A habitat model predicting Cerulean Warbler (*Dendroica cerulea*) distribution in Central America during Spring migration

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A brief glimpse at Cerulean Warblers…

- Nearctic Neotropical migrants
- Breed in eastern North America
- Canopy nesters and foragers
- Appear to prefer structurally diverse canopy with interspersed light gaps

Status

- The range-wide population of the Cerulean Warbler has been declining steadily for the last several decades
- Petitioned to be listed as a Threatened Species in 2001
- Declared "not warranted" to be listed on 12/5/06
Conservation efforts

- Proposed factors contributing to decline on all parts of their range: fragmentation and loss of habitat
- Cerulean Warbler Technical Group formed in 2001
- El Grupo Cerúleo
Objective

– To predict suitable stop-over habitat for the Cerulean Warbler in Central America by developing a Mahalanobis distance ($D^2$) habitat model for the region

Study Area

Field Methods

• Surveys for Cerulean Warbler presence:
  – 2004 – Belize
  – 2005 – Guatemala and Honduras
  – 2006 – Guatemala and Honduras

• Validation of model:
  – April 2007 – Chiapas, Mexico, Guatemala, and Honduras
Methods: Acquire variables

1. Elevation (USGS – EROS)
2. Average solar exposure (Hermann 1996)
3. Mean temp. for April (Hijmans et al. 2005)
4. Mean precip. for April (Hijmans et al. 2005)
5. Precip. for the wettest quarter (Hijmans et al. 2005)
6. Temp. for the driest quarter (Hijmans et al. 2005)
7. Tree cover (Hansen et al. 2006)

Model Development

• Conduct PCA with a PVA to determine the best 2 of 19 available bioclimatic variables

Results

Table 1: Summary statistics for explanatory variables used to model Cerulean Warbler habitat in Central America.
Results

Table 2: Results from logistic regression analysis

<table>
<thead>
<tr>
<th># present</th>
<th># absent</th>
<th>Coefficient</th>
<th>P</th>
<th>Rescaled R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>60</td>
<td>-0.0415</td>
<td>0.093</td>
<td>0.0097</td>
</tr>
</tbody>
</table>

Sensitivity: 95.8%
(proportion of correctly predicted presences)
**Discussion**

- Model adequately predicts Cerulean Warbler presence in Central America during spring migration

- Continued monitoring needed to further validate the model

- Future directions:
  - Collect absence dataset to assess specificity
  - Compare D² model with other algorithms

**Management Implications**

- Use model to locate priority areas for conservation action
Management Implications

• Know what management recommendations to suggest to landowners

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¿Preguntas?