Can eBird Serve as an Adequate Surrogate for Field Observations in Assessing the Prevalence of Virally Competent Avian Hosts for West Nile Virus?

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Introduction

• The prevalence of West Nile virus is dependent on viral amplification between virally competent, avian host species and mosquito vectors.
• Although point surveys provide optimal data, comprehensive surveys remain impractical.
• Citizen science may have provided a solution to problematic data collection.
• To evaluate the credibility of the application, this study aims to determine if eBird data can serve as an adequate surrogate for field observations.

Methods

• Fifteen-minute bird point surveys were conducted to test eBird’s legitimacy. This occurred at mosquito trapping sites over the course of two summers (2018 and 2019): Lake Helena, Police Academy, and the Helena Regulating Reservoir.
• After compiling eBird data at the same locations, a regression analysis was performed to distinguish potential correlations. I analyzed data specific to bird species with medium to high competence.

Results

Table 1. This table depicts the weekly P-values produced from the linear regression analysis completed, assessing the correlation between relative abundance (produced from point surveys) and relative frequency (eBird data). This correlation was completed on all bird data, not just the species with medium to high competence.

<table>
<thead>
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<th>Week 1</th>
<th>Week 2</th>
<th>Week 3</th>
<th>Week 4</th>
<th>Week 5</th>
<th>Week 6</th>
<th>Week 7</th>
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<tr>
<td>Helena Regulating Reservoir</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
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<tr>
<td>Lake Helena</td>
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<td>&lt;0.001</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
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<td>&lt;0.001</td>
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<td>0.013</td>
<td>0.001</td>
<td>N/A</td>
<td>&lt;0.001</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Figure 1. Brandon Brown (left) and I (right) conducting point surveys at Lake Helena site.

Figure 2. Lake Helena linear regression analysis on virally competent species data, comparing the relative abundance of point surveys with data from eBird.

Figure 3. Police Academy linear regression analysis on virally competent species data, comparing the relative abundance of point surveys with data from eBird.

Figure 4. Helena Regulating Reservoir linear regression analysis on virally competent species data, comparing the relative abundance of point surveys with data from eBird.

Figure 5: This picture displays an American Robin (Turdus migratorius), one of the many virally competent reservoirs for West Nile virus. This photo was provided by courtesy of Shane Sater.

Figure 6: This map displays various mosquito trap sites along with trap sites that tested positive for West Nile virus. The three sites that tested positive were the areas of interest within this study: Lake Helena, Police Academy, and Helena Regulating Reservoir.

Conclusion

• The weeks that were compared suggest significant correlation between the datasets.
• The analysis demonstrates a stronger relationship at the sites of Lake Helena and the Helena Regulating Reservoir. Police Academy exemplified a weaker correlation because lack of available eBird data.
• This indicates that eBird could be implemented with confidence as an assessment of viral reservoirs at these specific sites.

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