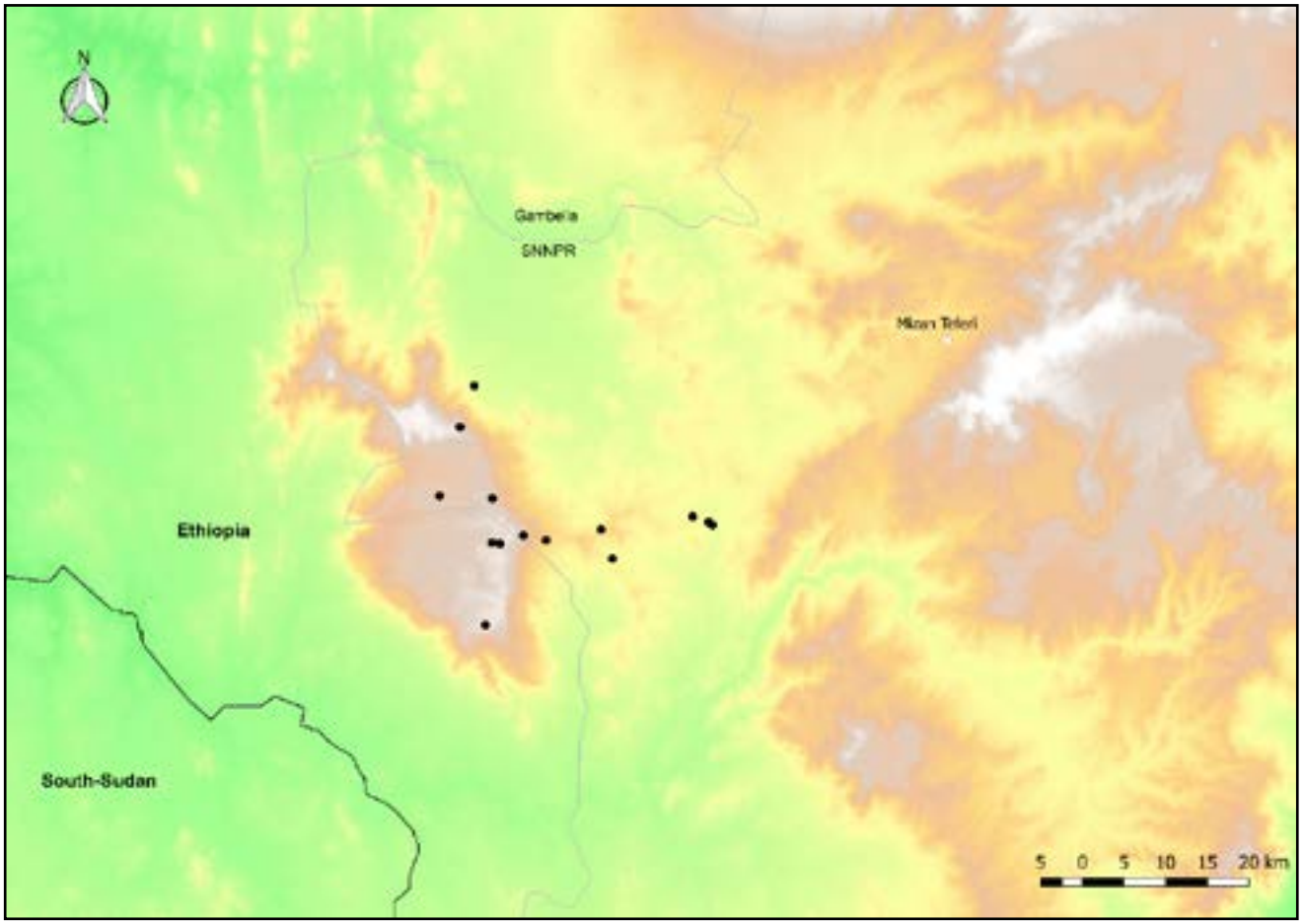


Fig. 2. Topographic map showing the sampling locations for herpetofauna in Gura-Ferda woreda. Topography shown with color-scale indicating height above sea level with green (< 1,000 m), yellow (> 1,000 m), brown (> 1,500 m), grey (> 2,000 m) and white (> 2,500 m).

In the following section, we will briefly list the observations made during our surveys. Surveys were mainly focused on amphibians, birds and mammals. However, also opportunistic observations of reptiles and butterflies were noted. The following sections will be updated based on expert opinions and slower identification of invertebrates and herpetofauna over time. New updates will be uploaded online (www.binco.eu) when this information becomes available.

3.1 Herpetofauna

Kassie A., De Beenhouwer M., Foquet R.

With 40% of amphibians in Ethiopia known to occur nowhere else in the world, Ethiopian amphibians are considered of high conservation value, though have long been understudied. Recently, several surveys have taken place in specific highland forests in the Southwest of the country, resulting in interesting discoveries and range extensions (Gower et al., 2012; Mengistu, 2012; Mertens et al., 2016; De Beenhouwer et al., 2016; Goutte et al., 2019). During this expedition in Gura-Ferda, amphibians were assessed on visual encounter surveys (VES) and sound recording surveys at night, from mid-July till the end of August during the end of the rainy season. Surveys were focused around small and large streams, swamps, wetlands and moorlands. Tentatively, 18 species of amphibians were recorded for this region, with at least seven (38%) endemic to Ethiopia (**Table 2**). Most endemic species were new observations for the region, occurring well outside their known distribution. A relatively low diversity of reptiles was encountered, echoing previous observations of reptile species diversity in the montane rainforests of southwest Ethiopia (Largen & Spawls, 2010; De Beenhouwer et al., 2015b). This might be partly attributed to the high elevation of our study area (generally > 2000 m) and a local aversion towards snakes. Reptiles and amphibians were identified using the field guide to Ethiopian reptiles and amphibians (Largen and Spawls, 2010), complemented with more recent literature (Mengistu, 2012) and distribution patterns updated using the IUCN red list (IUCN, 2014).

Table 2. Amphibians and reptiles identified in the Gura-Ferda woreda. 'New' indicates that the species was not yet known for the area and 'End' indicates that the species is endemic for Ethiopia. Where available, IUCN status and geographic occurrence according to the updated IUCN list at www.iucnredlist.org are used, accessed on 09/10/2018, LC= Least concern, VU= Vulnerable, EN= Endangered, DD= Data deficient and NE= not evaluated.

N°	Species	Vernacular name	New / End	IUCN
	Amphibia			
1	*Afrixalus clarkei*	Clarke's banana frog	New, end	EN
2	*Afrixalus quadrivittatus*	Striped banana frog	New	VU
3	*Amietophrynus cf. regularis*[1]	African common toad	Present	LC
4	*Conraua beccarii*	Filfil slippery frog	New, end	LC
5	*Hoplobatrachus occipitalis*	Crowned bullfrog	Present	LC
6	*Hyperolius viridiflavus*	Common reed frog	Present	LC
7	*Hyperolius kivuensis*	Kivu reed frog	Present	LC
8	*Hyperolius acuticeps*	Sharp-nosed reed frog	Present	LC
9	*Kassina senegalensis*	Bubbling kassina	Present	LC
10	*Leptopelis bocagii*	Bocage's tree frog	Present	LC

N°	Species	Vernacular name	New / End	IUCN
11	*Leptopelis vannutellii*	Dime forest tree frog	New, end	LC
12	*Paracassina obscura*	Eth. striped frog	New, end	LC
13	*Phrynobatrachus bibita*	Dwarf puddle frog sp.	New	LC
14	*Phrynobatrachus natalensis*	Natal dwarf puddle frog	Present	LC
15	*Ptychadena anchietae*	Plain grass frog	Present	LC
16	*Ptychadena erlangeri*	Erlanger's grass frog	New, end	NT
17	*Ptychadena mascareniensis*	Mascarene grass frog	New	LC
18	*Xenopus clivii*	Eritrea clawed frog	New, end	LC
	Reptilia			
1	*Afrotyphlops sp.*	Blind snake sp.	Present	
2	*Agama doriae*	Benoue agama	Present	
3	*Atractaspis cf. irregularis*[2]	Variable burrowing asp	Present	
4	*Bitis parviocula*	Eth. mountain adder	New, end	
5	*Boaedon fuliginosus*	African House Snake	Present	
6	*Cnemaspis dickersoni*	Dickerson's forest gecko	New	
7	*Crotaphopeltis hotamboeia*	Speckle-lipped skink	Present	
8	*Dispholidus typus*	Boomslang	Present	
9	*Hemidactylus brookii*	Brook's house gecko	Present	
10	*Lygodactylus gutturalis*	Uganda dwarf gecko	Present	
11	*Naja subfulva*	Forest Cobra	Present	
12	*Philothamnus battersbyi*	Battersby's Green Snake	Present	
13	*Psammophis sp.*[2]	Banded Snake	Present	
14	*Trachylepis maculilabris*	Speckle-lipped skink	Present	
15	*Trachylepis quinquetaeniata*	Five-lined skink	Present	
16	*Trioceros affinis*	Beardless Eth. Montane Chameleon	New, end	
17	*Varanus niloticus*	Nile Monitor	Present	

[1] Species designated as part of *A. regularis* / *A. asmarae* hybrid complex (Largen and Spawls, 2010)
[2] Not designated at species level due to the morphological ambiguity

3.2 Mammals

Foquet R., De Beenhouwer M.

We surveyed the community of medium to large mammals in Gura-Ferda forest complex with 18 camera traps (10 in highland forest and 8 in the lowland forest) during one month from the end of July to the end of August 2018 for a total of approximately 500 camera trap days. Camera traps were set in a diverse set of different habitats, including swamp edges, montane evergreen forest and lowland forest (**Fig. 3**). Opportunistic observations, most often monkeys and rodents, were also recorded during fieldwork and were GPS-marked. Mammals were identified using the Kingdon field guide to African mammals (Kingdon, 2012).

