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Predicting Toucan Locations in Panama Using ArcGIS

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Background and Methods

Toucans are omnivorous birds native to southern Latin America and South America. They are non-migratory, and their range is disputed among experts. In an attempt to develop a better understanding of the range and behavior of toucans, correlations between toucan presence and geographic features of the area were analyzed to create a location probability map. See figure 1. Due to data limitations, only portions of the Panama and Colon provinces could be accurately mapped. Figure 2 shows the area of panama included in the probability map.
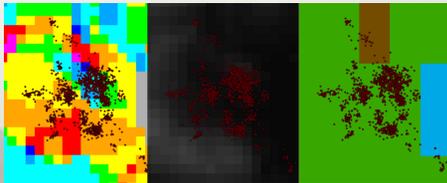

Figure 1. These three panels show the toucan locations overlaid on various layers to find a correlation between the layer and the location. Data was analyzed using X^2 tests, where e equals the number of points divided by the window's abundance of a specific attribute. In the case of Land cover, broadleaf forest occupied 83% of the viewing window, so it should hold 83% of the points if the points are distributed equally. However, since broadleaf forest held 99% of the points, land cover was deemed to be a factor in toucan location probability. From left to right: Slope Aspect, Elevation, Land cover.
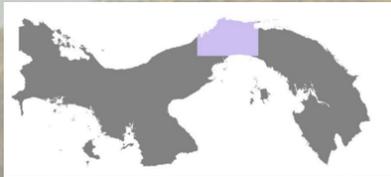

Figure 2. This map shows the area of Panama that was analyzed to determine the likelihood of the presence of toucans. The lavender field denotes the study area, grey denotes land that was not used in this analysis.

Data Sources

Elevation Data: Virtual Terrain Project
Land cover Data: Global Landsat
Water Data: DIVA-GIS
Toucan Locations: Movebank

Kays, R., Jansen, P.A., Knecht, E.M.H., Vohwinkel, R., and Wikelski, R., 2011, The effect of feeding time on dispersal of Virola seeds by toucans determined from GPS tracking and accelerometers: Acta Oecologica v. 37, i. 6, p. 625-631, doi:10.1016/j.actao.2011.06.007.
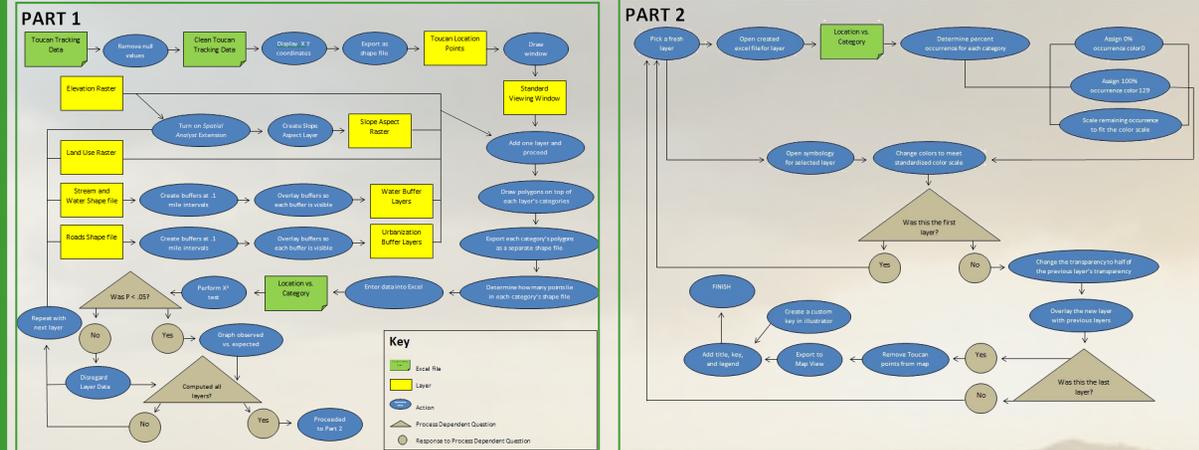
Cartographic Model

Figure 3. The steps that went into creating the final likelihood map can be seen above. These steps can apply to projects using GPS location data for any animal. Projects in areas with more spatial data should consider using more layers, specifically layers including information on urbanization, specific plant types, and more detailed layers that depict local water channels.

Toucan Position Likelihood Map
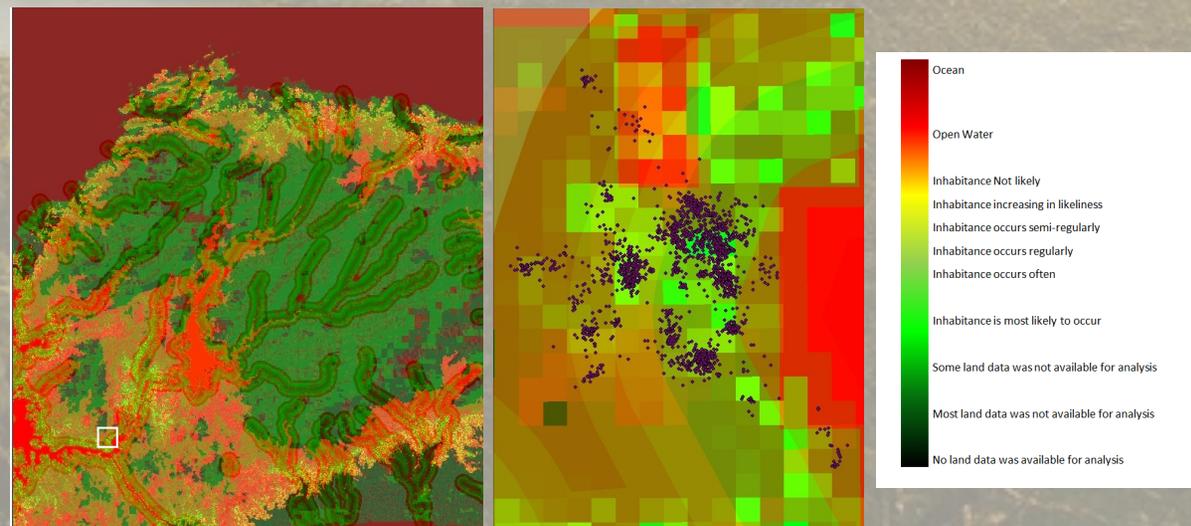
Figures 4, 5, and 6 (left to right). **Figure 4** shows the livelihood map for the region specified in figure 2. Note the white box in figure 4. **Figure 5** is the area inside the white box in figure 4. The purple dots symbolize toucan locations. **Figure 6** offers a key to reading figures 4 and 5. Fluorescent green indicates the highest probability of finding a toucan in that location.