


How changes in plant community structure affect terrestrial invertebrate food webs

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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 mutualists and predators of the endangered Fender's blue butterfly, *Plebejus icarioides fender* (Family: Lycaenidae). Larvae of this species form facultative protective mutualisms with ants, and they may be preyed upon by numerous invertebrate predators. We used pitfall trapping to compare terrestrial invertebrate community structure between control and herbicide-treated plots through time. The extent to which major changes in plant community composition affect the rest of the invertebrate community may have relevance for management decisions if the focus of the conservation effort has strong ecological interactions with greatly affected non-target species.

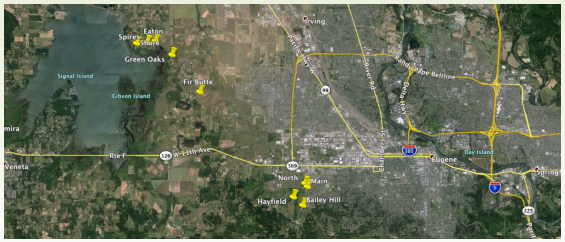
Experimental Question:

What are the consequences of herbicide-induced plant community change on terrestrial invertebrate abundance and diversity?

Focal Organisms

-Fender's Blue Butterfly (*Plebejus icarioides fender)*
-Kincaid's Lupine (*Lupinus oreganus*)
-Tall Oatgrass (*Arrhenatherum elatius*)
-Hymenoptera: Formicidae
-Various Arthropod Predators

Field Sites: Western Eugene Wetlands.



Experimental Setup:

-The study consisted of eight plot pairs, control plots and those sprayed with the grass specific herbicide fluazifop-p-butyl.
-Collection by pitfall traps occurred every two weeks from early April to early July.
-Lab work consisted of identification and enumeration of morphospecies as well as genera determination of all collected ants.

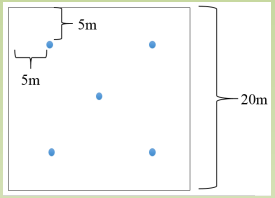


Figure 1: Pitfall placement within experimental plots

Results:

Over 90% of the ants collected during the field season were from 4 genera: *Formica, Prenolepis, Lasius and Aphaenogaster.* The remaining percentage was made up of seven other genera.

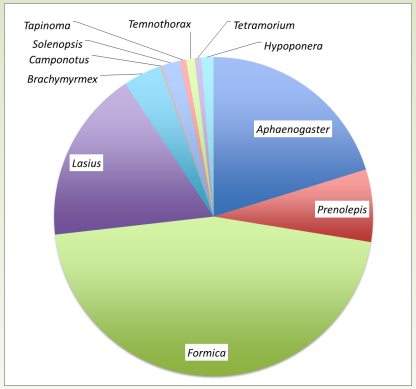


Figure 2: Percentage of ants of differing genera collected over the 2014 field season.

Results:

As time progressed the overall abundance of ants in the control and treatment plots increased. There were significantly different number of ants in the control plots compared to the treatment plots.

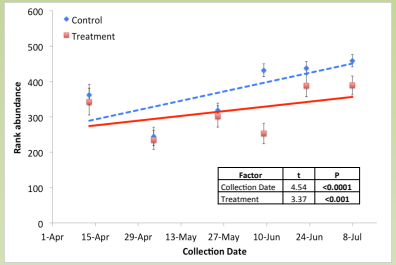


Figure 3: Overall rank abundance of ants in control and treatment plots over time.

The overall diversity of ants within the control and treatment plots was found to increase over time but there was no significant difference in diversity between control and treated plots.

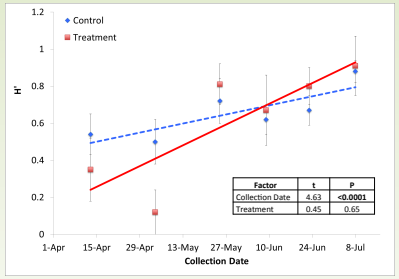


Figure 4: Shannon diversity index of ant genera in control and treatment plots over time.

Results:

Within the four most abundant ant genera there was a significant difference in rank abundance over time. There was not a difference found between the control and treatment, but the p-value (0.0857) was suggestive.

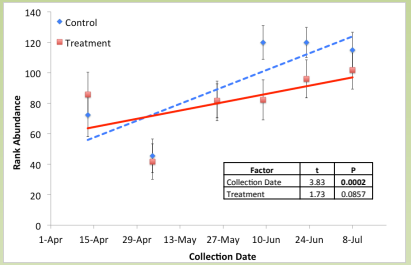


Figure 4: Overall rank abundance of the four most common ant general in control and treatment plots over time.

Conclusions:

-A change in plant community did affect the abundance of one important consumer – ants.
-The herbicide treatment had no impact on the diversity of the overall ant communities or the four most common ant genera.

Further Directions:

-Continuing field work for the duration of this five year study.
-Further examine populations of various arthropod predators.

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Thank you: