

Census of Great Blue Turacos
(*Corythaeola cristata*) and Yellow-billed
Turacos (*Tauraco macrorhynchus*) at
Moka, Bioko Island, Equatorial Guinea

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Abstract

Two species of Turacos are present on Bioko Island, Equatorial Guinea (located off the coast of western, sub-Saharan Africa): the Great Blue Turaco (*Corythaeola cristata*) and the Yellow-Billed Turaco (*Tauraco macrorhynchus*). There are few studies of the density of flocks for either of these two species, and none for the populations on Bioko Island. A line transect was used to census and estimate the density of flocks for each species in the agriculturally disturbed montane rainforest near Moka Village. There were a minimum of four Great Blue Turaco flocks and eight Yellow-billed Turaco flocks/pairs within the 0.76 km² research area. This gives respective densities of 5.3 flocks/km² and 10.5 flocks/km². During censuses, Turacos were encountered at the rates of 0.77/100 m and 0.23/minute. The abundance of the two species within this area seems to indicate that the current conservation status of both species is good. The baseline of data established by this project allows for the ongoing monitoring of Bioko Island's two Turaco species.

Introduction

This study was designed to provide information on the density of Great Blue Turaco and Yellow-billed Turaco flocks in the vicinity of Moka Village, Bioko Island, Equatorial Guinea. Turacos (Family Musophagidae) are large birds endemic to sub-Saharan Africa. Primarily frugivorous, favoring figs, they also eat leaves and flowers (Gautier-Hion & Michaloud 1989, Sun & Moermond 1997). By conducting a line transect along the Moka-Luba Road, which cuts through forest and agricultural fields, it was possible to assess the minimum number of flocks in the area (Bibby et al. 1998, White & Edwards 2002). Data were also collected on flock sizes. Additional qualitative information concerning Turaco behavior in a fruiting fig tree was also collected.

The montane rainforest on the study area has been, and, in some places continues to be, used for growing crops. There is, therefore, much 'edge' where fields and forest meet. The behavioral study was performed on September 21 and 22. The census was conducted on September 23 and from September 31 to October 2. This is the rainy season for Bioko Island.

Research, both census and behavioral, on some Turaco species has been conducted on continental Africa (Gautier-Hion & Michaloud 1989, Sun & Moermond 1997). Yet little is known about Bioko's two species of Turacos. This project provides new information both on density and size of Turaco flocks, and on the ecology of Bioko's two species of Turaco. This information establishes a baseline against which to assess the population trends for these two species within the study area.

Objective

Provide preliminary data on the density and size of Great Blue Turaco and the Yellow-billed Turaco flocks in the degraded montane forest at Moka, Bioko Island, Equatorial Guinea.

Hypothesis

Great Blue Turacos and Yellow-billed Turacos belong to definitive flocks which can be detected and recorded in order to determine flock density. These species are able to adapt and live in the unique edge habitat present where forest and agricultural fields meet.

Research Methods

The line transect was the center of the Moka-Luba Road that passes in front of the Moka Research Station. The 201 meter mark was located on a tree in front of the Station (Appendix I). The two observers started the censuses at the 201 meter mark between 6:40 h and 7:25 h (mean = 7:12 h, n = 4). The following were noted at the start of each census: date, day, time, meter mark and weather. The road was walked at a speed of approximately 1.4 km/h. The researchers stopped about every 50 m for about 20 seconds in order to listen and look more carefully over the area.



Figure 1. Yellow-billed Turaco perched on a low, dead branch at Moka. This medium bird (40-43 cm) has predominantly blue and green feathers and brilliant red underwings, a red crest, and a mostly yellow beak (Borrow and Demey 2004). *Photo by Jessica Weinberg.*

If a Turaco (Fig. 1, Fig. 2) was heard or seen on either side of the line transect, the following information was recorded: time, species, approximate distance from the projected line transect to the bird (perpendicular distance), meters along the projected line transect (distance from the Station) and whether the bird was seen or heard. Major changes in weather were noted throughout (Appendix II).



Figure 2. A Great Blue Turaco on a high, exposed branch at Moka. This very large bird (70-75 cm, about 1,000 g) has blue, black and yellow feathers, a long tail, a black crest, and a yellow bill tipped with red (Borrow & Demey 2004, Brosset and Fry 1988). *Photo by Shoshana Sommer.*

The two researchers walked to meter mark 221. The end time and location were recorded. After waiting for 5-10 minutes at meter mark 221, a second census was conducted on the way back to meter mark 201. The second census began between 7:35 h and 8:55 h (mean = 8:32 h, n = 4). The two censuses were repeated in the late afternoon, the first beginning between 15:53 h and 16:05 h (mean = 15:59 h, n = 2) and the return census between 17:15 h and 17:30 h (mean = 17:23 h, n = 2). These times were chosen to coincide with peak bird activity periods.

