

LOCAL GRASSLAND RESTORATION AFFECTS INSECT COMMUNITIES

SCAN FOR PAPER



IN THIS STUDY:
WE WERE INTERESTED IN
HOW LOCAL-SCALE GRASSLAND
RESTORATION COULD BE USED TO
IMPROVE HABITAT FOR
NATIVE INSECTS
THAT ARE DECLINING,
ESPECIALLY NATIVE
BUMBLE BEES.

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INTERRODUCTION

- 1) Land use change causes loss of native grassland habitats, leading to decline in native insects.⁽¹⁾
- 2) Ecological restoration are human actions designed to recover a damaged ecosystem and have been shown in other places to support greater diversity of native insect species as well.⁽²⁾
- 3) Restoration may create more microhabitats to support diverse communities, so we expect more functional redundancy.⁽³⁾
- 4) Because restoration can lead to more functional redundant in grasslands, loss of a single species from the ecosystem would less likely impact overall ecosystem functioning.⁽⁴⁾



MEETODAY

10A.M ~ 4P.M.



Observing for 9 weeks

plants & insects
Measured Variables:

- 1) Identification
- 2) Abundance
- 3) plant abundance
- 4) Plant life form

Nets	Aspiration	Dissection	Hand collection	Beating



Lupinus bicolor is an annual pea family plant (Fabaceae) commonly used for California grassland restoration. It was selected as a target species for focused insect collection.

No.1



Non-restored Site



These sites were selected because *L. bicolor* had been documented at each site in previous years.

No.1



Restoration consisted of plating native species and weeding non-natives.

