

How Changes in Plant Community Structure Affect Ant Communities

Chadwick V. Tillberg, Renee LaFountain, Kathy Trinh, Jackson O'Keefe
Biology Department, Linfield College, McMinnville, OR 97128



Abstract:

We investigated how change in plant community composition and vegetative structure brought about by annual grass-specific herbicide application affects terrestrial arthropod communities, with special emphasis on the potential of the endangered Fender's blue butterfly, *Plebejus icarioides fenderi* (Family: Lycaenidae). Larvae of this species form facultative protective mutualisms with ants, who chase away potential predators of the larvae. We used pitfall trapping to compare ant community structure between control and herbicide-treated plots through time. The extent to which major changes in plant community composition affect the mutualistic ant community may have relevance for management decisions if the focus of the conservation effort has strong ecological interactions with greatly affected non-target species.

Background:

Wet prairie communities in the Willamette Valley are under threat from habitat loss and invasive species. The endangered Fender's blue butterfly, and its threatened host plant Kincaid's Lupine, persist in small pockets of wet prairie in sites west of Eugene, OR. These habitats are experiencing invasion by non-native Tall Oatgrass (*Arrhenatherum elatius*). Land managers are utilizing narrow spectrum herbicide to restrict growth of the invasive plant, thereby favoring other larval and adult floral nectar resources. The focus of our part of this study is to assess how this change in plant community might affect the mutualistic ant community.

Experimental Setup:

- The study consists of twelve 20 m x 20 m plot pairs. Controls experienced fall mowing only. Treatment plots also were sprayed with grass specific herbicide fluzifop-p-butyl each March.
- Collection by pitfall traps occurred every two weeks from late March to early July.
- Here we present data from years 2 and 3 of a planned 5 year study.

Results:

