A SURVEY OF *APALIS FUSCIGULARIS* IN MSIDUNYI, A RECENTLY DISCOVERED FOREST IN THE TAITA HILLS, KENYA

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Introduction

In October 2011, while performing field work in the Taita hills, we discovered a new subpopulation of the Critically Endangered Taita Apalis *Apalis fuscigularis* in Msidunyi, a forest fragment that had never been visited by scientists despite years of intensive work in the area. The new forest that we discovered is small and extremely threatened as it is not protected and is surrounded by expanding agriculture.

Preliminary observations suggested that Msidunyi is a key site for *Apalis fuscigularis*.

Protecting Msidunyi forest is an action of extreme urgency, but biological knowledge is necessary to organize targeted actions and sensitize the local community, as well as Governmental and Non-Governmental Organization.

In this report, we summarize the findings of field work carried out in Msidunyi between October 2011 (the initial discovery of the forest) and May 2013. The results of our work confirm the importance of the site as a stronghold of Taita apalis, as well as of other endemic and globally threatened taxa. At the same time, we document increasing human pressure and steady degradation occurring on the site.

Study area

The Taita Hills are a small mountain massif in southern Kenya. The Taita are the northernmost end of the Eastern Arc, one of 34 world's most important biodiversity hotspots. Unfortunately, deforestation has been rampant in the last decades. More than 95% of the original vegetation has been lost. Currently, there are less than 500 hectares of forest, scattered in twelve fragments, eight of which are less than four hectares in size.

In October 2011, while performing field work in the Taita hills, we discovered a fragment of natural forest at a site called Msidunyi. Based on our GPS measurements the Closed-canopy forest has an area of 7.1 hectares (Fig 1), and is surrounded by a belt of natural scrubby vegetation, exotic trees (*Acacia mearnsii, Eucalyptus* sp., *Cupressus lusitanica*) and isolated indigenous trees, suggestung the remnants of a formerly much more extensive forest. The shrubby belt surrounding Msidunyi has an area of about 52 ha.

Focal species

A. fuscigularis is a Critically endangered species, endemic to the Taita Hills in Southern Kenya. Its global population has been estimated at 310-654 individuals (Borghesio et al. 2010b), representing 210-430 mature individuals (Birdlife 2013).

Recent surveys suggest that a population crash might have occurred in recent years, perhaps due to the drought that has been affecting East Africa since 2009 (Borghesio et al 2010a).

Considering the current status of *A. fuscigularis*, it is imperative to locate and protect all the sites where the specie occurs. Therefore, the purpose of our study is to collect baseline information on numbers and distribution of *A. fuscigularis* in and around Msidunyi forest.

Methods

A grid of regularly spaced sample points (100m distance) has been created with a GIS. The grid comprises 70 points covering the entire area of Msidunyi forest, plus the shrubby belt surrounding it.

Data were collected performing 10-min point counts without playback, or 6-min counts with playback (1 minute playback, followed by 2-min listening, two times at each point). Two observers visited the study area in five sessions, performing a total of 125 point counts without, and 94 counts with playback (Table 1). Recordings of *A. fuscigularis* were provided by the Sound Library of the British Museum of Natural History. Calls were broadcasted with an Altec Lansing im237 loudspeaker, connected to a Sandisk mp3 player.

Count methodology followed already established protocols that we have used in the Taita hills since 2009. In counts without playback, for each group of *A. fuscigularis*, we recorded (a) distance from the observer with a tape roll (b) compass direction to the bird (c) time (minutes) elapsed from the beginning of the count (c) whether birds were seen or heard (d) height of birds above ground (e) measures of canopy openness and undergrowth density (f) a visual estimate of habitat composition (percent of forest, shrubland, cultivation and plantation) within a 25-m radius circle. Measures (e) and (f) were recorded both at the observers' location and at the point of presence of the birds.