Restored Site

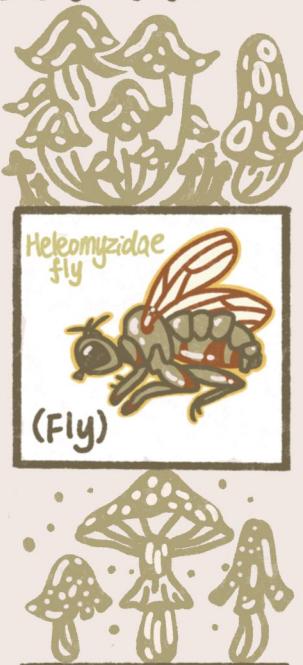


INSECT COMMUNITIES

Herbivores



Detritivores



Predators



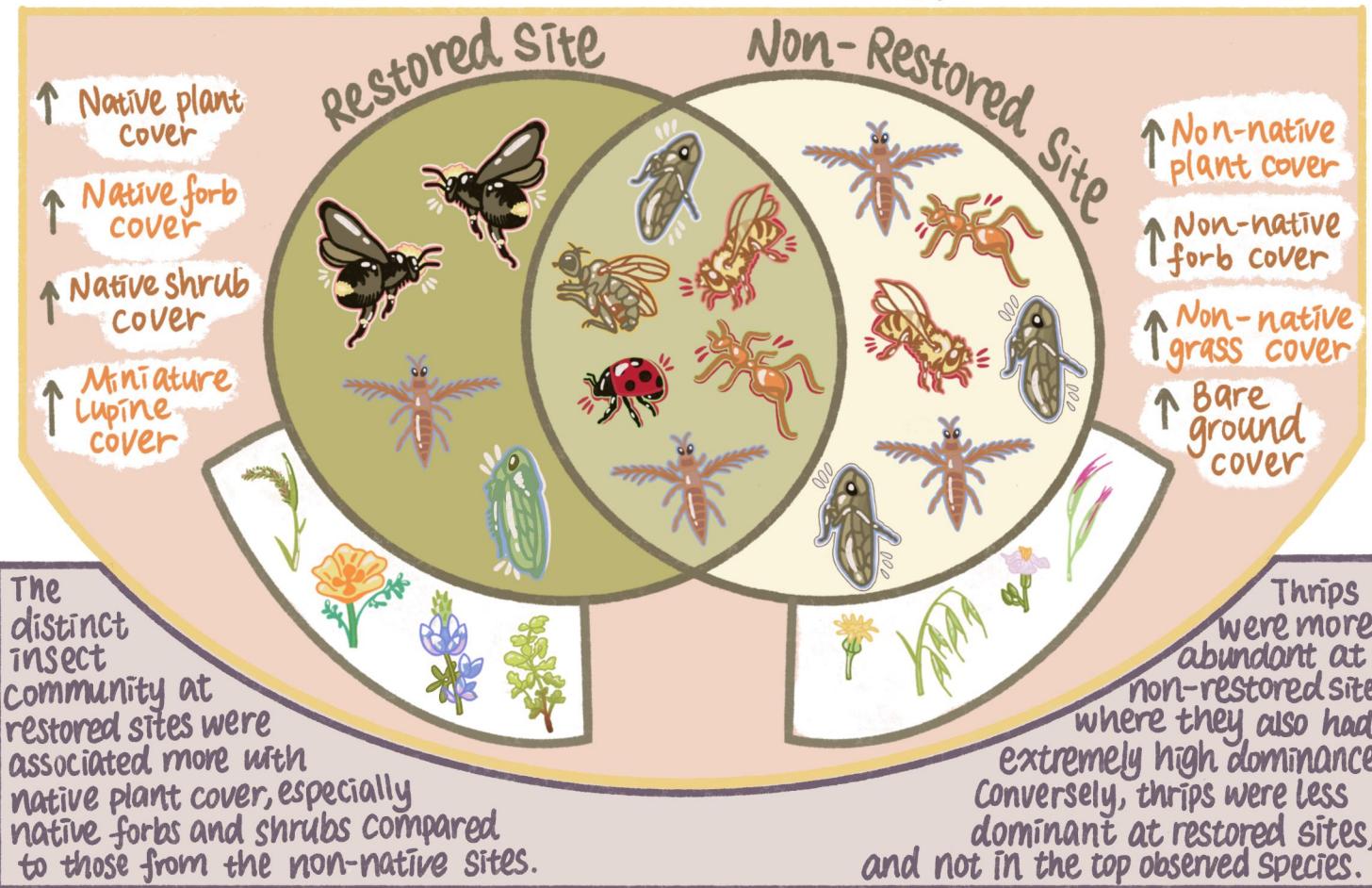
Pollinators



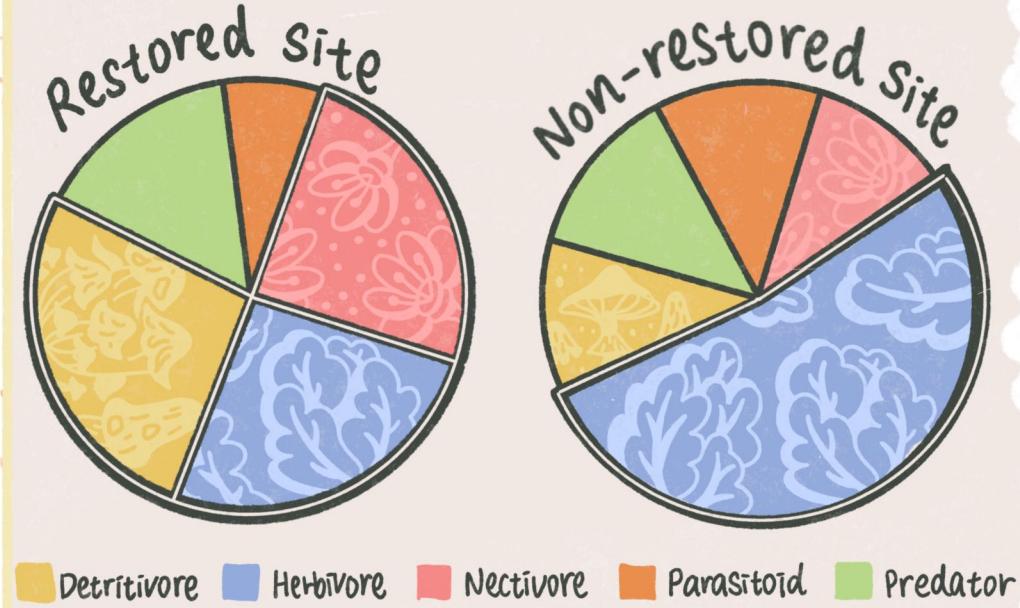
RESULTS

RESTORED SITE VS. NON-RESTORED SITE

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Restored grasslands had a different insect community composition compared to non-restored areas, but there were some similarities.



