Modeling wood turtle (*Clemmys insculpta*) distributions in La Mauricie National Park

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Introduction

The wood turtle (*Clemmys insculpta*) is listed as a species of special concern by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). The primary causes of declines in population size are attributed to habitat destruction and fragmentation[1].

Species distribution modeling was done for a wood turtle population inside La Mauricie National Park, located in the southernmost part of the Canadian Shield in Québec. The aims of this study are twofold: 1) identify potentially suitable habitats for the species and 2) locate potential 'hot spots' of occurrences.

The modeling done in this study will serve as a template for future studies within and around the parks for other species of interest.

Figure 1 – The study area - La Maurice National Park in Québec. Coordinates are roughly 46d44'36.44" N, 72d44'10.72" W.

Methods

- All modeling was carried out with Maximum Entropy computer software[2]

-A random sample of the occurrence points (70:30) were used to train and test the models, respectively.

- Ten models were constructed to get a representative potential distribution and the average output was chosen for analysis.

-Independent variables included: radiation duration, global radiation, land cover, distance to water and distance to deciduous forest.

- Thresholds of presence/absence were determined by choosing the point where sensitivity is equal to specificity on the receiver operator characteristic curve[3]

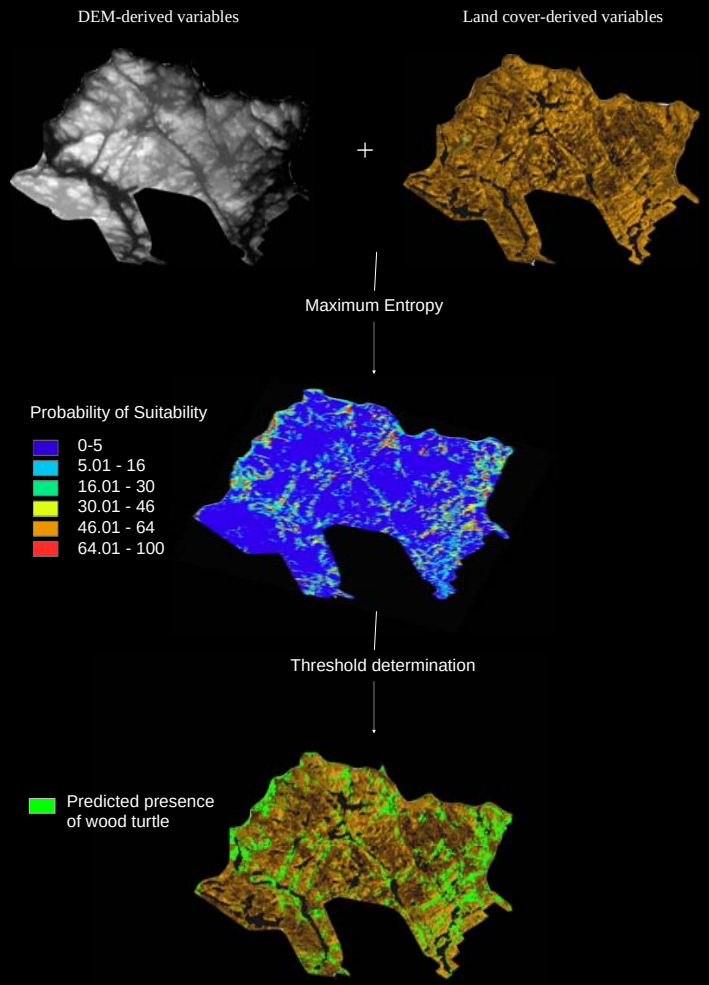

Figure 2 – Schematic of the methodology used to model wood turtle distributions.

Results

- The average area under the receiver operator characteristic curve (AUC) value for the ten runs was 0.938. A value of 0.5 represents a prediction no better than random, and a value of 1 represents perfect discrimination.

- Duration of radiation was the most important variable in the models (assessed by jackknifing), while distance to deciduous forest was the least important.

Figure 3 – Jackknife test of variable importance. Models run with all variables (red), the single variable (blue), and without the variable (green).

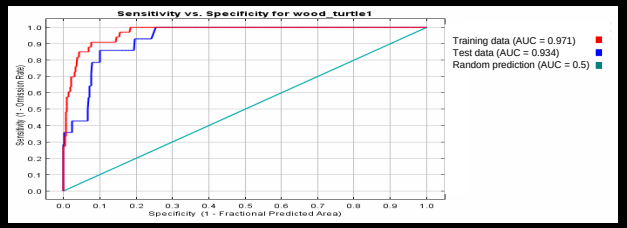

Figure 4 – Sensitivity (true positive rate) vs. specificity (true negative rate) plot. This plot is used to calculate the AUC value - an evaluation of the accuracy of the model.

Future Work

- Incorporate more land-cover derived landscape variables (ex. patch area, habitat connectivity and fragmentation, etc.) into the models.

- Time-series modeling using 1985, 1990, 1995, 2000 and 2005 Landsat land-cover maps.

References

1. Arvisais et al. 2004. Canadian Journal of Zoology. 82: 391-398.
2. Phillips et al. 2006. Ecological Modelling. 190: 231-259.
3. Liu et al. 2005. Ecography. 28: 385-393.

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