Mutualism in the Minesing Wetlands
Defining the relationship between the endangered Hine’s emerald dragonfly (Somatochlora hineana) and the digger crayfish (Fallicambarus fodiens)
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The Pairwise Species Interaction

Hine’s Emerald Dragonfly
- Endangered and found at only one location in Canada (Cosewic 2011)
- Large dragonfly with a wingspan of 90-95 mm
- Larval stage for 4 years and adult for 6-8 weeks
- Use crayfish burrows during drought conditions to avoid desiccation (Pintor & Soluk 2006)

Digger Crayfish
- Wetland species native to southern and eastern Ontario
- Create vertical burrows in sediment
- Are ecosystem engineers - organisms that modify physical habitat in a way that impacts other species (Jones et al. 1994)
- Thought to prey upon Hine’s Emerald larvae

Defining the Relationship
- There is the potential for the larvae to experience both negative and positive impacts when living in crayfish burrows (Figure 1)
- The net impact is not currently known but likely depends on environmental conditions
- For example, low annual rainfall which leads to drought may result in a net positive impact because the benefit of refuge outweighs the risk of predation

Objective: To determine whether the crayfish have a net positive or negative impact on the dragonfly population which is critical information for creating an effective recovery strategy.

Field Surveys in the Minesing Fen

- Collected presence/absence data for dragonfly larvae and crayfish during two sampling times:
  1. June 2013 under high water conditions
  2. Late July and September 2013 were expected to be dry but frequent rains resulted in constantly high water levels
- Organisms were collected from the channel using a D-net and from crayfish burrows using a manual bilge pump (Figure 2)
- Extracted water and any organisms present inside the burrows using two successive pumps
- pH, DO, and temperate were measured for water samples from each burrow
- Endangered organisms were sampled under OMNR permit MD-B-002-13
- Preliminary data are so far inconclusive

Figure 1: Arrows = positive impact, circle = negative impact. Crayfish positively impact dragonfly larvae inside their burrows by providing a shelter from harsh environmental conditions. Crayfish feed on small invertebrates, resulting in a negative impact due to predation.

Figure 2: Using the manual bilge pump to extract organisms from a crayfish burrow.

Next Steps
1. Radio Tracking
   - Determine key habitat and spawning areas by tracking females
   - Transmitters as small as 190 mg can be attached beneath the thorax
   - Individuals can be followed using hand held receivers
   - Radio transmitters have been used to successfully track migrating Green Darner dragonflies (Wikelski et al. 2006)

2. Mark and Recapture Study
   - Estimate population size by tagging adults with numbered bee tags
   - Recapture after allowing 48 hours for dispersal
   - Two adults (male and female) were tagged in 2013

3. The Nottawasaga Valley Conservation Authority (NVCA) is working on improving a groundwater monitoring network for Hine’s Emerald habitat.

Summary
This project may help guide management decisions for the Minesing wetlands as well as contribute to the growing body of research about the elusive Hine’s Emerald dragonfly.

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Citations

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