



Effects of forest management strategies

on

native bees

Marissa Chase

Postdoctoral Researcher

University of Minnesota

chase450@umn.edu



**Temperate
forests & bees**

**Deciduous
forests & bees**

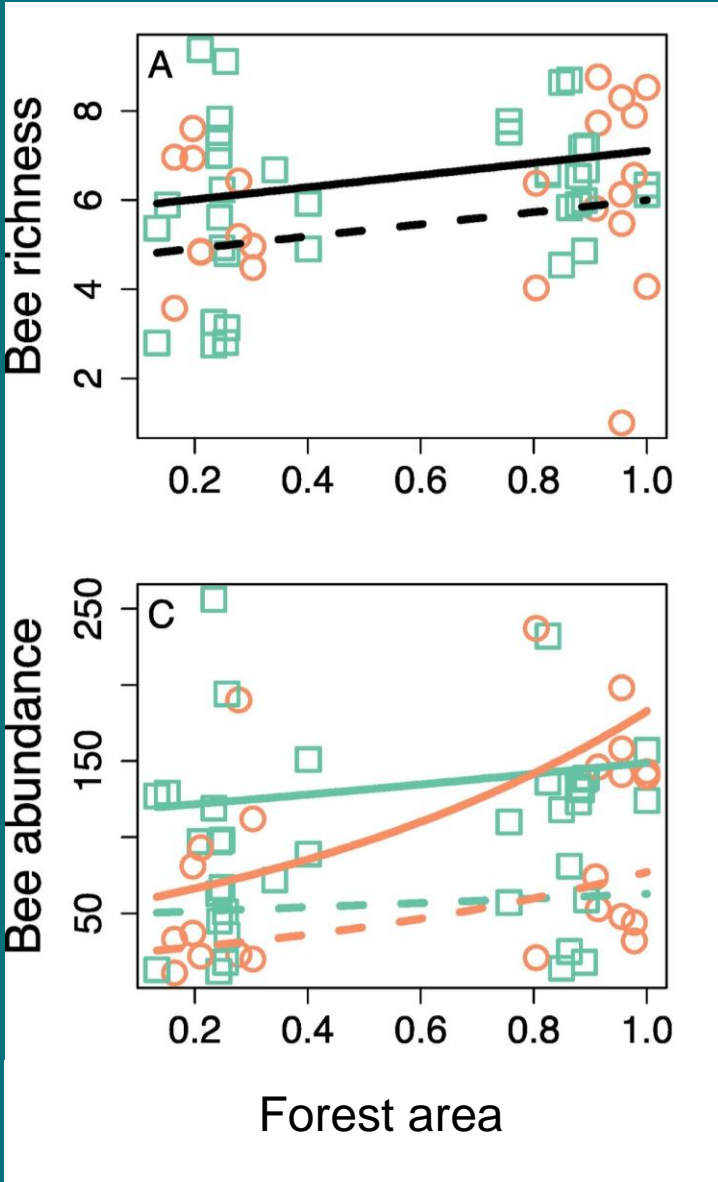