A 'flock' is defined as two or more birds within 30 m of one another. Graphing the number of encounters versus the estimated distances of these flocks from the line transect, it is possible to find the 'cut off distance' beyond which the ability of the researchers to detect flocks noticeably declines ([Fig. 3, Appendix II](#)). Flocks detected beyond the cut off distance were not counted (Bibby et al. 1998). It is interesting to note some patterns in detection distances which, with additional data, might provide some indication of the distances between flocks ([Fig. 3](#)).

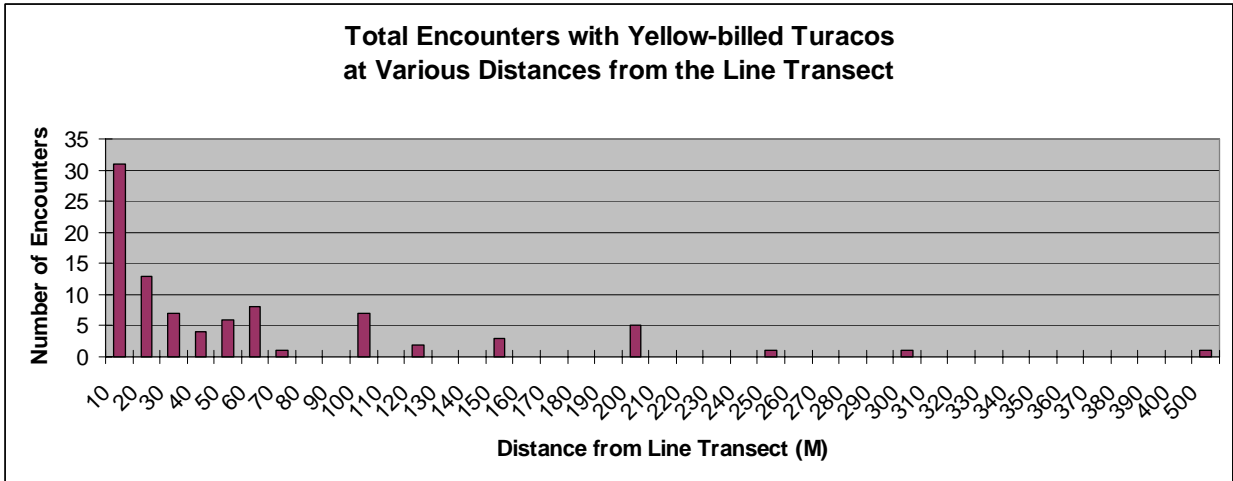
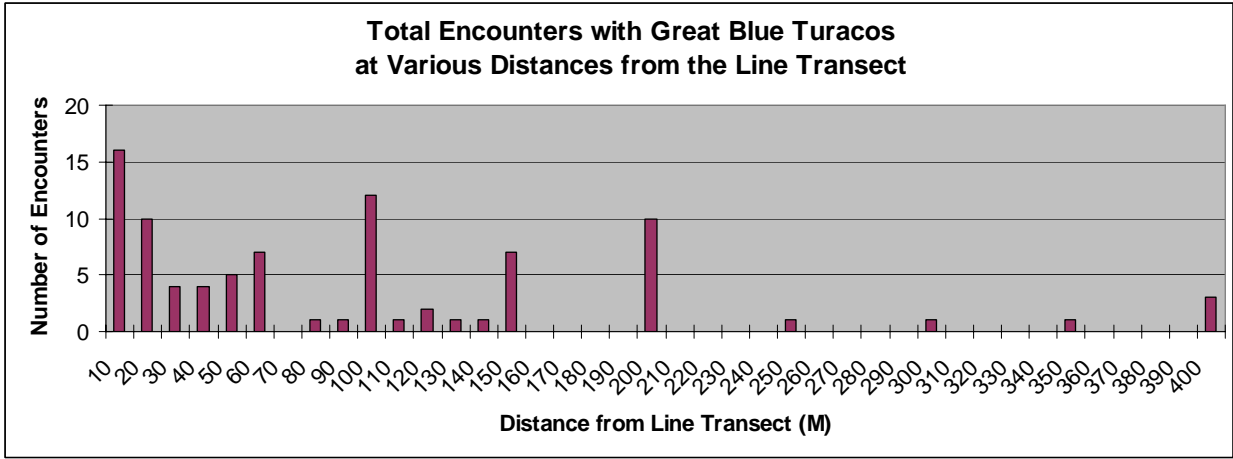
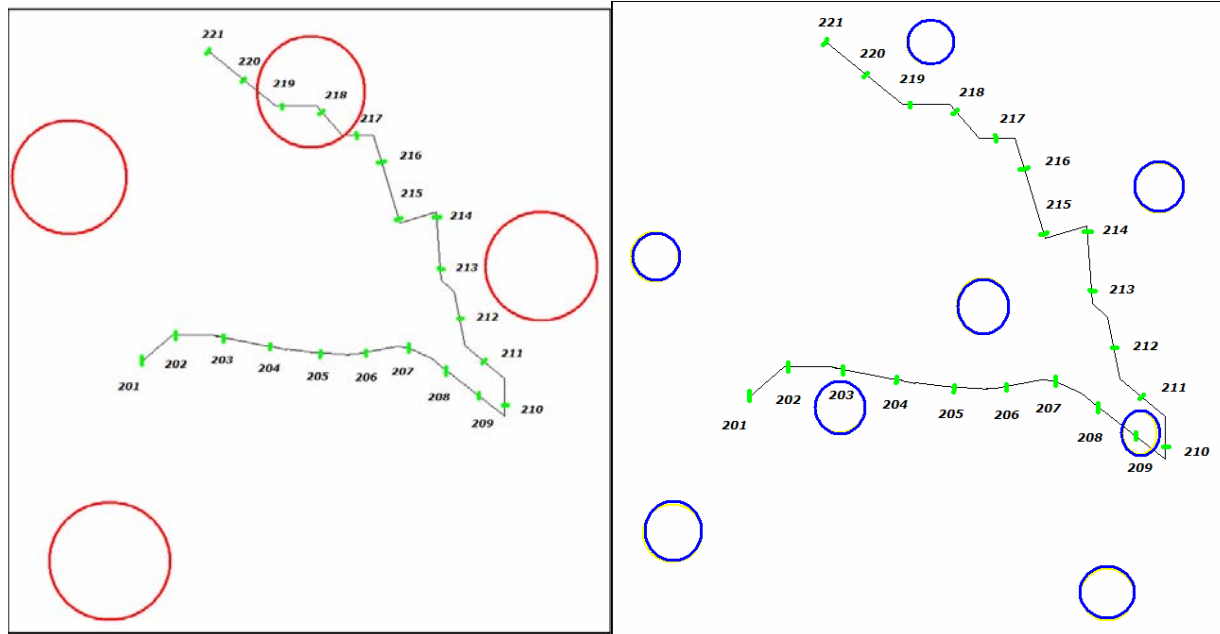


Figure 3. Graphs show the number of encounters with each species at various distances from the line transect. See Appendix III for data tables.

The cut-off distance for each species of Turaco was multiplied by 2 to calculate the width of the line transect. This number was then multiplied by the length of the line transect, giving a total area over which the flocks were observed. For both species, the cut-off distance is 200 m. This yields a survey area of 0.76 km² (400 m x 1900 m = 760,000 m² = 0.76 km²) (Lee & Edwards 2000, Davies 2002). The elevation of the line transect varied from 1412 m to 1581 m (Appendix I).

Results and Discussion

Because it was often difficult to tell for certain which birds were part of a flock, all Turaco sightings and vocalizations obviously produced by different birds were noted. The locations of these sightings and vocalizations were later plotted on a map of the line transect (Fig. 4). This allowed for better determination of number of flocks and locations of flocks.



Great Blue Turaco Flocks

Yellow-billed Turaco Flocks

Figure 4. The map on the left shows the transect route and the approximate locations (red circles) of the four Great Blue Turaco flocks identified within the study area. The map on the right shows the transect route and approximate locations (blue circles) of the eight Yellow-billed Turaco flocks/pairs identified within the study area. Because flock location often varied slightly from census to census (more so for the Yellow-billed Turacos than for the Great Blue Turacos), some of the locations are best guesses. Nonetheless, the data provides for a conservative estimate of minimum number of flocks within the study area at any given time. See Appendix III for elevation and coordinate information.

The minimum number of Great Blue Turaco flocks in the study area was four. This is, a density of 5.3 flocks/km². The minimum number of Yellow-billed Turacos flocks in the study area was eight. This is a density of 10.5 flocks/km². During censuses, Turacos were encountered at the rate of 0.77 /100 m and 0.23/minute. (Appendix III).

Previous studies on continental Africa indicate that Great Blue Turacos live in flocks of 6-20 birds (Sun & Moermond 1997). This was confirmed at Moka, Bioko Island, both at the observed fruiting fig tree, where up at least 12 birds often fed at any one time, as well as along our line transect, during which flocks of 6 or more birds were frequently observed (Appendix II). Using an average Great Blue Turaco flock size of 9 birds ((6 + 12) 0.5), there were about 48 birds/km².

Yellow-billed Turacos may live in territorial pairs (Sinclair & Ryan 2003, Sun & Moermond 1997). Although usually observed singly or in pairs, four or five birds were seen within 15 m of one another on several occasions (Fig. 5, Appendix II). Due to this problem of ascertaining flock size for Yellow-billed Turacos, it was more difficult to determine population density. To obtain a minimum estimate, it was assumed that mean flock size is 2 birds (based on the frequency of two-bird sightings). This yields a minimum of about 21 birds/km². It is suspected that this is a considerable underestimate.

Both the Great Blue Turaco and Yellow-billed Turaco are abundant in the Moka area. Both species seem to prefer the ecotone (i.e. edge) between forest and fields. In fact, fewer

Turacos were encountered per 100 m and per hour during casual walks through less affected montane forests than were encountered while walking on the road amongst degraded forest and agricultural fields.



Figure 5. Behavioral observations were made by watching a fruiting fig tree for a total of 9 h over 2 days. While many behaviors were observed, large amounts of time passed during which the birds were not visible due to the tree's foliage. It was, therefore, impossible to quantify this information, and the study was abandoned. The photo on the left shows two Great Blue Turacos on a dead tree near the fruiting fig. The bird on the left is scanning, and the bird on the right is relaxing with its wings drooping and tail feathers splayed. The photo on the right shows two Yellow-billed Turacos interacting. *Photos by Jessica Weinberg.*

Initially, this study was to focus on the behaviors of both bird species (Partner 2006, Anon. 2004). Scan sampling was to be used in order to observe and quantify the behaviors of both Great Blue and Yellow-billed Turacos feeding in a fruiting fig tree (Fig. 5, Appendix IV). While some behaviors were easily observed, there were long periods of time in which no birds could be seen, as they remained above and within the heavy foliage of the tree. Great Blue Turacos that entered the tree tended to stay for several minutes to a few hours, while Yellow-billed Turacos tended to stay for relatively short periods of time (several minutes). The fruit of this fig (*Ficus* sp., Bubi name: 'Voabat') had a mean diameter of 21 mm (range = 14.2 - 26.7 mm, $n = 35$ fruits), which may have satisfied the smaller Yellow-billed Turaco more quickly than the larger Great Blue Turaco (Abitz 2006).

While the behavioral observations were not quantitatively useful, performing these studies prior to carrying out the line transect helped researchers become more familiar with some of the calls made by each species, as well as the species general behavior and habitat preferences (e.g. height above ground). In addition, birds at the fruiting fig tree tended to behave differently according to weather, an observation that could be applied to the line transect, as well (Appendix IV). Finally, it was noted that most of the Great Blue Turacos were in the tree as part of a large flock, while the Yellow-billed Turacos generally visited singly or in pairs.

Recommendations

A week after the conclusion of this study, a group of 25-40 Great Blue Turacos was seen in and around a large fruiting fig tree in the Moka Village area (T. Butynski, pers. comm.). It

would be interesting if future research were able to determine if such large congregations represent a single flock or two or more flocks coming together to feed. Several Yellow-billed Turacos were also noted near this fig tree. More in-depth research on the size of Yellow-billed Turaco flocks is needed. It may be that flock size is related to the breeding season.

While Turacos are not commonly killed and sold as food, a single Great Blue Turaco was observed for sale at Cruso de Riaba y Moka (the intersection of Riaba and Moka) on 6 October 2006. It is possible that, as the numbers of primates and larger forest animals decline as a result of unsustainable shotgun hunting, Turacos will be more frequently hunted. On the other hand, if primate populations continue to decline, Turacos may thrive as a result of reduced competition for fruits. The present high density of Turacos in the Moka area could, therefore, be due to the diminished populations of primates. This would be a useful and interesting topic for future research. It would be valuable to conduct regular censuses of both Turaco species at Moka, as well as to monitor any increases in their use and sale as food.

Increasing the length of the line transect and choosing a section of road or trail that is relatively straight might be beneficial. In addition, further studies of the flock size of both species should be done at various times throughout the year to determine the relationship with the breeding ecology of each species. It would also be interesting to study behavior of both species as it relates to weather.

As a developing country with recent wealth in the form of oil revenues, Equatorial Guinea faces the challenge of balancing the present and future needs and wants of the people, the pressures of outside economic forces, and the need to conserve its natural resources, particularly the Island's biodiversity. In the end, an intact biodiversity may well be a far greater asset to the people of Bioko than is the oil. Bioko's political and social circumstances, combined with its unique biological diversity, create a challenge for conservation and a great responsibility for the government of Equatorial Guinea.

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