## FEEDING GUILD PERCENTAGE



- Non-restored sites were dominated more so by herbivores than any other feeding guild.
- Although herbivores were also abundant at restored sites, they were only more dominant compared to parasitoid and predatory insects, but not compared to detritivores and nectivores

## INSECT COMMUNITY RANKING BASED ON ABUNDANCE

RESTORED SITE

|      |  |                         |
|------|--|-------------------------|
| No.1 |  | Yellow-faced Bumble bee |
| No.2 |  | European Honeybee       |
| No.3 |  | Paralimini leaf hopper  |
| No.4 |  | Heleomyzidae fly        |
| No.5 |  | Seven-Spot Lady beetle  |

NON-RESTORED SITE

|       |  |                         |
|-------|--|-------------------------|
| No.1* |  | No.1* THrips            |
| No.2  |  | Ceratagallia California |
| No.3  |  | Seven-Spot Lady beetle  |
| No.4  |  | European Honeybee       |
| No.5  |  | Heleomyzidae fly        |

\* The font size represents the relative dominance of insect species. Species whose names coded by red are non-native and blue otherwise.



1) Bumble bees were the most observed species at restored site, but not even in the top five in non-restored site.

2) Thrips are more commonly found in non-restored sites, where there were also less even distribution of species diversity compared to restored sites.

# CONVERSATION

Based on this study from Santa Barbara, we found that local restoration is a potential tool for insect conservation in coastal CA, USA.



1) RESTORATION LED TO DIFFERENCES IN INSECT COMMUNITIES AND FEEDING GUILDS.

2) AT RESTORATION SITES, HERBIVORES ARE LESS DOMINANT AND POLLINATORS ARE MORE COMMON, COMPARED TO NON-RESTORED SITES.

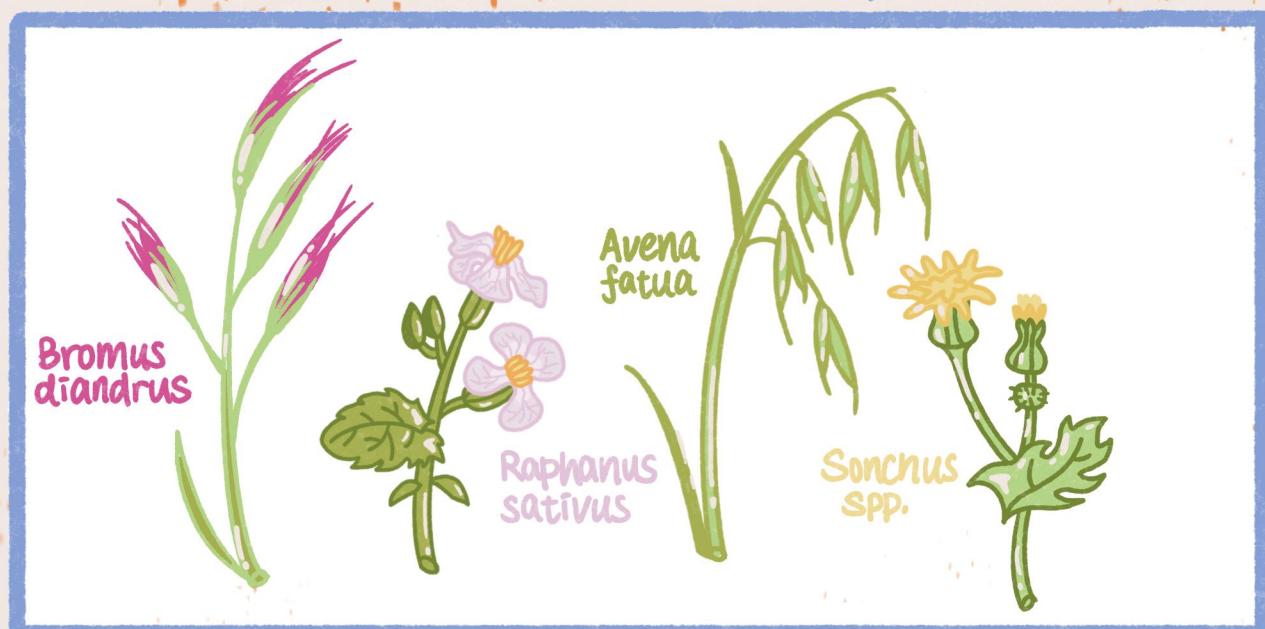


3) NATIVE BUMBLE BEES, ARE KNOWN TO BE DECLINING, BUT OUR WORK SHOWS THAT LOCAL GRASSLAND RESTORATION CAN PROVIDE THEM HABITAT REFUGIA.