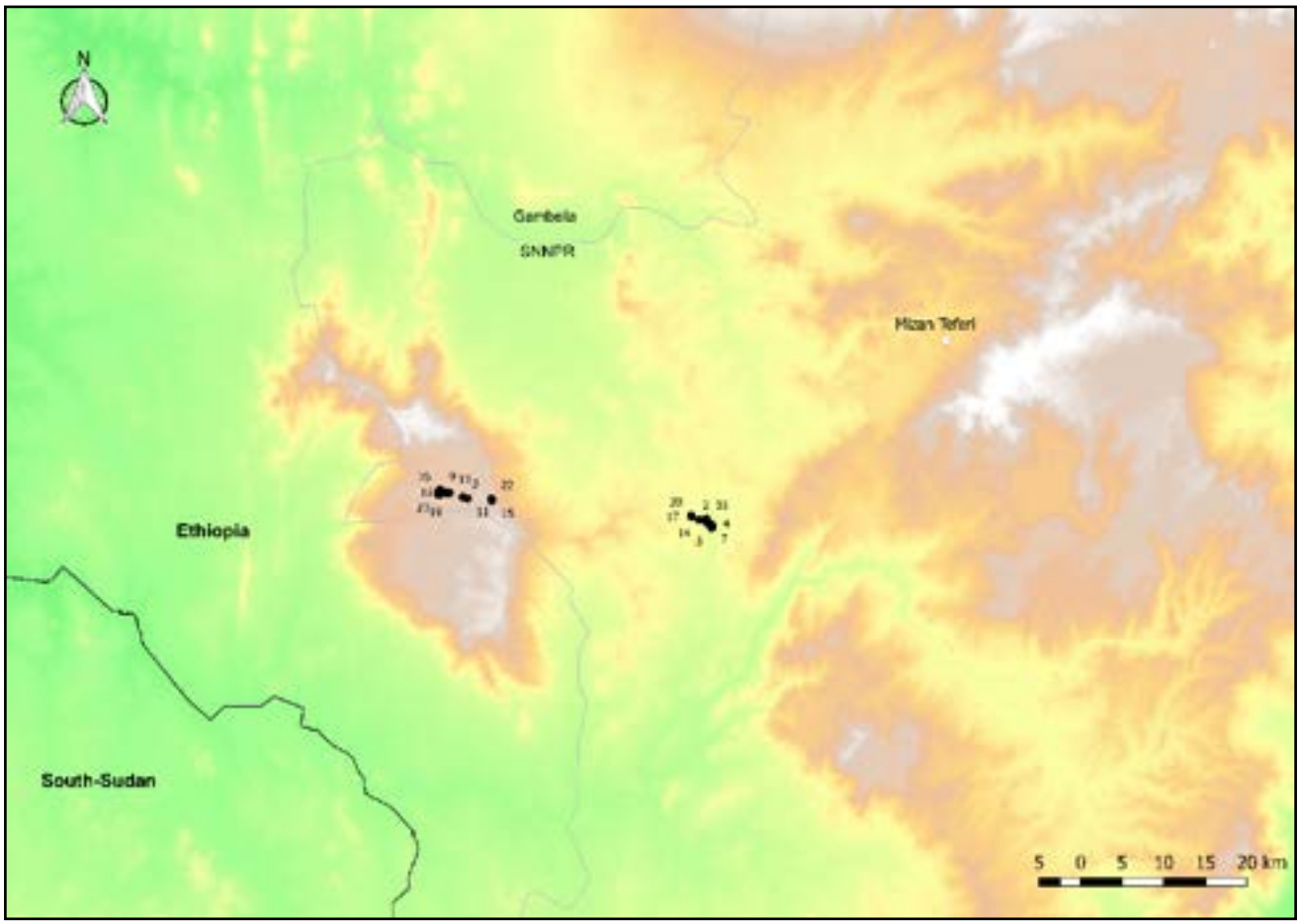


Fig. 3. Topographic map showing the camera trap locations in Gura-Ferda forest. Numbers match with movie/picture database. Topography shown with color-scale indicating height above sea level with green (< 1,000 m), yellow (> 1,000 m), brown (> 1,500 m), grey (> 2,000 m) and white (> 2,500 m).

A total of 26 mammal species were recorded (**Table 3**). Four species were only observed visually, whereas ten other species were observed visually/aurally and captured on camera traps. Six species were only observed with camera traps (**Table 3**). Three species were observed through fresh spoor and tracks though not seen visually nor on the camera trap. Two of these, African bush elephant and African leopard are considered vulnerable on the IUCN red list whereas the third, Cape buffalo is considered least concern. The leopard and buffalo tracks were very fresh though the elephant tracks could easily have been several months old (see Results section).

Table 3. Mammal species identified inside the Gura-Ferda woreda. CT = Camera trap observation, OO = Opportunistic observation, AU = Aurally, TR = Tracks/spore. IUCN status according to the IUCN updated list at www.iucnredlist.org, accessed on 23/12/2018, LC = Least concern, NT = Near threatened, VU = Vulnerable and EN = Endangered, DD = Data Deficient.

N°	Species	Vernacular name	ID	IUCN
1	*Atilax paludinosus*	Marsh mongoose	CT	LC
2	*Cercopithecus mitis boutourlinii*	Blue Monkey ssp. boutourlinii	OO	VU
3	*Cercopithecus neglectus*	De Brazza's monkey	CT, OO	LC
4	*Chlorocebus aethiops matschei*	Grivet Monkey ssp. matschei	OO	LC
5	*Civettictis civetta*	African civet	CT	LC
6	*Colobus guereza guereza*	*Eastern Black-and-white Colobus monkey*	CT, OO	LC
7	*Crocuta crocuta*	Spotted Hyena	CT, AU	LC
8	*Galago senegalensis dunni*	Lesser bushbaby ssp. dunni	OO	LC
9	*Galerella sanguinea*	Slender-tailed mongoose	CT	LC
10	*Genetta maculata*	Blotched genet	CT, OO	LC
11	*Heliosciurus gambianus*	Gambian sun squirrel	OO	LC
12	*Helogale parvula*	Common dwarf mongoose	CT	LC
13	*Heterohyrax brucei*	Yellow-spotted hyrax	CT, AU	LC
14	*Hystrix cristata*	Crested porcupine	CT, TR	LC
15	*Ichneumia albicauda*	White-tailed mongoose	CT, OO	LC
16	*Kobus ellipsiprymnus defassa*	Defassa waterbuck ssp. defassa	CT, OO	NT
17	*Loxodonta africana*	Afr. Bush elephant	TR	VU
18	*Mellivora capensis*	Honey badger	CT	LC
19	*Orycteropus afer*	Aardvark	CT	LC
20	*Panthera pardus*	Leopard	TR	VU
21	*Papio anubis*	Olive baboon	CT, OO	LC
22	*Potamochoerus larvatus*	Bushpig	CT, OO	LC
23	*Sylvicapra grimmia*	Bush duiker	CT, OO	LC
24	*Syncerus caffer*	Cape buffalo	TR	LC
25	*Tragelaphus scriptus*	Bushbuck	CT, OO	LC
26	*Xerus erythropus*	Striped ground squirrel	OO	LC

3.3 Birds

Foquet R., De Beenhouwer M.

