Project Update: July 2022

Methods

To model the current potential distribution of Ashy red colobus monkeys (Piliocolobus tephrosceles), we collected gps points of group locations (presences data). For model building, machine-learning tool Maxent 3.4.1 (Phillips et al. 2017) was applied to estimate current suitable habitats for house crows in Tanzania. It builds inference from incomplete species information by estimating species distribution using the probability of distribution of the maximum entropy (Phillips *et al.* 2006; Elith *et al.* 2011). A low number of predictors were used to address potential issues with overfitting and transferability (Ndimuligo et al. in press). The occurrence data was split into 75% for training and 25% for testing and applied a 10-percentile threshold bootstrap approach to convert raw model outputs to actual distributional estimates (Mwakapeje et al. 2019). Climate data for current period 1950-2000 from www.wolrdclim.com (Hijmans et al., 2005), slope, elevation and land cover types of re-classified to forest were used. Land cover class forest was obtained by re-classifying land cover data from MODIS 2020 used in Ndimuligo et al. (in press) as Ashy red colobuses prefer this vegetation type (Struhsaker 2010; Kibaja 2022).

Results

The results indicate that under current conditions, the model had AUC = 0.923, indicating that there is a higher than random chance that pixel identifying presences are suitable for the species (Figure 1). According to Hosmer and Lameshow (2000), the range of AUC values have been graded as AUC = 0.5 as "no discrimination", 0.7 < AUC < 0.8 as acceptable range, 0.8 < AUC < 0.9 is excellent range and AUC > 0.9 is outstanding range in the prediction ability.

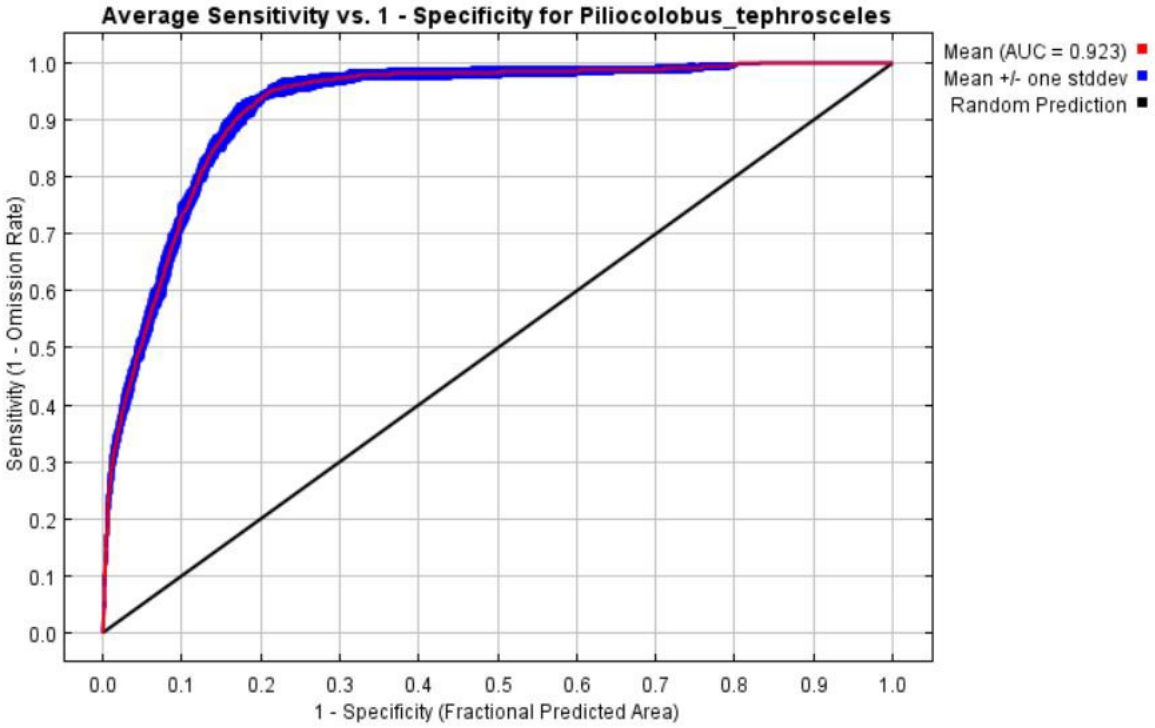

Figure 1. Maxent model output showing model accuracy

Ashy red colobus were predicted by 5-6 variables from climate and forest vegetation type at different percent (Table 1). Precipitation in the warmest Quarter had the highest contribution (25. 5%) followed by forest vegetation type 17.1% (Table 1). Primarily Ashy red colobus are forest dependent species (Struhsaker 2010; Kibaja 2022), thus this study results corroborate to the general pattern known.