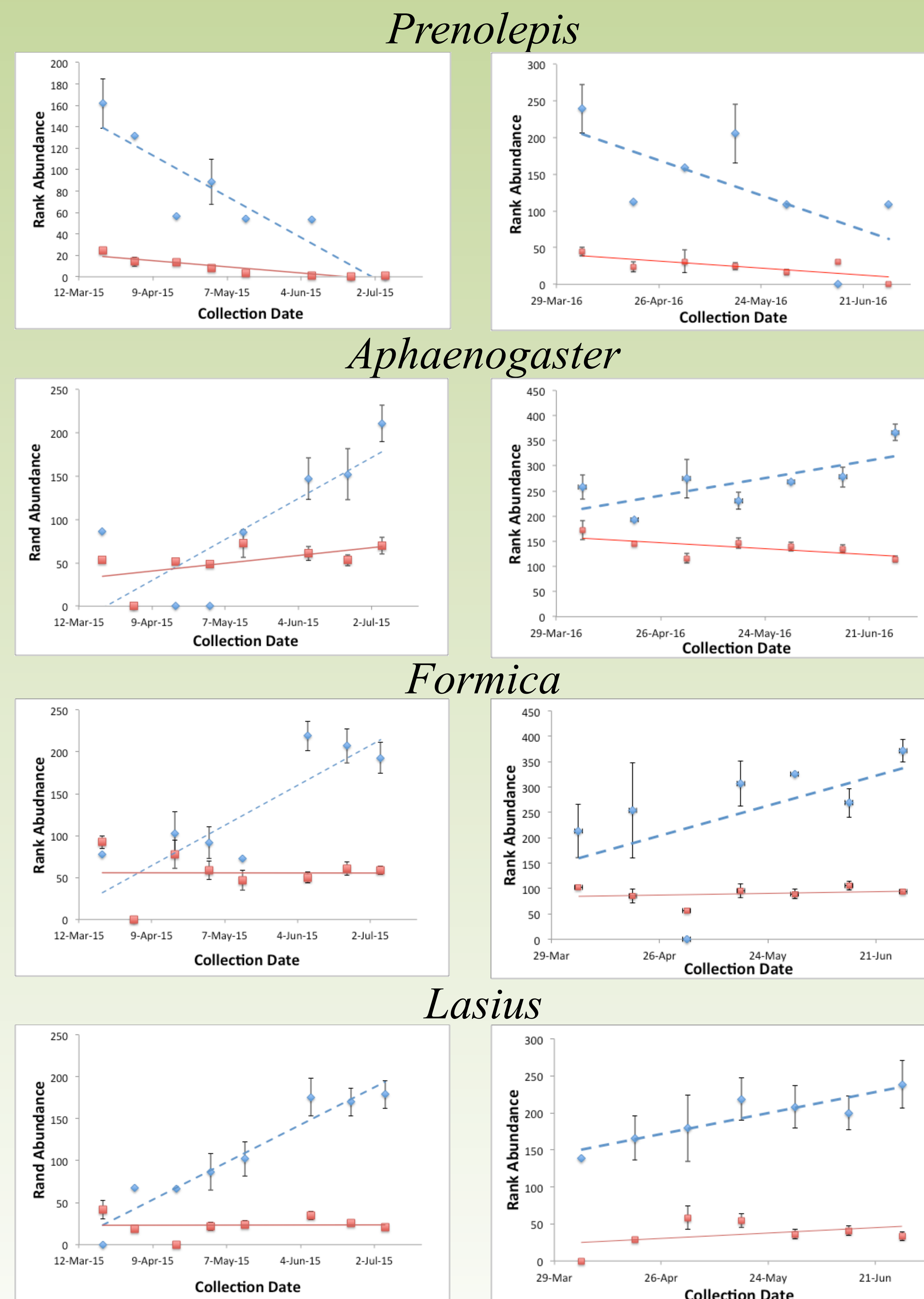
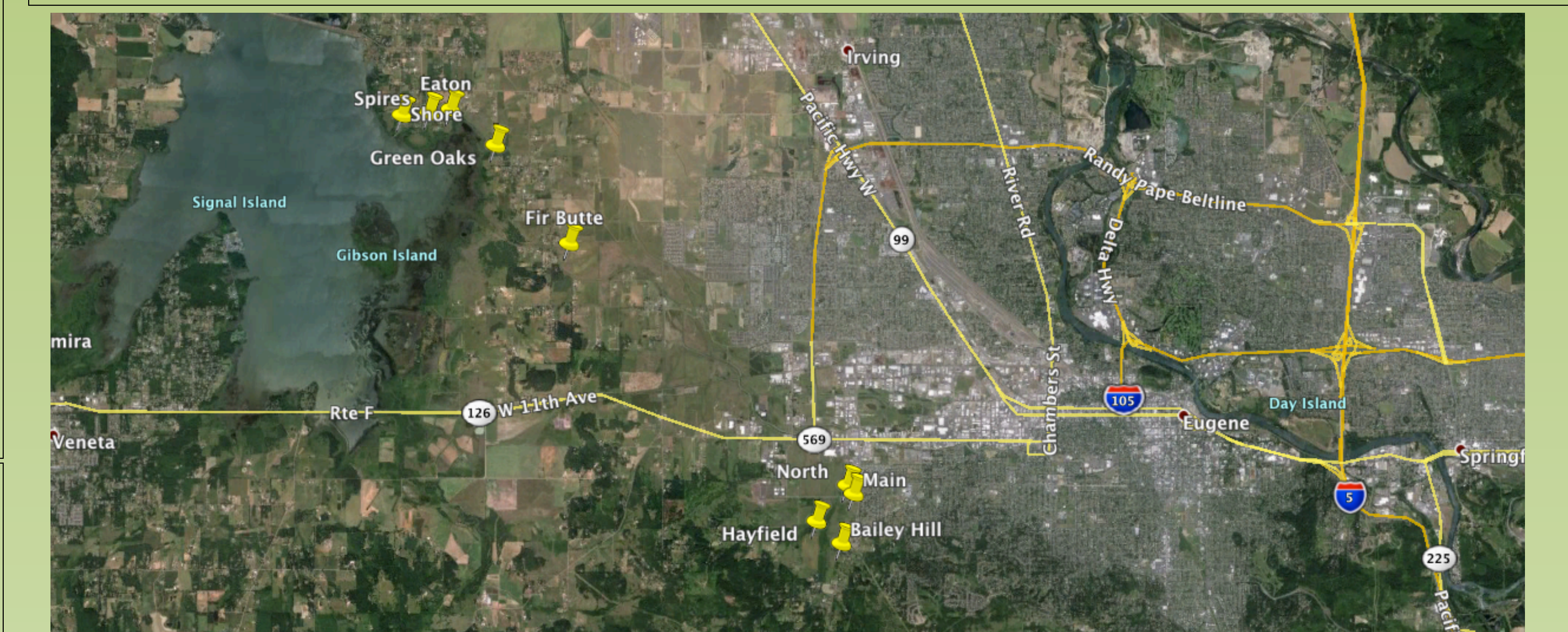


Figure 1: Rank abundance of four most common ant genera through time in control (blue) and treatment (red) plots from 2015 (left) and 2016 (right).

Field Sites: Western Eugene Wetlands.



Results:

- In 2015 and 2016, over 90% of the ants collected during the field season were from 4 genera that have been observed tending Fender's blue larvae: *Formica*, *Prenolepis*, *Lasius* and *Aphaenogaster*. The remaining percentage was made up of six other genera.
- Abundance trends for these four most common ants are similar for the 2015 and 2016 field seasons (Figure 1).
- Repeated measures ANOVA on 2015 rank abundance data for each ant genus found a significant effect of time ($p < 0.05$) and treatment (control vs. herbicide) ($p < 0.05$) in all four analyses.
- Analysis of 2016 field season data are in progress, though the trends appear similar.

Conclusions:

- A change in plant community composition brought about by herbicide use did appear to affect the abundance of ants.
- These trends were similar across two years.
- Whether these affects are due to changes in food web structure or due to changes in microclimate variables is an open question.

Future work:

- Continue collections for the duration of this five year study.
- Addition of fire as a management tool to half of each plot in 2017 field season.
- Correlate ant abundance data to microclimate data and plant community composition data.
- Examine population abundances of arthropod predators (ground beetles, spiders).

Thank you:

