Development of a Pollinator Habitat Assessment Tool in Maine’s Wild Blueberry Landscape

Brianne Du Clos
PhD Candidate, Ecology and Environmental Sciences
University of Maine
Orono, ME
BeeMapper Web Tool
What is BeeMapper?

• Aim: to help growers assess wild bee habitat around their wild blueberry fields
• Target audience: Maine wild blueberry growers
• Features:
  • Maps
    • Land cover
    • Predicted wild bee abundance
    • Navigational aids
  • User’s guide
  • Links for further reading
Why BeeMapper?

- Increasing reliance on honey bees may be unsustainable
- Need to understand contribution from wild bees
- How can we get the message out?
  - Make information publicly accessible
  - Display information in an intuitive manner

Photos: Wyman’s of Maine, University of Maine
InVEST Crop Pollination Model

- Spatially explicit ecosystem service model
- Single snapshot, landscape scale

Chapin 2014
InVEST Crop Pollination Model

• Developed to inform decision making
InVEST Crop Pollination Model

- **Input:**
  1. Land cover data
     - 2004 MeLCD
     - 5 m resolution
     - 8 land cover types
     - Ancillary sources:
       - USDA CropScape
       - NWI
       - Roads, Railways
InVEST Crop Pollination Model

- **Input:**
  1. Land cover data
  2. Suitability values
     - Expert opinion survey (n=12)

### Table 3. Average (± standard deviation) scaled landcover suitability values assigned through expert opinion.

<table>
<thead>
<tr>
<th>Landcover</th>
<th>Ground nesting</th>
<th>Cavity nesting</th>
<th>Spring forage</th>
<th>Early Summer forage</th>
<th>Late Summer forage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deciduous/mixed forest, edge</td>
<td>0.9(0.17)</td>
<td>1.0(0.19)</td>
<td>0.9(0.24)</td>
<td>0.9(0.24)</td>
<td>1.0(0.22)</td>
</tr>
<tr>
<td>Developed/other</td>
<td>0.9(0.25)</td>
<td>0.6(0.30)</td>
<td>1.0(0.27)</td>
<td>0.9(0.26)</td>
<td>1.0(0.22)</td>
</tr>
<tr>
<td>Coniferous forest</td>
<td>0.5(0.23)</td>
<td>0.6(0.28)</td>
<td>0.1(0.24)</td>
<td>0.1(0.21)</td>
<td>0.1(0.29)</td>
</tr>
<tr>
<td>Deciduous forest/mixed forest</td>
<td>0.6(0.21)</td>
<td>0.9(0.22)</td>
<td>0.7(0.21)</td>
<td>0.5(0.29)</td>
<td>0.4(0.18)</td>
</tr>
<tr>
<td>Emergent wetlands/scrub-shrub</td>
<td>0.2(0.14)</td>
<td>0.4(0.24)</td>
<td>0.7(0.22)</td>
<td>0.6(0.25)</td>
<td>0.6(0.20)</td>
</tr>
<tr>
<td>Wetlands/water</td>
<td>0.1(0.0)</td>
<td>0.1(0.05)</td>
<td>0.3(0.20)</td>
<td>0.2(0.16)</td>
<td>0.5(0.18)</td>
</tr>
<tr>
<td>Agriculture/field</td>
<td>0.7(0.29)</td>
<td>0.2(0.18)</td>
<td>0.9(0.31)</td>
<td>0.7(0.27)</td>
<td>0.9(0.33)</td>
</tr>
<tr>
<td>Blueberries</td>
<td>1.0(0.25)</td>
<td>0.4(0.26)</td>
<td>0.4(0.29)</td>
<td>1.0(0.28)</td>
<td>0.5(0.26)</td>
</tr>
</tbody>
</table>

Chapin 2014
InVEST Crop Pollination Model

• Input:
  1. Land cover data
  2. Suitability values
  3. Bee species life history
     • Foraging distance
     • Nesting preference
     • Flight season
InVEST Crop Pollination Model

- **Input:**
  - Land cover data
  - Suitability values
  - Bee species life history
- **Validation data from 40 fields**
- **Output:** predicted wild bee abundance (10 m)
Participatory development

• 1\textsuperscript{st} iteration: Small group presentation
  • Feedback:
    • more navigational aids
    • simple information
    • shaded color abundance map

• 2\textsuperscript{nd} iteration: Booth at a large meeting
  • Spring Growers Meeting, March 2015

• 3\textsuperscript{rd} iteration: Six 1:1 sessions
  • Growers using a variety of management practices, March 2015
Translation to wild blueberry growers

• Sources of uncertainty:
  • Model performance
  • Accuracy at field scale

• How will growers use this data?
  • Honey bee hive placement
  • Pollinator conservation or planting placement
What’s next

• More testing and development
  • More intuitive use and interpretation
  • Incorporating links for further reading

• Field surveys in 8 land cover types

• Application of InVEST in midcoast Maine growing region
Acknowledgments

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  • Samuel Hanes
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  • Nate Swan