Birds were identified using visual, vocal and camera trap observations. Birds were assessed during early morning surveys and on an ad hoc basis throughout the expedition. Bird species seen within the Gura-Ferda woreda are listed below (**Table 4**). Birds were identified using the Helm field guide "Birds of the Horn of Africa" (Redman et al., 2009). Since sampling was conducted during the European summer, very few migratory birds were observed.

Table 4. Bird species identified inside Gura-Ferda woreda. SV = Survey, OO = Opportunistic observation, CT = Camera trap observation. 'New' indicates that the species was not yet known for the area, 'End.' indicates that the species is endemic for the Horn of Africa. IUCN status according to the IUCN updated list at www.iucnredlist.org, accessed on 01/10/2018, LC = Least Concern, NT = Near Threatened, VU = Vulnerable, EN = Endangered, CR = Critically Endangered.

N°	Species	Vernacular name	ID	N / E	IUCN
1	*Accipiter melanoleucus*	Great Sparrowhawk	OO		LC
2	*Accipiter minullus*	Little Sparrowhawk	OO		LC
3	*Accipiter tachiro*	African Goshawk	SV		LC
4	*Agapornis pullarius*	Red-headed Lovebird	SV		LC
5	*Alopochen aegyptiaca*	Egyptian Goose	SV		LC
6	*Amaurornis flavirostra*	Black crake	SV		LC
7	*Amblyospiza albifrons*	Grosbeak Weaver	SV		LC
8	*Anaplectes rubriceps*	Red-headed Weaver	OO		LC
9	*Apaloderma narina*	Narina Trogon	PT		LC
10	*Ardea melanocephala*	Black-headed Heron	OO		LC
11	*Atimastillas flavicollis*	Yellow-throated Leaflove	PT		LC
12	*Batis erlangeri*	Western Black-headed Batis	PT		LC
13	*Bostrychia carunculata*	Wattled Ibis	PT	End	LC
14	*Bostrychia hagedash*	Hadada Ibis	PT, CT		LC
15	*Bradypterus baboecala*	Little Rush Warbler	PT	New	LC
16	*Bradypterus cinnamomeus*	Cinnamon Bracken Warbler	PT		LC
17	*Bubo cinerascens*	Greyish Eagle-Owl	OO		LC
18	*Buteo augur*	Augur Buzzard	PT		LC
19	*Buteo buteo*	Common Buzzard	OO		LC
20	*Buteo rufinus*	Long-legged Buzzard	OO		LC
21	*Butorides striata*	Striated Heron	OO		LC
22	*Bycanistes brevis*	Silvery-cheeked Hornbill	PT		LC
23	*Camaroptera brevicaudata*	Grey-backed Camaroptera	PT		LC
24	*Campephaga phoencea*	Red-shouldered Cuckooshrike	PT		LC

N°	Species	Vernacular name	ID	N / E	IUCN
25	*Campethera cailliautii*	Green-Backed Woodpecker	PT		LC
26	*Cecropsis daurica*	Red-rumped Swallow	PT		LC
27	*Centropus monachus*	Blue-headed Coucal	PT		LC
28	*Centropus senegalensis*	Senegal Coucal	PT		LC
29	*Ceuthmochares aereus*	Blue Malkoha	PT	New	LC
30	*Chalcomitra senegalensis*	Scarlet-chested Sunbird	PT		LC
31	*Chrysococcyx cupreus*	African Emerald Cuckoo	PT		LC
32	*Ciconia episcopus*	Woolly-necked Stork	PT		LC
33	*Cinnyricinclus leucogaster*	Violet-backed starling	OO	New	LC
34	*Cinnyris cupreus*	Copper Sunbird	PT		LC
35	*Cinnyris venustus fazoqlensis*	Variable Sunbird	PT		LC
36	*Circaetus cinerascens*	Western Banded Snake-Eagle	OO		LC
37	*Cisticola sp.*	Cisticola	PT		LC
38	*Cisticola troglodytes*	Foxy Cisticola	OO		LC
39	*Clamator jacobinus*	Jacobin Cuckoo	OO		LC
40	*Clamator levaillantii*	Levaillant's Cuckoo	OO		LC
41	*Coccopygia quartinia*	Yellow-bellied Waxbill	PT		LC
42	*Colius striatus*	Speckled Mousebird	PT		LC
43	*Columba arquatrix*	African Olive Pigeon	PT		LC
44	*Columba delegorguei*	Eastern Bronze-naped Pigeon	SV	New	LC
45	*Columba guinea*	Speckled Pigeon	PT		LC
46	*Columba larvata*	Lemon Dove	OO, CT	New	LC
47	*Coracina caesia*	Grey Cuckooshrike	OO		LC
48	*Coracina pectoralis*	White-breasted Cuckooshrike	SV		
49	*Corvus crassirostris*	Thick-billed Raven	PT	End	LC
50	*Cossypha albicapillus*	White-crowned Robin-Chat	SV		LC
51	*Cossypha niveicapilla*	Snowy-crowned Robin-Chat	SV		LC
52	*Cossypha semirufa*	Rüppell's Robin-Chat	SV		LC
53	*Coturnix delegorguei*	Harlequin Quail	OO		
54	*Crinifer zonurus*	Eastern Plantain-eater	SV		
55	*Crithragra citrinelloides*	African Citril	OO		LC
56	*Crithragra mozambica*	Yellow-Fronted canary	OO		LC
57	*Cuculus clamosus*	Black Cuckoo	PT		LC
58	*Cuculus solitarius*	Red-chested Cuckoo	PT		LC
59	*Cyanomitra olivacea ragazzii*	Olive Sunbird	PT		LC
60	*Dendroperdix sephaena*	Crested Francolin	SV		LC
61	*Dendropicos abyssinicus*	Abyssinian Woodpecker	PT	End	LC