Table 1. Predictor variables contribution to Ashy red colobus current potential suitable habitat distribution, western Tanzania

Variable ID	Variable Name	Percent contribution
bio18	Precipitation of Warmest Quarter	25.5
forest	Vegetation type	17.1
bio3	Isothermality	14.1
bio10	Mean Temperature of Coldest Month	13.3
bio12	Annual Precipitation	12.2
bio17	Precipitation of Driest Quarter	9.5
bio13	Precipitation of Wettest Month	5
bio2	Mean Diurnal Range	3.2
		100

This study indicated that potential suitable habitat distribution for Ashy red colobus in western Tanzania are widespread as newly unknown areas in the southern highlands is depicted (Figure 3) in addition to Northern area in the currently Burigi-Chato National Park and its adjacent areas. This part previously named as Minziro in Rodgers (1981), Davenport et al. (2007) and Kibaja (2022). Importantly the study shows that the Greater Mahale Ecosystem has a largest potential suitable habitat for Ashy red colobus (Figure 3). These findings corroborate with findings of presence by Kano (1971 or 1972) and Kibaja (2022). Kibaja et al. ip prep.) and (2022) recorded many groups in the Greater Mahale Ecosystem in 2014-2016 echoes the study by Kano (1971). A suitable habitat along northeast of Greater Mahale Ecosystem was found, which is Gombe National Park a known habitat of Ashy colobus (e.g., Rodgers 1981; Starnford 1998; Kamenya 1997). As well as in the Ufipa plateaus (Davenport et al. 2007; Kibaja 2022) which appear as a mid strip south of GME (Figure 2). Patches south of GME on W and E of Ufipa plateaus are new areas (Figure 2).

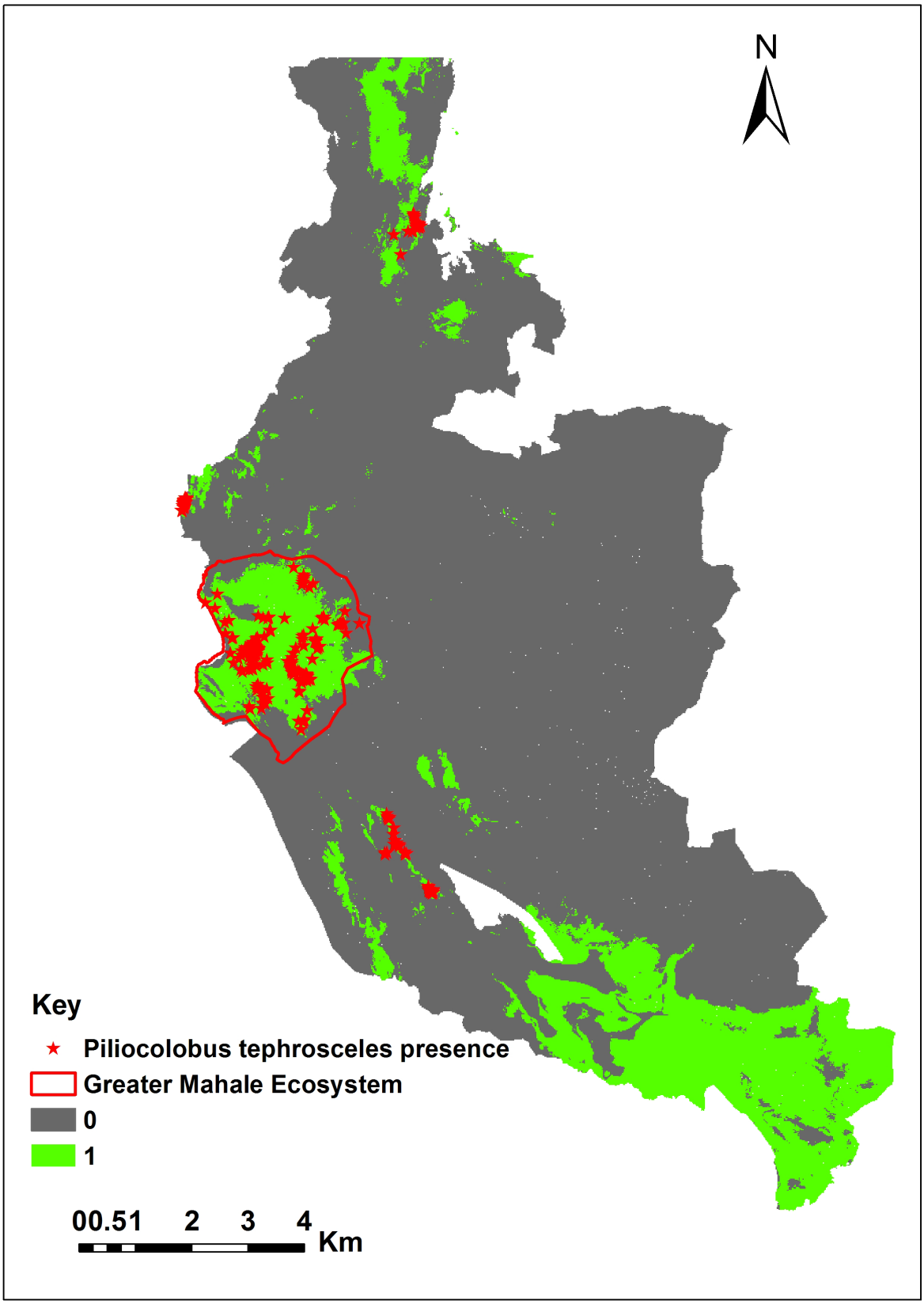

Figure 2. Predicted current potential suitable habitat distribution of Ashy red colobus in western Tanzania (0 mean unsuitable, 1 represents suitable)

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