Additional information on the sex-ratio of the *A. fuscigularis* population in the study area was collected using playback of recorded calls. *A. fuscigularis*, as other species of the *A. thoracica* group (Dowsett-Lemaire 2010), responds quickly to playback of its song . The two sexes are easily distinguished based on vocalization and plumage patterns (L. Borghesio & L. Wagura, pers. obs.). In birds, skewed sex-ratios are often a sign of a decreasing population trend (Donald 2007), and this has also been observed in *Turdus helleri*, the second Critically Endangered Taita endemic bird (Lens et al. 1998). Thus, we calculate sex-ratio in the study area as a preliminary assessment of population health.

Results

We obtained 27 observations of *A. fuscigularis*, 18 of which during playback counts. The frequency of detection, as expected, was higher in counts performed with playback.

The distribution of the observations on a map suggest that approximately eight territories of *A. fuscigularis* are located in the study area (Fig 2). The elevation of the observations ranges between 1890 and 2010m. The lowest part of the study area (1790-1890m), in the northern and eastern sector, appears not to be occupied by *A. fuscigularis*.

Of the 27 observations, 22 were of pairs, 3 of single males and 2 of single females. The sex-ratio (1.04 males / female) was almost balanced.

Other species of interest that were observed during the field work include the local form of the Montane white-eye (*Zosterops (poliogastrus) silvanus*), whose systematic status is debated, but might be a good species (Collar 1994) and the endemic butterflies *Cymothoe teita* and *Papilio desmondi taita.* Among the plants, the trees *Dasylepis integra* (Eastern Arc endemic; IUCN: Vulnerable) and *Prunus africana* (IUCN: Vulnerable) were observed in the forest and in the shrub belt surrounding it. One *Psychotria* sp. Shrub might prove to be the still undescribed "*Psychotria* species B" cited by Beentje (1994) and feared extinct as it has not been observed in the Taita for decades.

At the time of our first visit, Msidunyi forest fragment was remarkably intact, with very few signs of human activity (Fig 3). By October 2012 of human disturbance and logging increased dramatically (Fig 4).

Discussion

This study confirms that Msidunyi area is a key site for *A. fuscigularis*. Our best estimate is that eight territorial pairs occur in the area, representing 2.4-5.2% of the global population (or 3.7-7.6% of the mature individuals). The presence of *A. fuscigularis* in the site is continuous, as we observed territorial pairs on five subsequent sampling sessions over a period of 1.5 years. Moreover, sex ratio of the individuals attracted by song playback was almost equal to unity. Detection frequency apparently decreased during the counts performed from February to April 2013 (Table 1), but this is because in that period we extended our search towards the eastern part of the study area, where the presence of *A. fuscigularis* appears to be less frequent. Thus, our data do not show evidence of negative temporal trend, even though we can't exclude that increasing human disturbance will have negative consequences.

The distribution of *A. fuscigularis* in the study area was not homogeneous. Sectors located at lower elevations (<1890m) were apparently unoccupied. However, elsewhere in the Taita hills (Chawia forest), *A. fuscigularis* occurs at altitudes as low as 1500m. Thus, the absence of *A. fuscigularis* at the lower elevations in Msidunyi might not be a direct consequence of altitude.

Interestingly, most of the observations of *A. fuscigularis* where obtained outside, or at the edge, of the patch of indigenous closed-canopy forest. This confirms that *A. fuscigularis* tends to favour relatively open vegetation, such as forest edges or canopy gaps, and to avoid more dense, closed-canopy parts of the forest (Wagura *et al.* 2012). Thus, conservation actions in Msidunyi will require to focus on an area extending beyond the patch of indigenous forest, including the bushland belt from about 1800m altitude and above. This area extend over approximately 40-50ha.

Besides *A. fuscigularis*, we confirmed the presence in Msidunyi of several other endemic and/or globally threatened species. Of particular interest the presence of a, yet unidentified, *Psychotria* which might turn out to be a species long considered to be extinct.

At the same time, our field work confirmed the extreme urgency of acting to prevent the destruction of the tiny bit of remaining forest and other natural habitats in the area. During the short duration of our field work, damage caused by logging, which is not illegal as the area is not owned by the Government, was large. At this pace, little will be left of the forest within a short time.

