

Habitat Suitability for the White-breasted Thrasher

Introduction

The Caribbean islands are a biodiversity hotspot, comprising one of the highest densities of endemic species in the world (Myers et al. 2000). Tourism development is rapidly increasing in these islands and is responsible for severe habitat loss and fragmentation (Young et al. 2010). For the extraordinary biodiversity and the imminent threat of development, the Caribbean islands are considered a global conservation priority (Myers et al. 2000).

The white-breasted thrasher, *Ramphocinclus brachyurus* (Figure 1), is a passerine that is endemic to the islands of Saint Lucia and Martinique in the Caribbean (BirdLife International 2012). On Saint Lucia (Figure 2), it is present in two sub-populations in the dry forest habitat of



Figure 1. A male white-breasted thrasher, *Ramphocinclus brachyurus*, perches on a nest

the east coast (White et al. 2012). Fewer than 900 birds were counted in 2011, and the species has been listed as endangered since 1994 (BirdLife International 2012). Development, including clearing forests for agriculture and tourism, makes habitat unsuitable for the thrasher. (White et al. 2012).

This project aims to determine areas of Saint Lucia that provide suitable habitat for the white-breasted thrasher. Suitability is defined here by the location's similarity to the characteristics of the current range. A better understanding of potentially suitable habitats may help determine conservation priorities for the white-breasted thrasher.

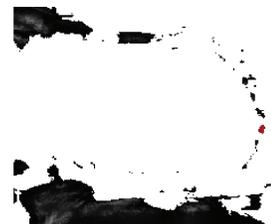


Figure 2. Saint Lucia (red) is located in the Caribbean Islands

Methods

To determine the most suitable habitat for the white-breasted thrasher on Saint Lucia, ten climatic and development factors were considered. These were the current thrasher population range, average temperature, average precipitation, elevation, slope, aspect, land use, distance to streams, distance to highways, and distance to the coast. The current thrasher range layer was provided by Matthew Morton; all other layers were found online, either from WorldClim.org or from the Saint Lucia Integrated National GeoNode (SLING; sling.gosl.gov.lc). Slope and aspect were calculated from elevation.

The layers were projected into St. Lucia 1955 British West Indies Grid. Desirable attributes were determined by manually examining the current population range to find the minimum and maximum values of the characteristic present. The layer was then reclassified using Spatial Analyst tools based on where else the characteristics were found: 1 if the area matched

the characteristic of the range, 0 if it did not.

The exception to this method was the highway and stream data, which did not show a pattern of presence in the current thrasher range. Based on White et al. (2012), areas close to streams were reclassified as good habitat, and areas close to highways were reclassified as poor habitat. Closeness to streams was denoted by a range of 0 to 3 (3 being close to stream), which was multiplied by 0.33 in the additive model to prevent weighting. Closeness to the current range was also described by a range of 0 to 3 and multiplied by 0.33 to prevent weighting.

An additive model was created using the reclassified layers :

Land use + highway + stream*0.33 + shoreline + elevation + slope + aspect + precipitation + mean temperature + current range *0.33

The possible values range from 0 to 10.

