Understory and Stand Type Effect on Occupancy of Southeastern Winter Bird

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BACKGROUND

● Expand on Dr. Quay’s study
● Covariates:
  1. Stand Type
  2. Understory Density
● Effect on species presence
● Effects on Conservation
OBJECTIVES

Two Questions:

I. What effect does understory density have on the occupancy of wintering birds in the Southeast?

I. What effect does stand type have on the occupancy of wintering birds in the Southeast?
**HYPOTHESIS**

**Question 1** → Positive Relationship between understory density and occupancy of ground/mid story foraging species (Northern Cardinal & Carolina Wren)

   Weaker Positive Relationship in understory density and occupancy of canopy/bark foraging species (Red-bellied Woodpecker, Tufted Titmouse, & Brown -headed Nuthatch)

**Question 2** → Pine stand type will only positively relate to Brown -headed Nuthatch occupancy.
METHODS

Location: Carl Alwin Schenck Memorial Forest

➔ 20 points surveyed 3 times each
   At least 100 meters apart
   Surveyed between 4pm-7pm

➔ Occupancy Survey
   7 minutes at each point
   50 meter radius
   Presence/Absence recorded for each focal species seen or heard
SAMPLE POINT LOCAT
SAMPLE POINT COORDINATES

NORTH SIDE

Coordinates (in order):
8: 35.823553, -78.72875
14: 35.820862, -78.730513
3: 35.821264, -78.733927
11: 35.818322, -78.734378
9: 35.818398, -78.731403
17: 35.81928, -78.730843
2: 35.818646, -78.727965
0: 35.820207, -78.727413
19: 35.820682, -78.725579
12: 35.822417, -78.726807

SOUTH SIDE

Coordinates (in order):
6: 35.817466, -78.719741
15: 35.818063, -78.723355
16: 35.818063, -78.724866
1: 35.817185, -78.726285
18: 35.816898, -78.728058
4: 35.815455, -78.728954
10: 35.815517, -78.730402
5: 35.814579, -78.731222
13: 35.815284, -78.734267
7: 35.8133, -78.724846

Points were selected randomly by ArcMap
COVER TYPED & UNDERSTORY DENSITY

Upland - Density 1

Bottomland - Density 2

Pine - Density 3
RESULTS

<table>
<thead>
<tr>
<th>Species</th>
<th>Total Detections</th>
<th>Naive Occupancy Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brown-headed Nuthatch</td>
<td>5</td>
<td>0.25</td>
</tr>
<tr>
<td>Carolina Wren</td>
<td>17</td>
<td>0.55</td>
</tr>
<tr>
<td>Northern Cardinal</td>
<td>18</td>
<td>0.7</td>
</tr>
<tr>
<td>Red-bellied Woodpecker</td>
<td>6</td>
<td>0.3</td>
</tr>
<tr>
<td>Tufted Titmouse</td>
<td>20</td>
<td>0.64</td>
</tr>
</tbody>
</table>

Table 2: Best models for each species and relationships between covariates and species

<table>
<thead>
<tr>
<th>Species</th>
<th>Best Model</th>
<th>AIC Value</th>
<th>Second Best Model</th>
<th>AIC Value</th>
<th>Delta AIC</th>
<th>Relationship</th>
</tr>
</thead>
<tbody>
<tr>
<td>BHNU</td>
<td>Null</td>
<td>38.42</td>
<td>Understory</td>
<td>40.23</td>
<td>1.81</td>
<td>Positive</td>
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<tr>
<td>CARW</td>
<td>Null</td>
<td>73.67</td>
<td>Upland</td>
<td>75.19</td>
<td>1.52</td>
<td>Positive</td>
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<tr>
<td>NOCA</td>
<td>Null</td>
<td>77.3</td>
<td>Bottomland</td>
<td>78.82</td>
<td>1.52</td>
<td>Positive</td>
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<tr>
<td>RBWO</td>
<td>Null</td>
<td>43.01</td>
<td>Pine</td>
<td>44.36</td>
<td>1.35</td>
<td>Negative</td>
</tr>
<tr>
<td>TUTI</td>
<td>Null</td>
<td>80.23</td>
<td>Understory</td>
<td>80.31</td>
<td>0.08</td>
<td>Positive</td>
</tr>
</tbody>
</table>
DISCUSSION

Minimal effect of understory density on species occupancy

Minimal effect of stand type on species occupancy
DISCUSSION

Some evidence of a positive effect on Tufted Titmouse occupancy with increased understory density

Some evidence of positive effects of stand type on occupancy of Northern Cardinal and Carolina Wren

- Northern Cardinal positively with bottomland
- Carolina Wren positively with Upland
DISCUSSION

Slightly less likely to find Red-bellied Woodpecker in pine

Negative correlation with pine

Many negative associations with pine

Pine stands at Schenck are closer to roads
**DISCUSSION**

**Limitations**
- Small Sample Size
- Birding Experience
- Time of Day
- Weather
- Subjectivity of Understory Estimates
- Subjectivity of Stand Type

**Improvements**
- Increase Sample Area
- Increase Sample Points
- Longer Sample Period
- Assumption (occupancy does not mean preference)
SOURCES

QUESTIONS?