"When emerald ash borer populations crash, what happens to the released parasitoids?"

Assessing climate effects on emerald ash borer biocontrol

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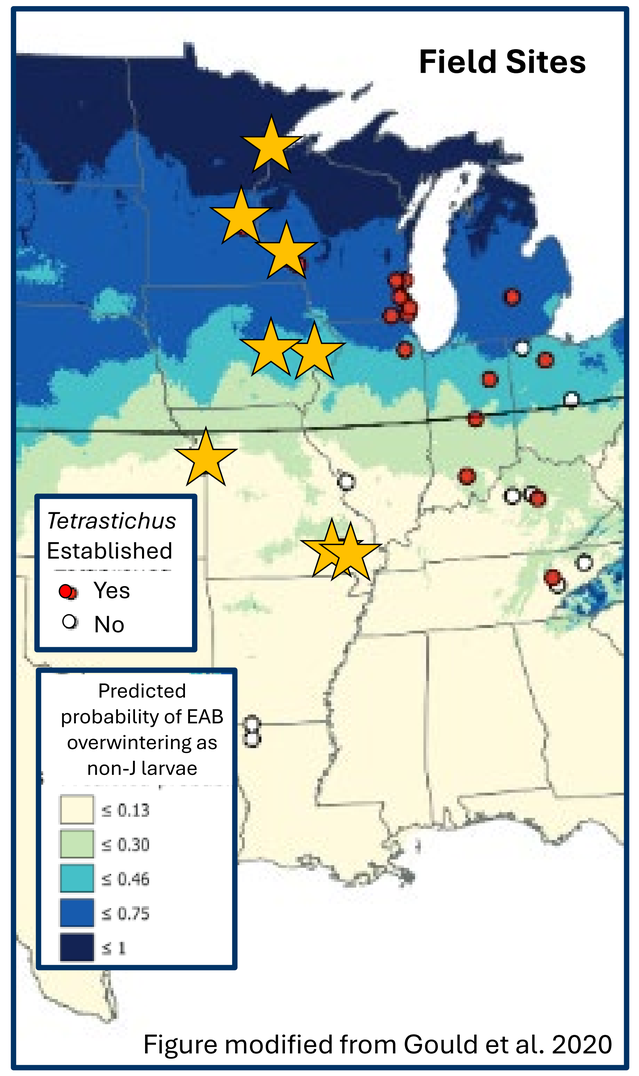
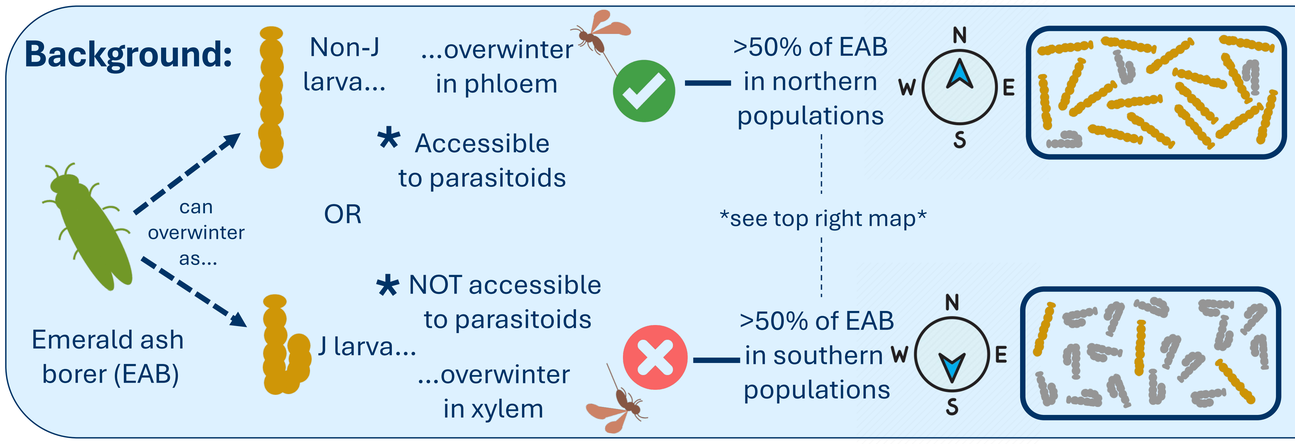


Figure modified from Gould et al. 2020

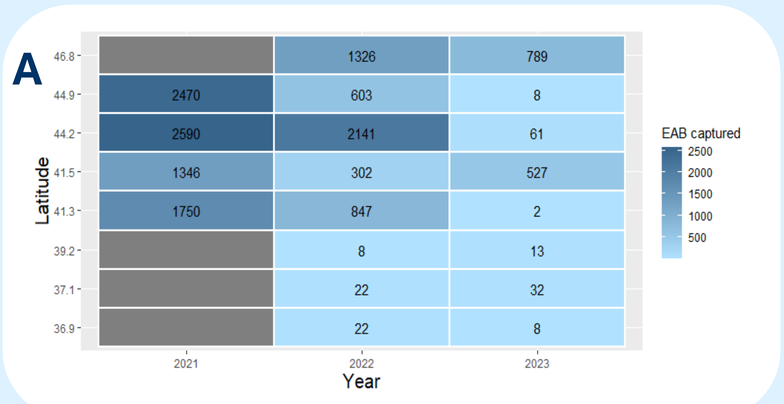
Background:



- It was predicted that parasitoids would not establish well in south due to low % of non-J larvae.
- However, they seem to be establishing.
- This is likely because a small % of a large EAB population is still enough non-J larvae to persist.

BUT, what will happen to the parasitoid populations when the EAB population crashes?

Part 1: Are the EAB populations different across our North to South gradient?



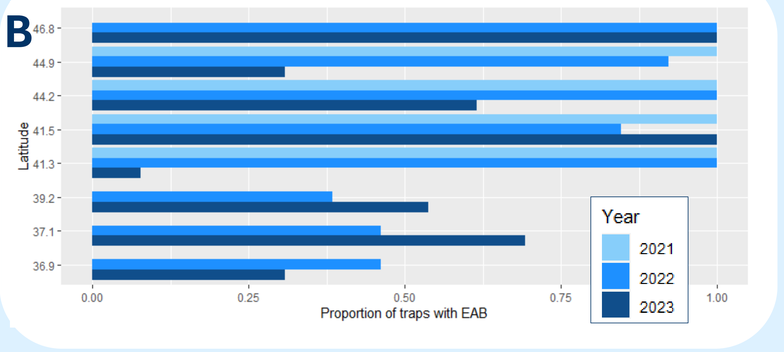


Figure 1. Emerald Ash Borer population sizes over time at each site, from North (top) to South (bottom). **A)** Heatmap with the number of EAB adults captured in traps (N=13) at each site from 2021-2023. **B)** Bar graph showing the proportion of traps (N=13) at each site that had at least 1 positive capture of EAB. Both graphs show a **general decrease in EAB populations** over time at each site. Importantly, the **southern sites have very low population levels**, which will allow us to determine if parasitoids can persist with limited host numbers.

Part 2: Are the released parasitoids establishing and persisting?

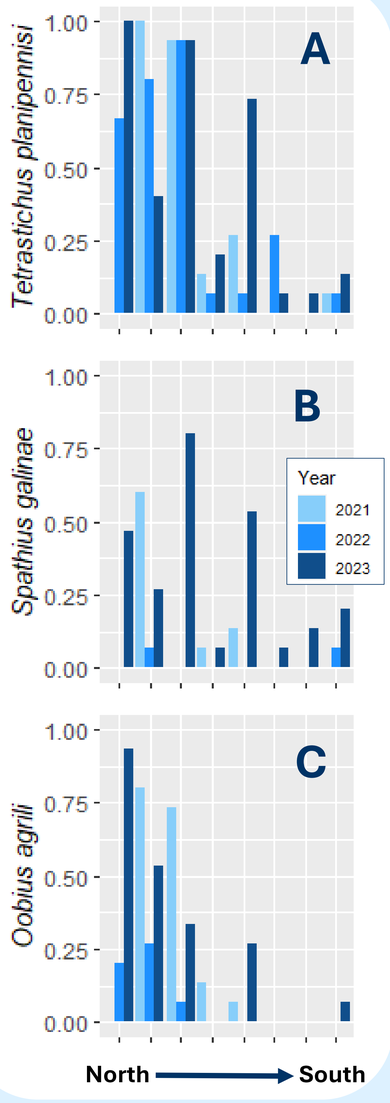


Figure 2. Parasitoid population sizes at each site, from North (left) to South (right), over the last 3 years. All three graphs show the proportion of traps (N=15) with positive capture at each site. **A)** *Tetrastichus planipennisi (Tets):* The population trend resembles that of EAB. Notably, *Tets* have been capture at every site in 2023, including sites with low EAB numbers. **B)** *Spathius galinae:* Though the populations seem to be smaller than that of the *Tets*, the general trend still matches *Tets,* and they have also been found at all sites in 2023. **C)** *Oobius agrili: Oobius* are much harder to detect given their size, but a recent capture in the south shows they are still present, despite the last release being in 2018.

Note: *Spathius agrili* has not be recaptured at these sites.

Part 3: Are there healthy ash at these sites?

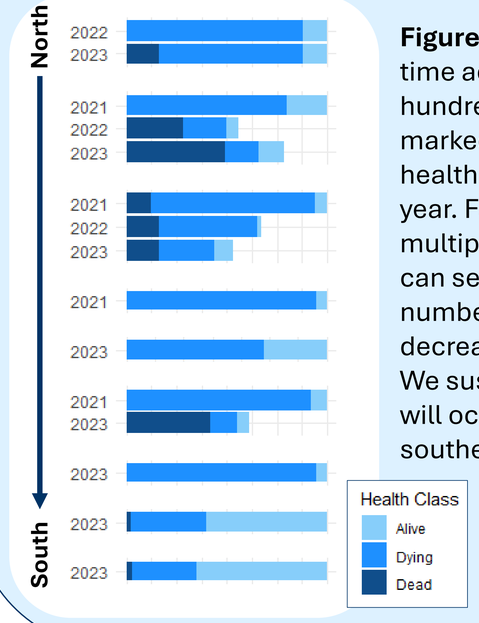


Figure 3. Ash health over time across all sites. One hundred ash trees have been marked at all sites and their health is reassessed every year. For sites where we have multiple years of data, we can see an increase in the number of dead trees and a decrease in healthy trees. We suspect these changes will occur faster at our southern sites over time.

What's next? Life table study

- Insects tend to have faster life cycles in warmer areas.
- How much more quickly does EAB develop in the south versus the north?
- How does this affect their replacement/ growth rate?
- Are the parasitoids contributing significantly to EAB mortality?

Plan: To place EAB eggs on trees in 5 of our sites this Spring and then recover the developed insects 1 year later.

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See my talk in the Early Career Professionals Session!!