N°	Species	Vernacular name	ID	N / E	IUCN
62	*Dendropicos fuscescens*	Cardinal Woodpecker	PT		LC
63	*Dendropicos obsoletus*	Brown-backed Woodpecker	PT	New	LC
64	*Dendropicos spodocephalus*	Eastern Grey Woodpecker	OO		LC
65	*Dicrurus adsimilis*	Fork-tailed Drongo	PT		LC
66	*Dryoscopus cubla*	Northern Puffback	PT		LC
67	*Estrilda ochrogaster*	Abyssinian Waxbill	OO		LC
68	*Estrilda astrild peasei*	Common Waxbill	PT		LC
69	*Euplectes ardens*	Red-collared widowbird	PT		LC
70	*Euplectes gierowii*	Black Bishop	PT		LC
71	*Euplectes hordeaceus*	Black-winged Red Bishop	OO	New	LC
72	*Falco cuvierii*	African Hobby	OO		LC
73	*Geokichla piaggiae*	Abyssinian Ground Thrush	PT, CT		LC
74	*Gyps africanus*	White-backed Vulture	OO		CR
75	*Halcyon chelicuti*	Striped Kingfisher	OO		LC
76	*Halcyon malimbica*	Blue-breasted Kingfisher	PT	New	LC
77	*Halcyon senegalensis*	Woodland Kingfisher	PT		LC
78	*Hedydipna collaris*	Collared Sunbird	OO		LC
79	*Hieraaetus ayresii*	Ayres's Hawk-Eagle	OO		LC
80	*Hieraaetus wahlbergi*	Wahlberg's Eagle	OO		LC
81	*Hyliota flavigaster*	Yellow-bellied Hyliota	PT		LC
82	*Iduna natalensis*	African Yellow Warbler	PT		LC
83	*Indicator indicator*	Greater Honeyguide	PT		LC
84	*Indicator minor*	Lesser Honeyguide	OO		LC
85	*Ispidina picta*	Pygmy Kingfisher	OO	New	LC
86	*Jynx ruficollis*	Red-throated Wryneck	OO		LC
87	*Lagonosticta larvata*	Black-faced Firefinch	PT		LC
88	*Lagonosticta rubricata*	African Firefinch	PT		LC
89	*Lamprotornis chloropterus*	Lesser Blue-eard Starling	OO		LC
90	*Laniarius aethiopicus*	Ethiopian Boubou	PT		LC
91	*Lanius humeralis*	Northern Fiscal	PT		LC
92	*Leptoptilos crumeniferus*	Marabou Stork	OO		LC
93	*Lonchura bicolor*	Black-and-white Mannikin	SV		LC
94	*Lonchura cucullata*	Bronze Mannikin	OO		LC
95	*Lophaetus occipitalis*	Long-crested Eagle	PT		LC
96	*Lophoceros alboterminatus*	Crowned Hornbill	SV		LC
97	*Lophoceros nasutus*	African Grey Hornbill	OO		LC
98	*Lybius bidentatus*	Double-toothed Barbet	OO		LC

N°	Species	Vernacular name	ID	N / E	IUCN
99	*Lybius guifsobalito*	Black-billed Barbet	OO	End	LC
100	*Lybius undatus leucogenys*	Bandet Barbet	OO	End	LC
101	*Mandingoa nitidula*	Green Twinspot	OO	New	LC
102	*Melaenornis edolioides*	Northern Black Flycatcher	OO		LC
103	*Melaenornis pallidus*	Pale Flycatcher	OO		LC
104	*Melochila mentalis*	Moustached Grass Warbler	OO		LC
105	*Merops apiaster*	Euopean Bee-eater	PT		LC
106	*Merops variegatus*	Blue-breasted Bee-eater	OO		LC
107	*Muscicapa adusta*	African Dusky Flycatcher	PT		LC
108	*Necrosyrtes monachus*	Hooded Vulture	PT		CR
109	*Onychognathus morio*	Red-winged Starling	OO		LC
110	*Oriolus monacha meneliki*	Abyssinian Oriole	PT	End	LC
111	*Passer swainsonii*	Swainson's Sparrow	PT		LC
112	*Phoeniculus purpureus*	Green Wood Hoopoe	OO		LC
113	*Phylloscopus umbrovirens*	Brown Woodland Warbler	PT		LC
114	*Platysteira cyanea*	Brown-throated Wattle-eye	PT		LC
115	*Ploceus baglafecht*	Baglafecht Weaver	PT		LC
116	*Ploceus cucullatus abyssinicus*	Village Weaver	PT		LC
117	*Ploceus nigricollis*	Black-necked weaver	OO	New	LC
118	*Ploceus ocularis*	Spectacled Weaver	PT		LC
119	*Ploceus superciliosus*	Compact Weaver	PT		LC
120	*Poeoptera sharpii*	Sharpe’s Starling	SV		LC
121	*Poeoptera stuhlmanni*	Stuhlmann's Starling	PT		LC
122	*Pogoniulus chrysoconus*	Yellow-fronted Tinkerbird	PT		LC
123	*Poicephalus flavifrons*	Yellow-fronted Parrot	PT	End	LC
124	*Polyboroides typus*	African Harrier-Hawk	PT		LC
125	*Prinia subflava*	Tawny-flanked Prinia	PT		LC
126	*Prionops plumatus*	White-crested Helmetshrike	OO		LC
127	*Psalidoprocne pristoptera*	Black Saw-wing	PT		LC
128	*Pseudoalcippe abyssinica*	African Hill Babbler	OO		LC
129	*Pternistis squamatus*	Scaly Francolin	CT		LC
130	*Pycnonotus barbatus schoanus*	Common bulbul	PT		LC
131	*Rhinopomastus minor*	Abyssinian Scimitarbill	PT	New	LC
132	*Rougetius rougetii*	Rouget’s Rail	PT	End	NT
133	*Sarothrura elegans*	Buff-spotted Flufftail	OO	New	LC
134	*Saxicola (torquatus) torquatus*	African Stonechat	PT		LC
135	*Scopus umbretta*	Hamerkop	OO		LC

