Neighborhood Density & Richness Influence "Pollination Boost" Seed Output but not Significantly

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Introduction

- Increasing frequency of Fires and other disturbances ignite calls for restoration efforts. Restoring pollinator habitats, or Flowering Plant communities, is critical as pollinator populations dwindle (Rhodes CJ et al.).
- Effects of the density/richness of a plant's neighborhood on individual fitness markers are documented (Silander, J.A., Pacala).
- **Gap: Unknown how neighborhood density & richness affects the boost in seed production that pollination provides.**

Research Question

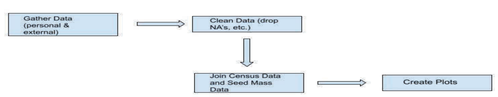
- How does neighborhood density affect the seed output boost that arises from pollination?
- How does neighborhood richness affect the seed output boost that arises from pollination?
- What are the frequencies for the measurements of neighborhood density and richness?

Methods

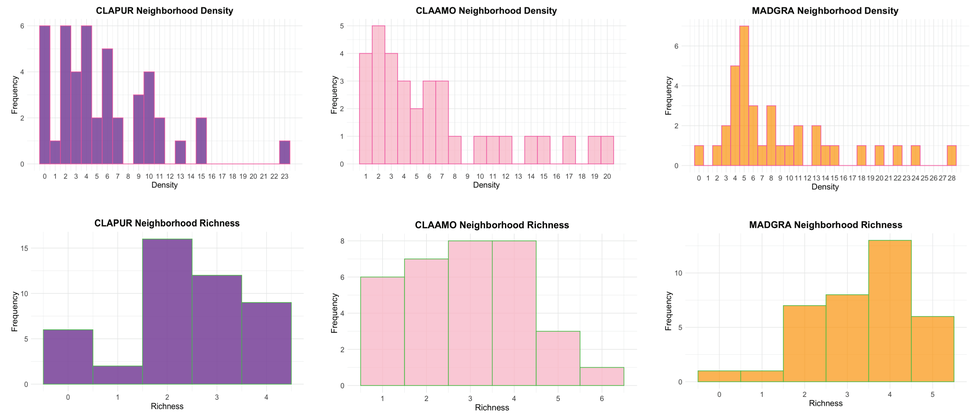
Data Collection:

- For each species, 8-12 focal individuals are chosen at random per stand.
- For each focal, a certain number of blooms are chosen as open (pollination allowed), and as closed (no pollination allowed) using mesh bagging..
- Each focal is censused using a 10cm^2 neighborhood, or a 20cm^2 neighborhood for very large individuals.
- The open treatment seed mass per bloom minus the closed treatment seed mass per bloom for an individual is the Pollination Boost Mass.
- Study was conducted in western cascades in the aftermath of the Holiday Farm Fire. Fire severity data and Stand location data are utilized.

General Workflow:

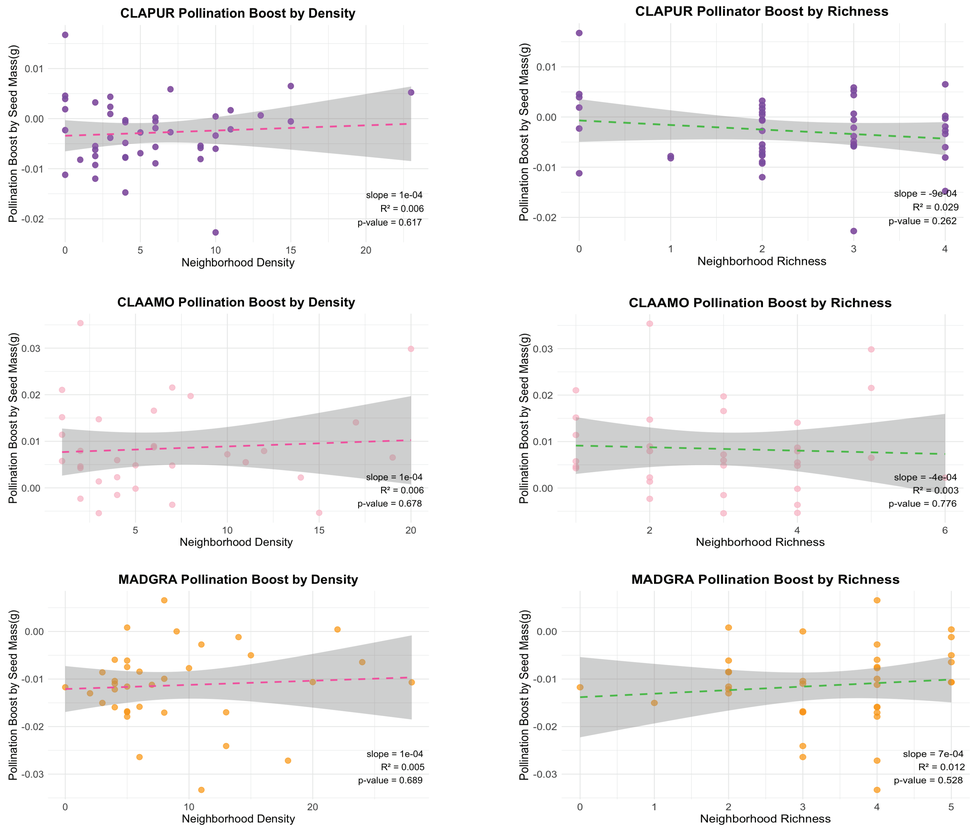


Result 1: Measurement Frequencies



Low Density with Medium-High Richness is most common.

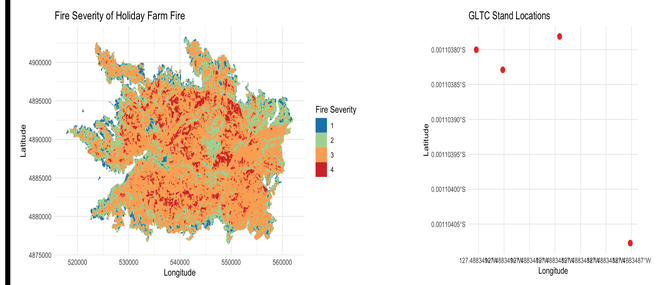
Result 2: Density & Richness on Pollination Boost Seed Mass



Small correlation between Density & Pollination Boost

Small negative correlation between Richness & Pollination Boost

Location(s)



Conclusion

Effects of Density:

- An increase in density does correspond to an increase in Pollination Boost seed mass, but not to a significant degree.
- A possible explanation is that a higher neighbor density could also be an indicator of higher quality soil/abundant nutrients or attract more pollinators.

Effects of Richness:

- An increase in richness corresponds to a decrease in Pollination Boost seed mass, except in MADGRA (can self-pollinate). However not a significant decrease.
- Possibly explained by the effects of interspecific competition for pollinators & other resources.

Takeaways:

- Data is preliminary, subject to change.
- Competitive neighborhood not a strong factor on the effects of pollination in restorative settings.
- Both alternative hypotheses rejected.

References

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Johnson, C.A., Dutt, P. & Levine, J.M. Competition for pollinators destabilizes plant coexistence. Nature 607, 721–725 (2022).
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