Habitat Suitability Model

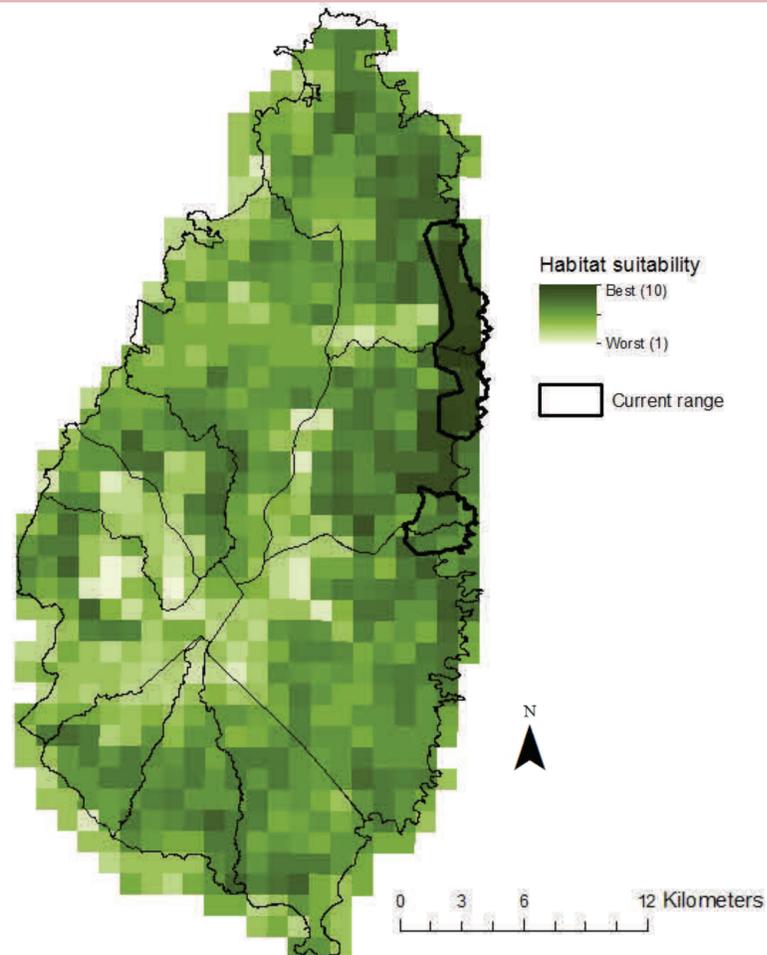


Figure 3. Suitability analysis for white-breasted thrasher habitat

Contributing Factors

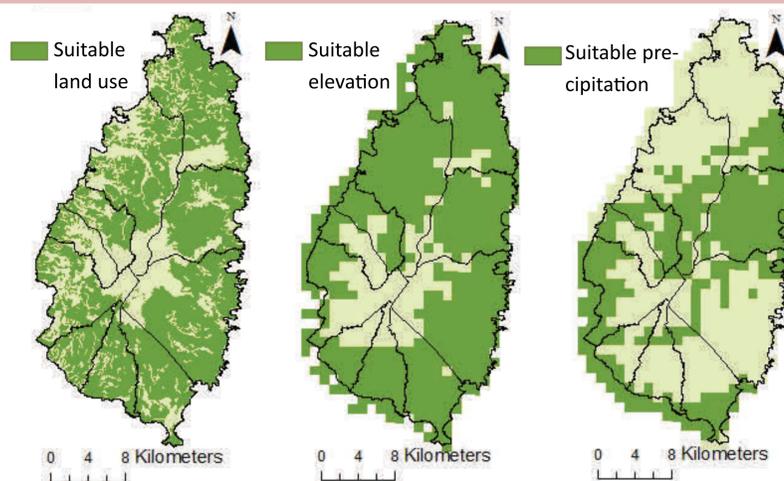


Figure 4. Factors that contributed to the suitability analysis for the habitat of the white-breasted thrasher. Other factors (not pictured) include slope, aspect, shoreline, temperature, highways, streams, and current thrasher range.

Project Findings

The suitability analysis model, based on these ten factors, determined that the most suitable thrasher habitat is in their current range (Figure 3). This is logical, since most of the characteristics that defined suitability for this study were based on the qualities of the current range. The next most suitable habitats are found to the north and to the southwest of the current range, where the climatic factors are likely very similar to the range. Other areas that have high suitability are found along the southwestern and southern coasts, although these are smaller fragments of suitable habitat, which may not be large enough to support a viable thrasher population.

These results contrast the findings of White et al. (2012), who determined that

inland of the west coast is the best habitat available for the white-breasted thrasher. In the model presented here, this is determined to be among the least similar habitat to the current range. This illustrates the sensitivity of suitability analyses to the input factors (Figure 4). Some factors that may be important for white-breasted thrasher habitat were not included in this analysis due to unavailability of data. These include information on habitat fragmentation, vegetation cover (NDVI), density of introduced carnivores like mongooses, and current human development. The interactions of these factors may also play a role in determining habitat quality, for example human development and introduced predators may put extra pressure on thrasher species.

Conclusion

These results emphasize the importance of conservation of the thrasher's current range as the most suitable habitat on the island. Only 4% of the white-breasted thrasher's small range is currently protected (White et al. 2012); this analysis also illustrates the potential for suitable habitat surrounding the current range and elsewhere on the island. More research

will be necessary to determine which climatic and biotic factors determine the ideal habitat for the white-breasted thrasher.

Given the thrasher's endangered status, habitat conservation will be key for the species' survival in the face of increasing tourism development.

Cartographer: Emma Sass

Date: December 14, 2012

Professor: Carl Zimmerman, TA: Carolyn Talmadge

Data sources: WorldClim.org, Saint Lucia National GeoNode (sling.gosl.gov.lc), Matthew Morton

Projection: St. Lucia 1955 British West Indies Grid

References

BirdLife International 2012. *Ramphocinclus brachyurus*. In: IUCN Red List of Threatened Species. Version 2012.2. <www.iucnredlist.org>. Downloaded 14 December 2012.

Myers, N, Mittermeier, RA, Mittermeier, CG, da Fonseca, GAB, and Kent, J. 2000. Biodiversity hotspots for conservation priorities. *Nature* 403: 853-858

White, RL, Baptiste, TJN, Dornelly, A, Morton, MN, O'Connell, MJ, and Young, RP. 2012. Population responses of the endangered white-breasted thrasher *Ramphocinclus brachyurus* to a tourist development in Saint Lucia—conservation implications from a spatial modeling approach. *Bird Conservation International* 22: 468-485

Young, RP, Baptiste, TJN, Dornelly, A, Temple, H, Whitehead, H, Young, HG, Morton, MN. 2010. Potential impacts of tourist developments in St Lucia on the endangered white-breasted thrasher *Ramphocinclus brachyurus*. *Bird Conservation International* 20:354-364