N°	Species	Vernacular name	ID	N / E	IUCN
136	*Serinus flavivertex*	Yellow-crowned Canary	PT		LC
137	*Stephanoaetus coronatus*	African Crowned Eagle	OO		NT
138	*Streptopelia semitorquata*	Red-eyed Dove	PT		LC
139	*Strix woodfordii*	African Wood Owl	OO		LC
140	*Tauraco leucotis*	White-cheeked Turaco	PT		LC
141	*Tchagra senegalensis*	Black-crowned Tchagra	OO		LC
142	*Terathopius ecaudatus*	Bateleur	OO		NT
143	*Terpsiphone viridis*	African Paradise Flycatcher	PT		LC
144	*Treron calvus*	African Green Pigeon	PT		LC
145	*Trigonoceps occipitalis*	White-headed Vulture	PT		CR
146	*Turdoides leucopygia*	White-rumped Babbler	PT		LC
147	*Turdoides plebejus*	Brown Babbler	SV		LC
148	*Turdoides tenebrosa*	Dusky Babbler	OO		LC
149	*Turdus pelios*	African Thrush	OO		LC
150	*Turdus plebejus*	Mountain Thrush	SV		LC
151	*Turtur afer*	Blue-spotted Wood Dove	OO		LC
152	*Turtur tympanistria*	Tambourine Dove	PT, CT		LC
153	*Uraeginthus bengalus*	Red-cheeked Cordon-bleu	OO		LC
154	*Vidua chalybeata*	Village Indigobird	OO		LC
155	*Vidua macroura*	Pin-tailed Whydah	OO		LC
156	*Zosterops abyssinicus*	Abyssinian White-eye	PT		LC
157	*Zosterops poliogastrus kaffensis*	Montane White-eye	PT		LC

3.4 Lepidoptera

Foquet R., Mertens J.

Invertebrates are known to be understudied worldwide, and this is certainly the case for Ethiopia. Butterfly (Rhopalocera and Hesperiidae) diversity, for example, currently reaches 353 species in Ethiopia. This is indeed a low number compared to neighboring countries in East Africa (e.g. Kenya: 859 spp., Uganda: 1149 spp., Tanzania: 1300 spp.) (Sáfián et al., 2009). Although this enigmatic species group merits a thorough inventory of the whole area, butterfly diversity was assessed only opportunistically over the course of the expedition. Identification of the species was conducted afterwards based on in-situ photographs of live specimens. As there is no modern identification guide for butterflies of the Horn of Africa, the species list of the African Butterfly Database (Sáfián et al. 2009) was used as template to create our own picture-based guide.

Table 5. Butterfly species identified within the Gura-Ferda woreda. This list is not exhaustive; all Lycaenidae are missing and many other species could not be identified with the provided images.

N°	Species	Family	End
1	*Acleros mackenii instabilis ?*	Hesperiidae	
2	*Coeliades forestan*	Hesperiidae	
3	*Coeliades forestan*	Hesperiidae	
4	*Hesperiidae sp ?*	Hesperiidae	
5	*Sarangesa sp ?*	Hesperiidae	
6	*Acraea bonasia banka*	Nymphalidae	End
7	*Acraea ocari*	Nymphalidae	End
8	*Acraea peneleos gelonica*	Nymphalidae	End
9	*Acraea perenna kaffana*	Nymphalidae	End
10	*Acraea safie antinorii*	Nymphalidae	End
11	*Acraea sotikensis*	Nymphalidae	
12	*Amauris niavius aethiops*	Nymphalidae	
13	*Aterica galene incisa*	Nymphalidae	End
14	*Charaxes candiope*	Nymphalidae	
15	*Charaxes chanleri ?*	Nymphalidae	
16	*Charaxes etesipe abyssinicus*	Nymphalidae	End
17	*Charaxes etheocles*	Nymphalidae	
18	*Charaxes junius junius*	Nymphalidae	End
19	*Charaxes zoolina zoolina*	Nymphalidae	
20	*Cyrestis camillus camillus*	Nymphalidae	
21	*Euphaedra medon fraudata ?*	Nymphalidae	
22	*Eurytela dryope angulata*	Nymphalidae	
23	*Eurytela hiarbas abyssinica*	Nymphalidae	End
24	*Hamanumida daedalus*	Nymphalidae	

N°	Species	Family	End
25	*Junonia chiromena*	Nymphalidae	
26	*Junonia oenone*	Nymphalidae	
27	*Junonia sophia infracta*	Nymphalidae	
28	*Junonia terea fumata*	Nymphalidae	
29	*Junonia westermanni westermanni*	Nymphalidae	
30	*Libythea labdaca laius*	Nymphalidae	
31	*Neptidopsis ophione nucleata*	Nymphalidae	
32	*Neptis agouale parallela*	Nymphalidae	
33	*Tirumala formosa neumanni*	Nymphalidae	
34	*Phalanta eurytis*	Nymphalidae	
35	*Phalanta phalanta aethiopica ?*	Nymphalidae	
36	*Precis pelarga*	Nymphalidae	
37	*Pseudacraea lucretia walensensis*	Nymphalidae	End
38	*Salamis cacta cacta*	Nymphalidae	
39	*Papilio dardanus antinorii*	Papilionidae	End
40	*Papilio cynorta-species group*	Papilionidae	
41	*Papilio nireus-species group*	Papilionidae	
42	*Belenois raffrayi raffrayi*	Pieridae	
43	*?Belenois thysa /Mylothris agathina*	Pieridae	

4 Results

The biodiversity surveys have resulted in approximately 20 nights of amphibian surveying, 514 days of cumulative camera trapping and 35 days of general field sampling (surveys and opportunistic observations).