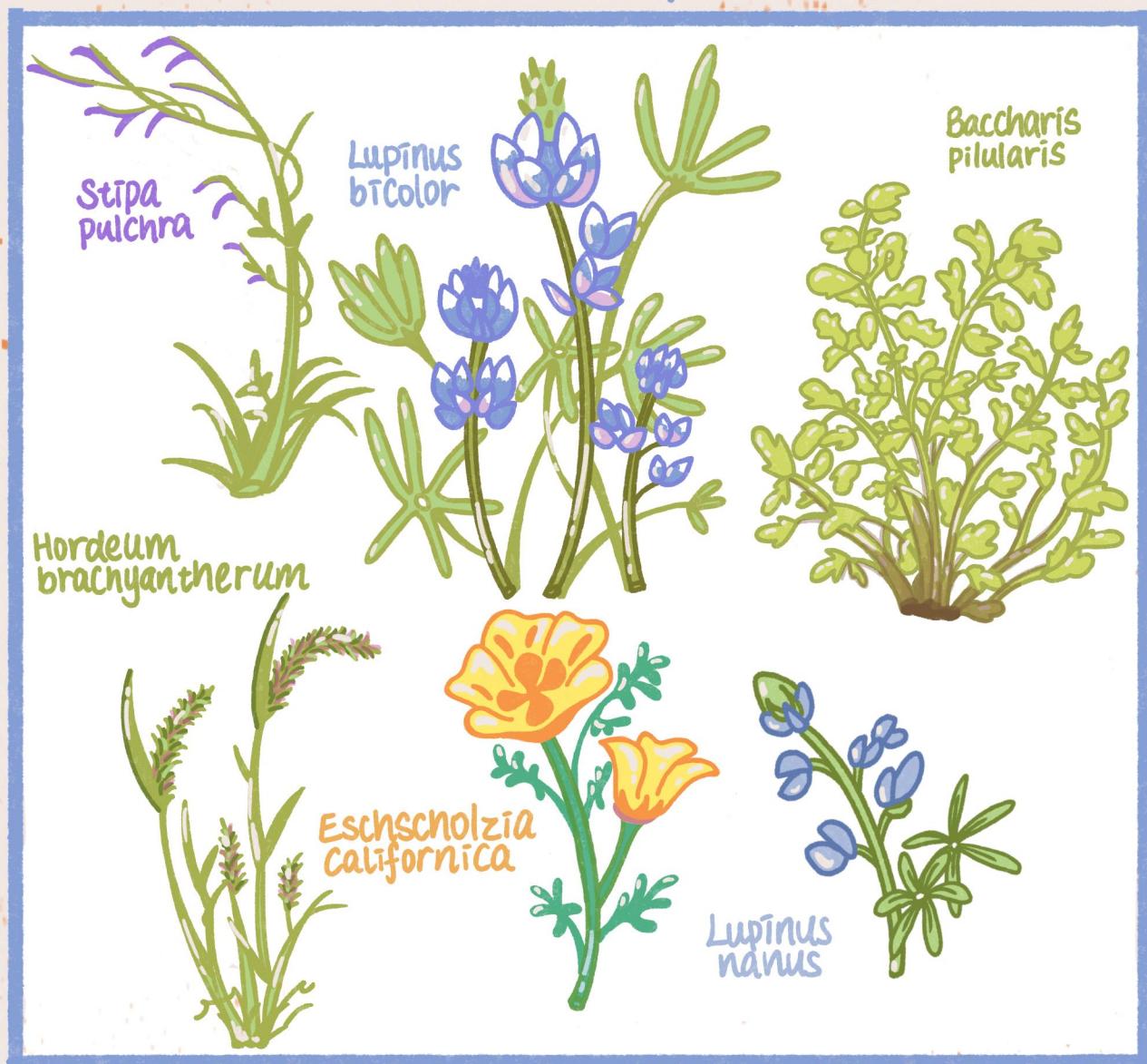


# APPENDIX

## Common non-native plants



## Common native plants



# REFERRING

1: Steffan-Dewenter, I. & Tscharntke, T. (2002) Insect communities and biotic interactions on fragmented calcareous grasslands – a mini review. *Biological Conservation*, 104, 275–284.

2. Menz, M.H.M., Phillips, R.D., Winfree, R., Kremen, C., Aizen, M.A., Johnson, S.D. et al. (2011) Reconnecting plants and pollinators: challenges in the restoration of pollination mutualisms. *Trends in Plant Science*, 16, 4–12.

3. Morandin, L.A. & Kremen, C. (2013) Hedgerow restoration promotes pollinator populations and exports native bees to adjacent fields. *Ecological Applications*, 23, 829–839.

4. Yachi, S. & Loreau, M. (1999) Biodiversity and ecosystem productivity in a fluctuating environment: the insurance hypothesis. *Proceedings of the National Academy of Sciences*, 96, 1463–1468

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