**CA forests &
bees**



Temperate forests are important
habitat for native bees

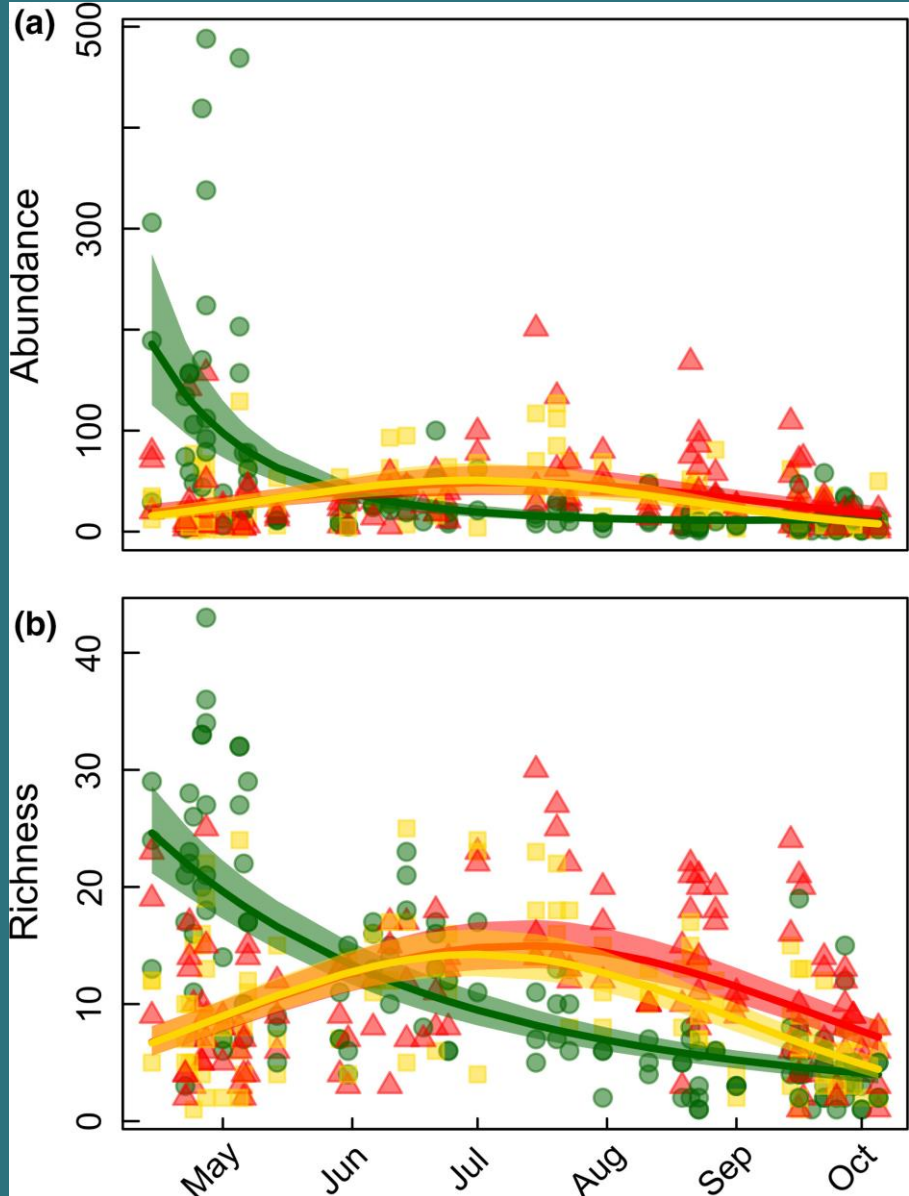


Temperate forests are important habitat for native bees



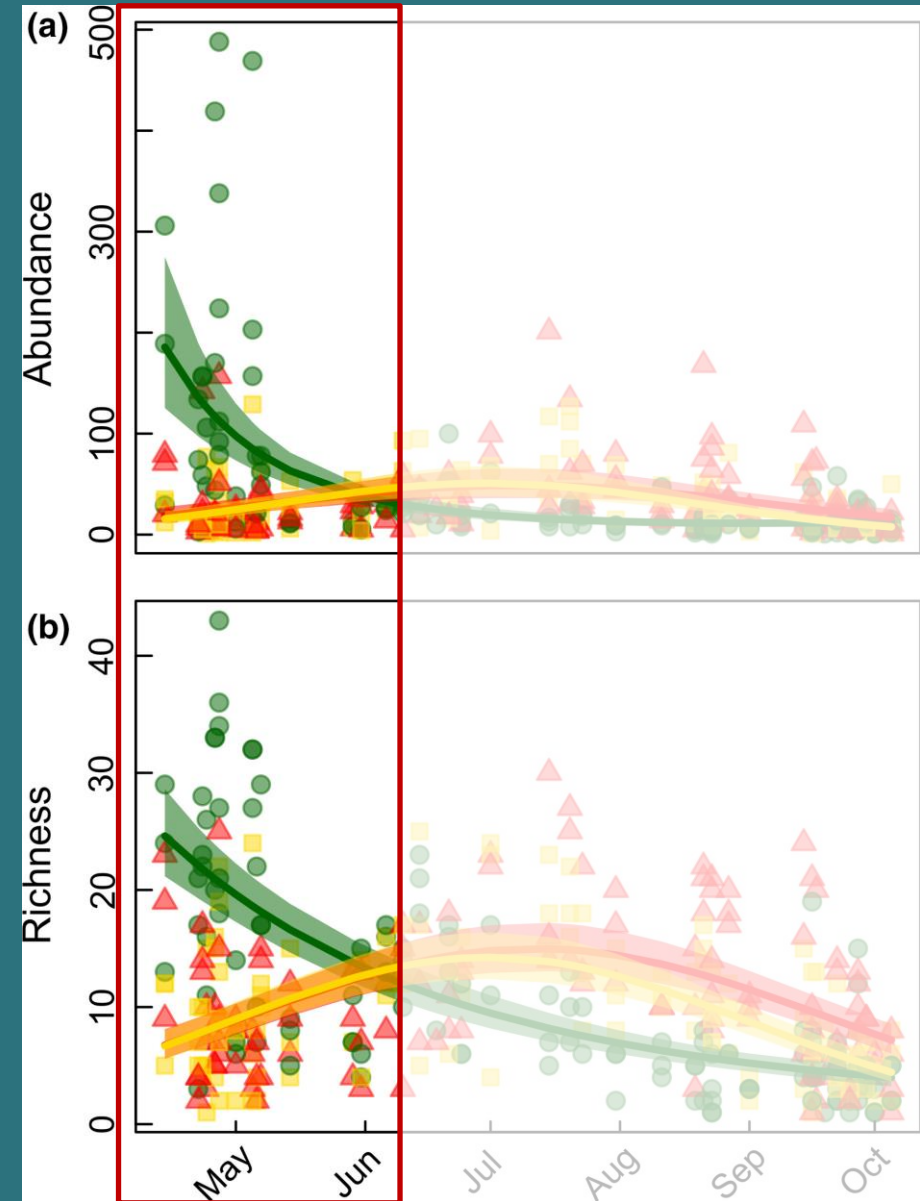