Provisionally, 157 bird species, 18 amphibian species, 17 reptile species and 26 mammal species were found during the surveys, of which respectively 13 bird, 9 amphibian and 3 reptile species were not known to occur in the area. The Gura-Ferda woreda still contains substantial coverage of natural forest, ranging from lowland evergreen forest to broadleaf mountain forest, both associated with a unique biodiversity characterized by many species restricted to the Horn of Africa, to Ethiopia, or even to the Southwest of Ethiopia. However, natural forest is increasingly being fragmented and intensified resulting into a mosaic of smaller and altered forest patches in the region.

Our study indicates that the diversity of habitats adds to the total species diversity in the area; where large numbers of typical forest species were observed inside the forest, many other species could exclusively be found in the surrounding grasslands, open woodland and agricultural landscape.

-- Birds --

Of the 158 bird species recorded for the woreda, several species are considered endemic to the Horn of Africa (**Table 4**). All of the endemics encountered were recorded regularly within suitable habitat. Two endemic species, *Dendropicos abyssinicus* and *Poicephalus flavifrons* show a considerable range extension.

Also, several species were found in the woreda which show a very restricted range within Ethiopia. Although these species are not considered threatened on the international red list, they might be threatened with extinction within Ethiopia. The species *Cisticola ruficeps, Ceuthmochares australis, Cossypha niveicapilla, Halcyon malimbica* and *Sarothrura elegans* are considered here as RR (range restricted) in Ethiopia and could be seen as species of specific conservation value for the area. All show range-extensions compared to what is currently known/accepted. Other species are rather common in Ethiopia but show a considerable range extension here: *Ceblepyris caesius, Sylvia abyssinica* and *Treron calvus*.

One species was found in the lowland evergreen forest that was not known to be present in Ethiopia, the Eastern Bronze-naped pigeon (*Columba delegorguia*). Several males were heard calling (sound recordings available) and a female was photographed at a clearing in the forest. The species seemed to be common at least in this forest type.

Eight bird species, of which seven raptor species, were recorded which are threatened on the IUCN red list (**Table 4**). Of these bird species, three are considered critically endangered (three vulture species). All threatened species are shown to be, at least seasonally, present within the reserve. This emphasizes the importance of the reserve for globally threatened bird species, and raptors and vultures in specific.

-- Amphibians --

The main target was to assess the amphibian diversity of Gura-Ferda woreda and specifically the Ethiopian endemics. Through this study, it is shown that many of these endemic species (e.g. *Leptopelis van-*

nutellii) show a considerable range extension and can also be found in the Gura-Ferda woreda (**Table 3**.). Also, several other amphibian species, not restricted to Ethiopia, showed a considerable geographic range extension (e.g. *Afrixalus quadrivittatus*). Furthermore, in some cases, the area is one of the few locations where this particular species can still be found (e.g. *Ptychadena erlangeri*). Several amphibian species that were recorded are considered threatened on the IUCN red list and are known to be rare and restricted to forested habitat (e.g. *Afrixalus clarkei*) in Southwest Ethiopia. Moreover, one species was recorded, which is currently known from only one previous observation in the same area (Goutte et al., 2019). This species might be restricted to this site only and the area could therefore well be an Alliance for Zero Extinction (AZE) site. These observations not only indicate the importance of the area for amphibian conservation, but also the poor research attention dedicated to the region up to now. It is here shown that most endemic amphibians that are recorded for the Southwest of the country also occur as far as Gura-Ferda.

-- Reptiles --

Compared to previous similar BES's (De Beenhouwer et al. 2015b, De Beenhouwer et al. 2016), a higher diversity of reptiles was observed in this expedition. Due to a combination of lowland (forest) habitat and relatively dry weather (for the time of the year) the list of observed species was set at 17 species. Several noteworthy species were recorded of which *Cnemapis dickersoni* (RR) and *Bitis parviocula* (End.) are considered rare in Ethiopia. The endemic *Trioceros affinis* was the most common reptile encountered in the highland habitats, but also shows a range extension compared to current knowledge.

-- Mammals --

Twenty-five species of large mammals were indicated for the reserve, of which several are endemic (**Table 2**) and/or considered threatened on the IUCN red list. The African leopard and African Bush elephant are both considered vulnerable, as well as the endemic subspecies of blue monkey (*Cercopithecus mitis boutourlinii*). The Defassa subspecies of waterbuck is categorized near threatened. Elephant tracks were only observed in the lowland evergreen forest and consisted of older tracks such as spore, dung, scrub trees and mineral pits. No fresh spore nor sightings were found during the survey. The current IUCN distribution includes also the highland forest of Gura-Ferda but no proof (young or old) could be found there.

Several large mammal species were expected to be present in the area though were not observed during our study. Interviews with local guides suggest that species such as Serval (*Leptailurus serval*), side-striped jackal (*Canis adustus*) and Lion (*Panthera leo*) still occur in the area. It is therefore recommended to enlarge the sampling effort to assess if these animals might (still) be present, especially for the red-listed species *Panthera leo* (VU). It is also noticed that Giant forest hog (*Hylochoerus meinertzhageni*) was not observed despite being present in forests in the direct vicinity (De Beenhouwer et al., 2015b). Interviewees again pointed out that these species still occur in the area, especially the highland mountain forest.