Acknowledgements

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Table 1. Summary of the field work in Msidunyi. The table lists the number of points visited in the three sessions of field work, the number of detections of *Apalis fuscigularis* (number of individuals in parentheses), and the frequency of detection (no detections / no of points)

	Sampling session	**no of samples**	**no of detections**	**Frequency of detection**
Without playback				
	January 2011	68	6 (11)	0.09
	February 2013	57	2 (4)	0.04
	Total	125	8 (15)	0.06
With playback				
	October 2011	19	9 (17)	0.47
	October 2013	15	4 (7)	0.27
	Feb-Apr 2013	60	6 (11)	0.08
	Total	94	19 (35)	0.20

Figure 1. Top: map of the Taita hills forest fragments where *A. fuscigularis* has been observed at the end of 2013. Bottom: aerial photograph of the study area, from Google Earth (image taken on 18/10/2001). The image shows the indigenous forest patch (solid red line, area: 7.1 ha) surrounded by a belt of bushland and exotic plantations of trees (*Cupressus lusitanica*, *Eucalyptus* spp, *Acacia mearnsii*; dotted line, area: 52ha).

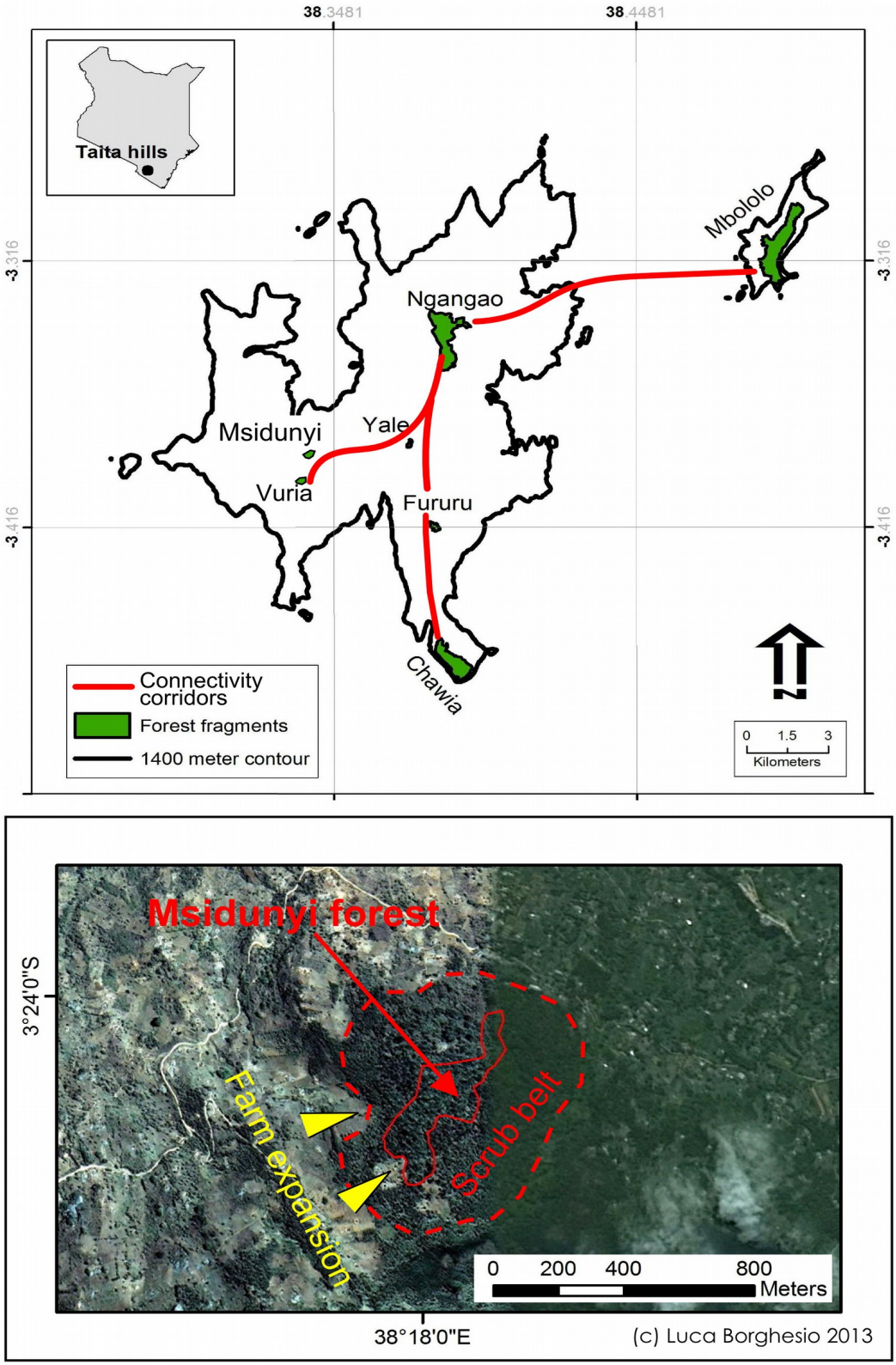

Figure 2. Map of the 27 observations of *A. fuscigularis* obtained during the study (red dots). The red lines delimit the estimated eight territories of the species in the area. Yellow dots = the grid of 70 sample points spaced 100m from each other. Thick green line = the patch of closed canopy indigenous forest

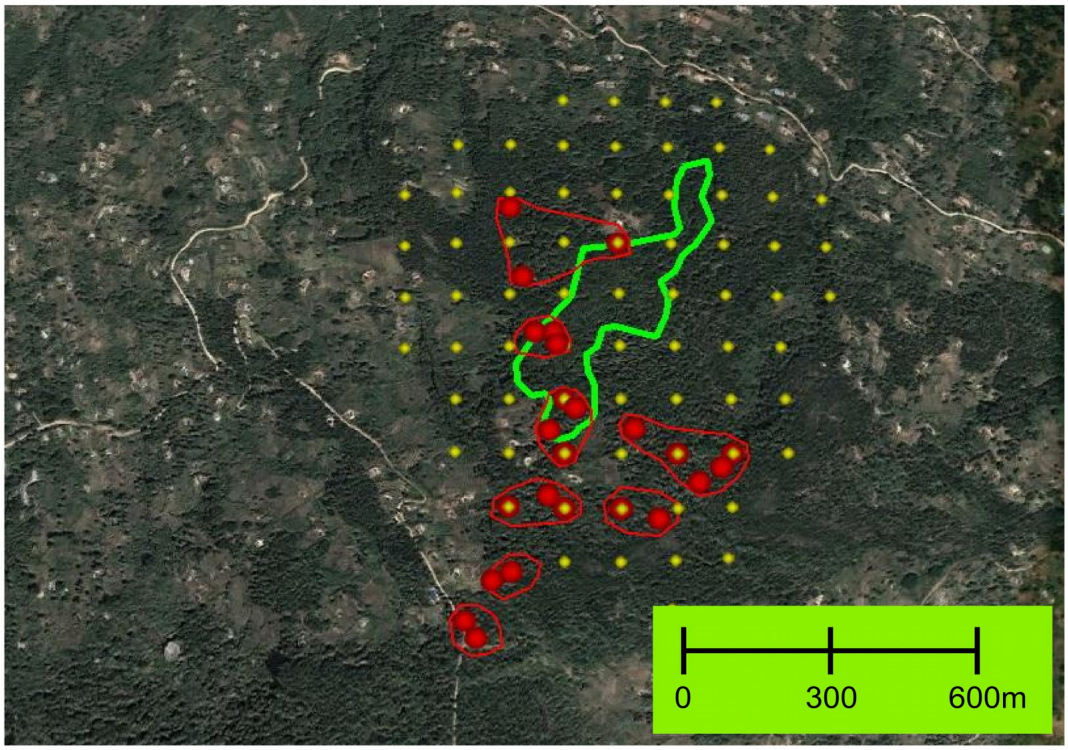

Figure 3. A shot taken at the interior of the patch of Msidunyi closed-canopy forest, October 2011

Figure 4. Logging inside the Msidunyi forest fragment, 15th October 2012.

Figure 5. A male Taita apalis