Temperate forests are important habitat for native bees





Temperate forests are important habitat for native bees





Phenology

Different resources

Specialization



Temperate
forests & bees

Deciduous
forests and
bees

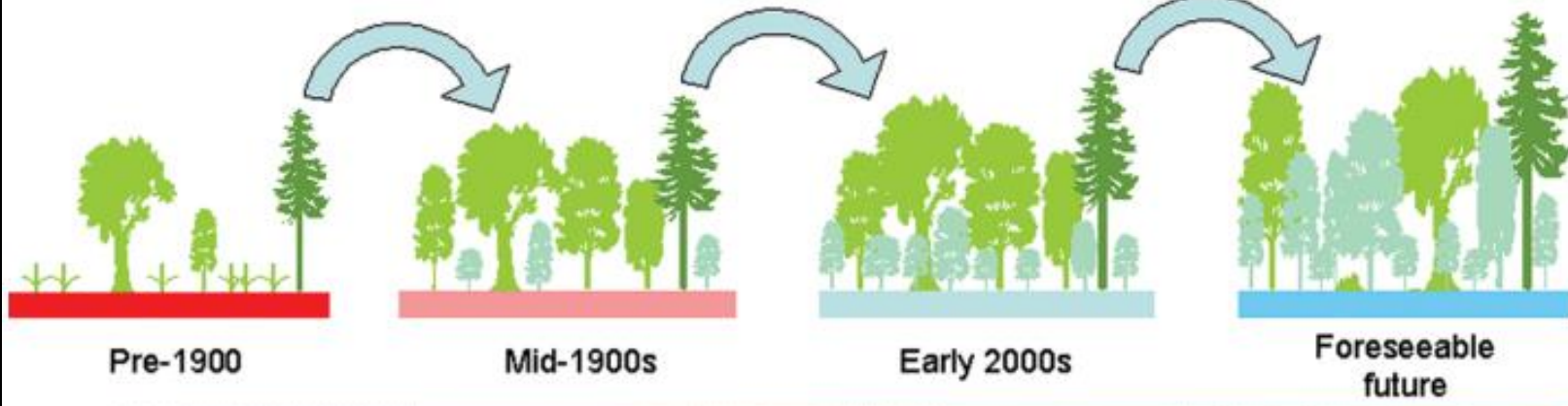
CA forests and
bees

Fire importance

Fire suppression;
canopy closure;
increased shade

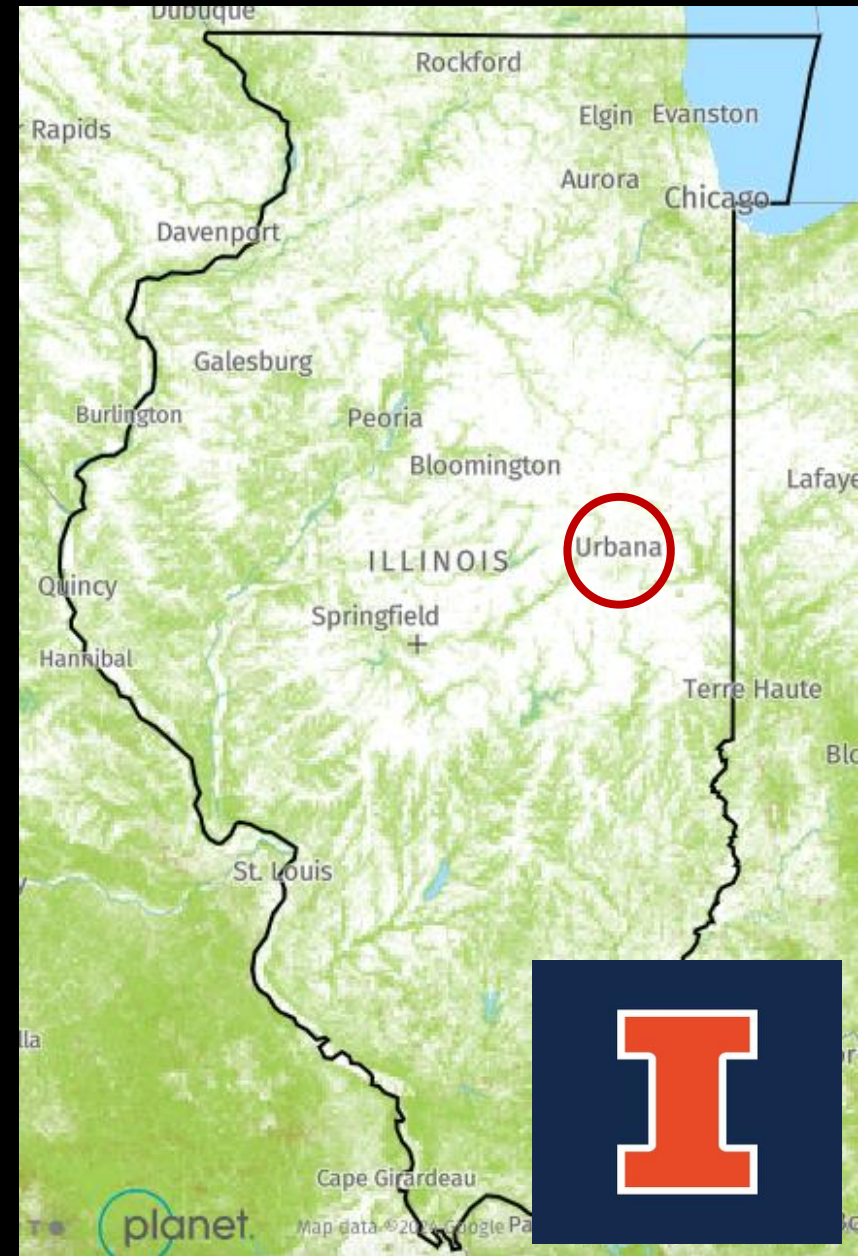
Dramatic increase
of shade-tolerant,
mesophytic trees