5 Discussion

This biodiversity survey of the Gura-Ferda woreda revealed a high species richness and confirmed the presence of several forest related species endemic to Ethiopia. Many of these species are globally threatened and some of them have very restricted ranges. Some of the more remarkable species found were the enigmatic *Bitis parviocula*, and the endangered *Afrixalus clarkei*. These are globally threatened and/or endemic species that emphasize the biological importance of this region, as well as indicating that the current functionality of the ecosystems to conserve biodiversity is still in place. The variety of habitats, elevation and climatic differences that are present within the woreda add up to a rich and diverse set of species.

The tracks found from several large mammals that were not confirmed by the camera traps indicate that a longer and more extensive camera trap study is recommendable. In particular African leopard and forest buffalo (*S. caffer nanus*), two species that are known to occur in the more remote forest patches in Southwest Ethiopia (e.g. De Beenhouwer et al., 2016, Mertens et al., 2018,), were not found on camera traps. Local people confirmed the continued presence of forest buffalo in the lowland evergreen forest area, though they stated that species was not found any more in the highland mountain forest. A specific study on the threats, distribution and population estimate of these species is highly recommended to increase the long-term survival in the larger area. Local guides indicated recent poaching events, especially of buffalo and bush elephant, which were said to be organized by Chinese men.

Human disturbance including agricultural activities have transformed the forest to a landscape mosaic of forest, agroforest and non-forest habitats. Most of the remaining lowland evergreen forest, for example, has already been converted to coffee forest, mainly due to investors from outside the communities. Also, human encroachment into the primary forest is occurring from villagers around the forest, in search of timber and non-timber forest products. With an increasing global coffee market, the lack of urban planning and the rising influx of people from drier lowland into the highlands, we expect that forest encroachment and deforestation will continue to increase. Empowering local communities to claim ownership over their lands could prove a fruitful conservation strategy as it is generally accepted that Ethiopian community forestry is a healthy forest management strategy from a biodiversity point of view.

To safeguard the high endemicity of the region as well as the typical forest species (e.g. *Sarothrura elegans*), the research, monitoring and conservation of the remaining primary forest will be crucial. Increased attention by scientists for the biodiversity, especially those red-listed, and an assessment of how populations of species change over time, will provide more insight in where and how biodiversity strongholds within an increasingly fragmented landscape can be conserved.

-- KBA analysis --

To be updated later

6 References

De Beenhouwer, M., Aerts, R., Hundera, K., Van Overtveldt, K., Honnay, O., 2015a. Management intensification in Ethiopian coffee forests is associated with crown habitat contraction and loss of specialized epiphytic orchid species. Basic and Applied Ecology 16, 592–600.

De Beenhouwer M., Mertens J., Geeraert, L., and Jocqué, M., 2015b. Express Biodiversity Survey in Belete Gera forest, Ethiopia. BINCO Express Report 4. Biodiversity Inventory for Conservation. Glabbeek, Belgium, 24 pp.

De Beenhouwer M., Oosterlynck B., Van Opstal M., Shaweno A., Belay M., Erens J., 2016. Express Biodiversity Survey in Sheka Forest Biosphere reserve, Ethiopia. Biodiversity Express Survey 5. Biodiversity Inventory for Conservation. Glabbeek, Belgium, 30 pp.

Friis, 1992. Forests and forest trees of northeast tropical Africa – their natural habitats and distribution patterns in Ethiopia, Djibouti, and Somalia. Kew Bulletin 15, 1-396.

Goutte, S., Reyes-Velasco, J., Boissinot, S., 2019. A new species of puddle frog from an unexplored mountain in southwestern Ethiopia (Anura, Phrynobatrachidae, *Phrynobatrachus*). ZooKeys 824, 53 70.

Kingdon, J., 1997. The Kingdon field guide to African mammals. Black Publishers Ltd., London, UK, 476 pp.

Largen, M.J., 2001. Catalogue of the amphibians of Ethiopia, including a key for their identification. Tropical Zoology 14, 307-402.

Largen, M. J., Spawls S., 2010. Amphibians and Reptiles of Ethiopia and Eritrea. Frankfurt am Main: Edition Chimaira.

Mengistu, A.A., 2012. Amphibian diversity, distribution and conservation in the Ethiopian highlands: morphological, molecular and biogeographic investigation on Leptopelis and *Ptychadena* (Anura). PhD Tesis, University of Basel, Switzerland, 204 pp.

Mertens, J., Jocque, M., Geeraert, L., De Beenhouwer, M., 2016. Newly discovered populations of the Ethiopian endemic and endangered *Afrixalus clarkei* LARGEN, implications for conservation. Zookeys 565, 141-146.

Mittermeier, R.A., Gil, P.R., Hoffmann, M., Pilgrim, J., Brooks, T., Mittermeier, C.G. et al., 2004. Hotspots revisited: Earth's biologically richest and most endangered terrestrial ecoregions. Conservation International, pp. 241–273.

Redman, N., Stevenson, T., Fanshawe, J., 2009. Birds of the Horn of Africa: Ethiopia, Eritrea, Djibouti, Somalia, and Socotra. Princeton field guides, 495 pp.

Sáfián Sz., Collins, S.C., Kormos, B. Siklósi, A., 2009. African Butterfly Database version 1.0 – www.abdb-africa.org (accessed 26.02.19).

Woldemariam, T., Fetene, M., 2007. *Forests of Sheka: Ecological, social, legal and economic dimensions of recent land use/land cover changes, overview and synthesis*. In: Forests of Sheka: Multidisciplinary Case Studies on Impacts of Land use/Land cover Changes, Southwest Ethiopia (Ed.: Fetene, M.). Melca-Mahiber, Addis Ababa, p. 1-8