Introduction

Great Lakes Colonial Waterbirds as Sentinels for Continuing Reproductive and Health Impairments at Contaminated Sites in Michigan during 2010–17

K.A. Grisman, M. Bleitz, S. Hughes, R. Wamers, Department of Biology, Calvin College, Grand Rapids, MI
M. Annis, J. Moore, L. Williams, U.S. Fish and Wildlife Service, Region 3, East Lansing, MI

Materials and Methods

Embryonic Viability and Deformities

Embryonic mortality rates to late stage hatching gulls were assessed in the River Raisin AOC (24.6±4.9%) both in the Saginaw Bay AOC (22.5±4.8%) and in the Grand Traverse Bay (27.8±7.1%). Dotted lines indicate site means. Sites with the same letter(s) were not statistically different by Tukey’s test (p<0.05).

Table 1. Relative risk ratios for incidence of embryonic

<table>
<thead>
<tr>
<th>Site</th>
<th>Mortality Rate</th>
<th>Incidence</th>
<th>RR ratio</th>
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</thead>
<tbody>
<tr>
<td>Saginaw Bay AOC</td>
<td>22.5±4.8</td>
<td>0.77</td>
<td></td>
</tr>
<tr>
<td>River Raisin AOC</td>
<td>24.6±4.9</td>
<td>1.00</td>
<td></td>
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<tr>
<td>Grand Traverse Bay</td>
<td>27.8±7.1</td>
<td>1.43</td>
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</table>

Results and Discussion

Growth

Great Lakes waterbirds were in poor health in 2010–17, with 46% lower mean PHA skin response than the reference colonies (Fig. 7A). The low mean response was significantly lower at the charity than the reference colonies (ANOV A p<0.0002; Fig. 7B). When the mean response was reduced to < 1.5 T and RR ratios for overall growth (weight gain) in pre-fledglings from the Saginaw Bay and River Raisin AOCs were significantly lower at Charity than the reference colonies (p

Conclusions

Herring gulls, Caspian terns, and black-crowned night herons in the Saginaw Bay AOC showed impairments in immune responses and reproductive health consistent with past studies, which were consistent with past studies. Embryonic viability, particularly in May and June, was consistently lower in the River Raisin AOC than in the Saginaw Bay AOC. Herring Gulls and Caspian Terns both had significantly lower T and RR ratios for overall growth (weight gain) in pre-fledglings from the Saginaw Bay and River Raisin AOCs than the reference colonies. The low mean response was significantly lower at Charity than the reference colonies (ANOV A p<0.0002; Fig. 7B). When the mean response was reduced to < 1.5 T and RR ratios for overall growth (weight gain) in pre-fledglings from the Saginaw Bay and River Raisin AOCs were significantly lower at Charity than the reference colonies (p

Acknowledgments

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References


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