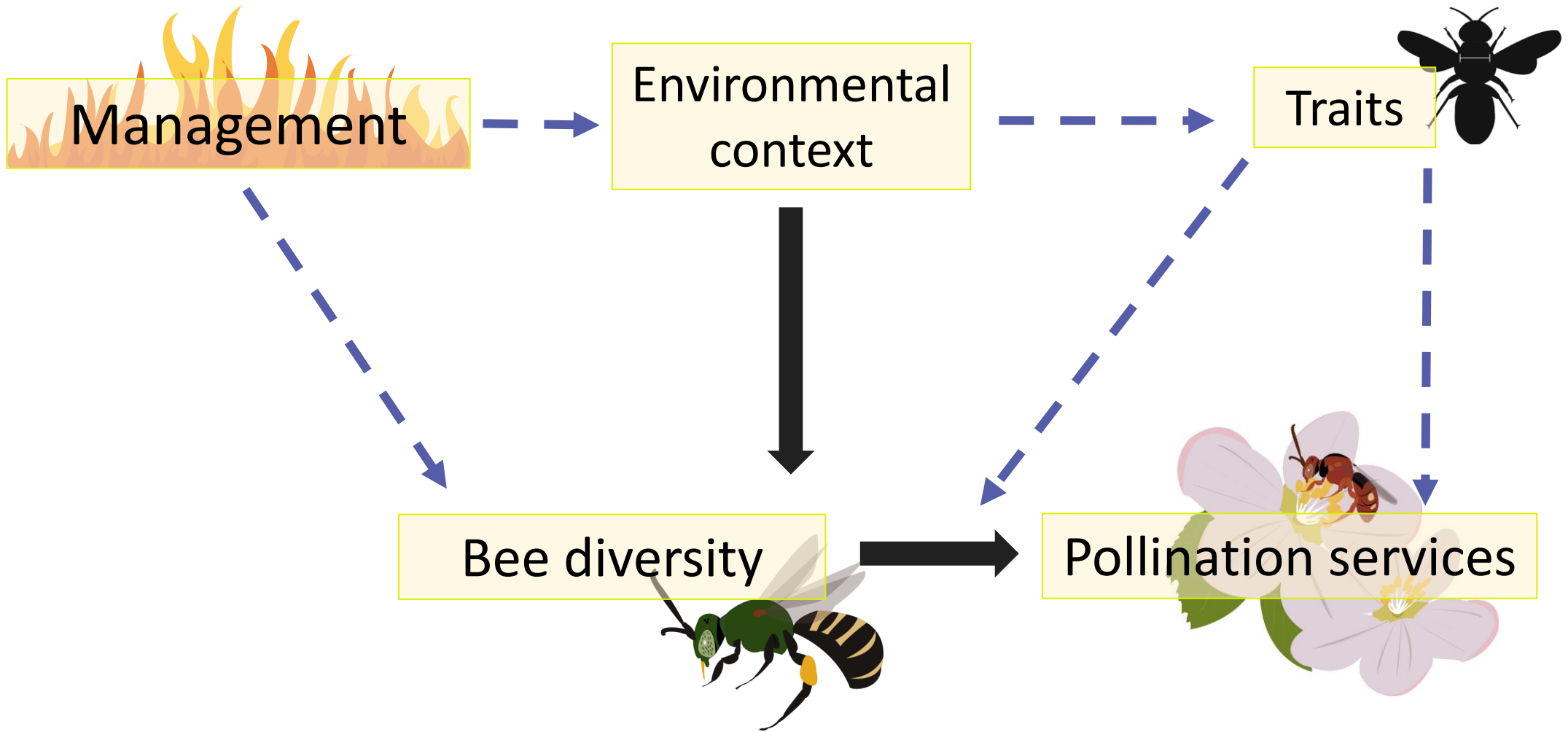
Decreased flammability
due to mesophytic litter and
cool, humid microclimate

