

# **N-mixture models to estimate abundance and distribution of bird community at multiple forest sites in the Albertine Rift, Uganda**

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**Abstract:** Uganda's Albertine Rift is a mountainous region in the western part of the country that extends from the northern tip of Lake Albert to the southern end of Lake Tanganyika. This region contains the highest diversity of vertebrates on the African continent, with more than 52% of Africa's birds and nearly 40% of the continent's mammals. In 10 years of bird point count surveys at 41 semi-protected forests, >125,000 individual count records were accumulated for >700 species with the aim to investigate factors governing species distribution and community composition. Due to logistical constraints and the relative inaccessibility of several forests, many survey routes were unable to be surveyed >1 during a season (period of assumed population closure), and some were surveyed only once during the entire study period. This lack of temporal replicates generally precludes our ability to account for imperfect detection without additional information (e.g. distance sampling). Here, we build a hierarchical N-mixture model that allows sharing of information on detectability across space and species to obtain estimates of bird abundance, including the effects of spatial covariates governing abundance. We investigate overdispersion in abundance by modeling counts under Poisson, zero-inflated Poisson, and negative binomial distributions, evaluating model fit using Bayesian p-values. We explore several covariate effects on abundance, including elevation, forest type and anthropogenic disturbance. Our results will provide valuable information for management of bird biodiversity in Uganda, including trends in abundance for rare and endemic species and estimates of the impacts of energy exploitation and other development activities on avian communities.

"will consider delivering lightning talk"