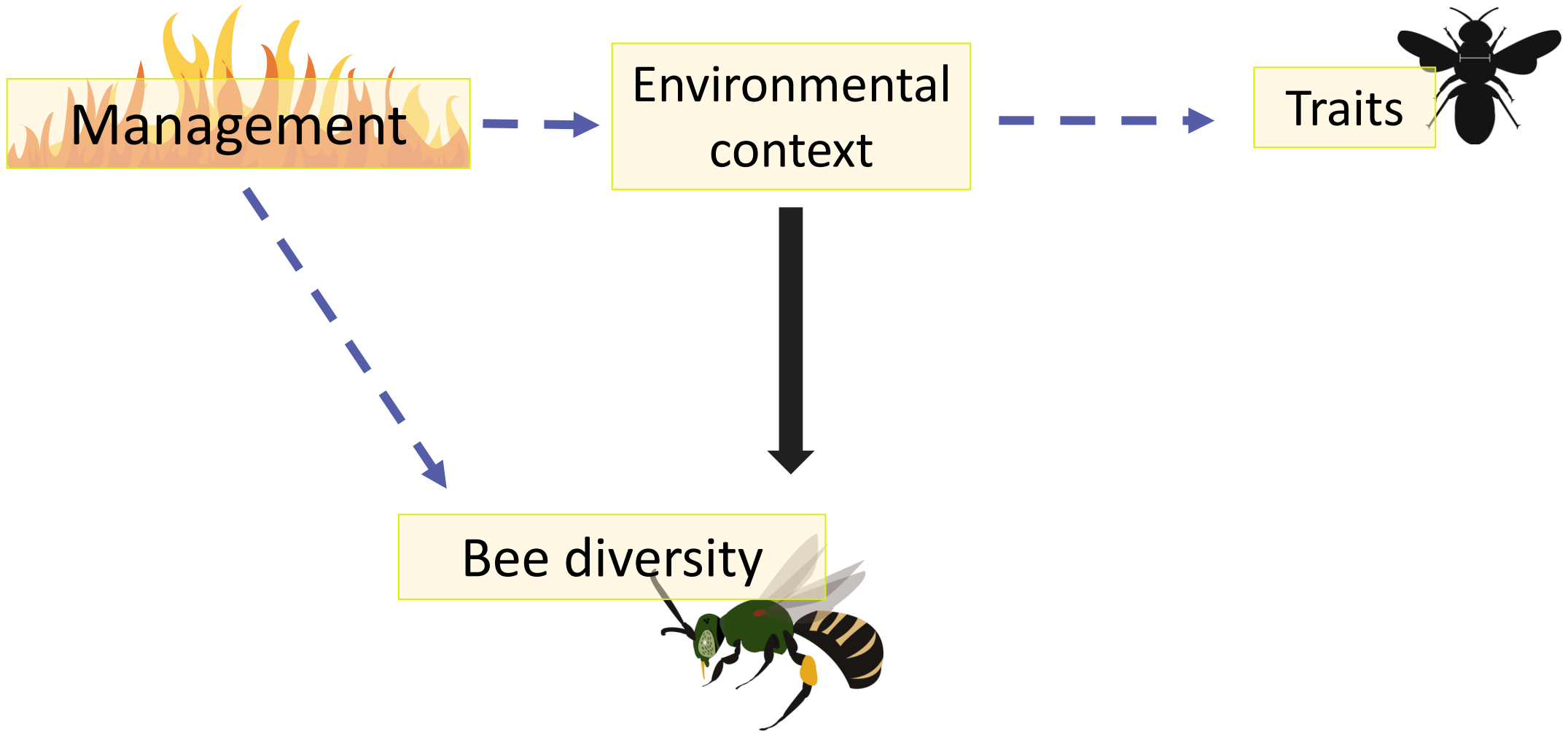


Mesophication

Nowacki & Abrams 2008

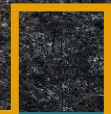






Emulating historical disturbance regimes

Prescribed fire



- (-) leaf litter
- (+) bare ground
- (+) soil nutrients
- (+) floral resources
- (-) deadwood



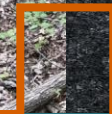
Thinning



- (+) canopy gaps
- (+) floral resources
- (+) deadwood



Thin+burn



???



Unmanaged habitat supported some vulnerable bee groups

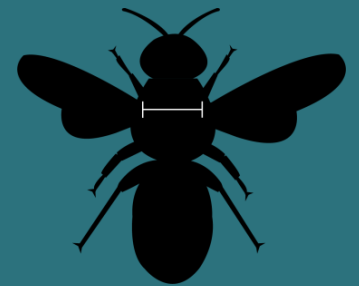


Specialists

Cavity-nesters

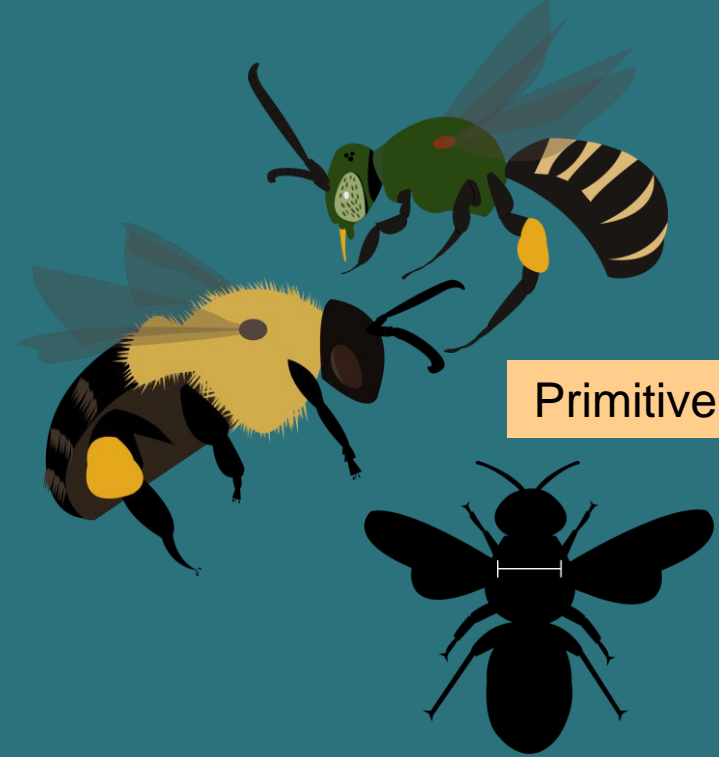


Cleptoparasites



Larger bees

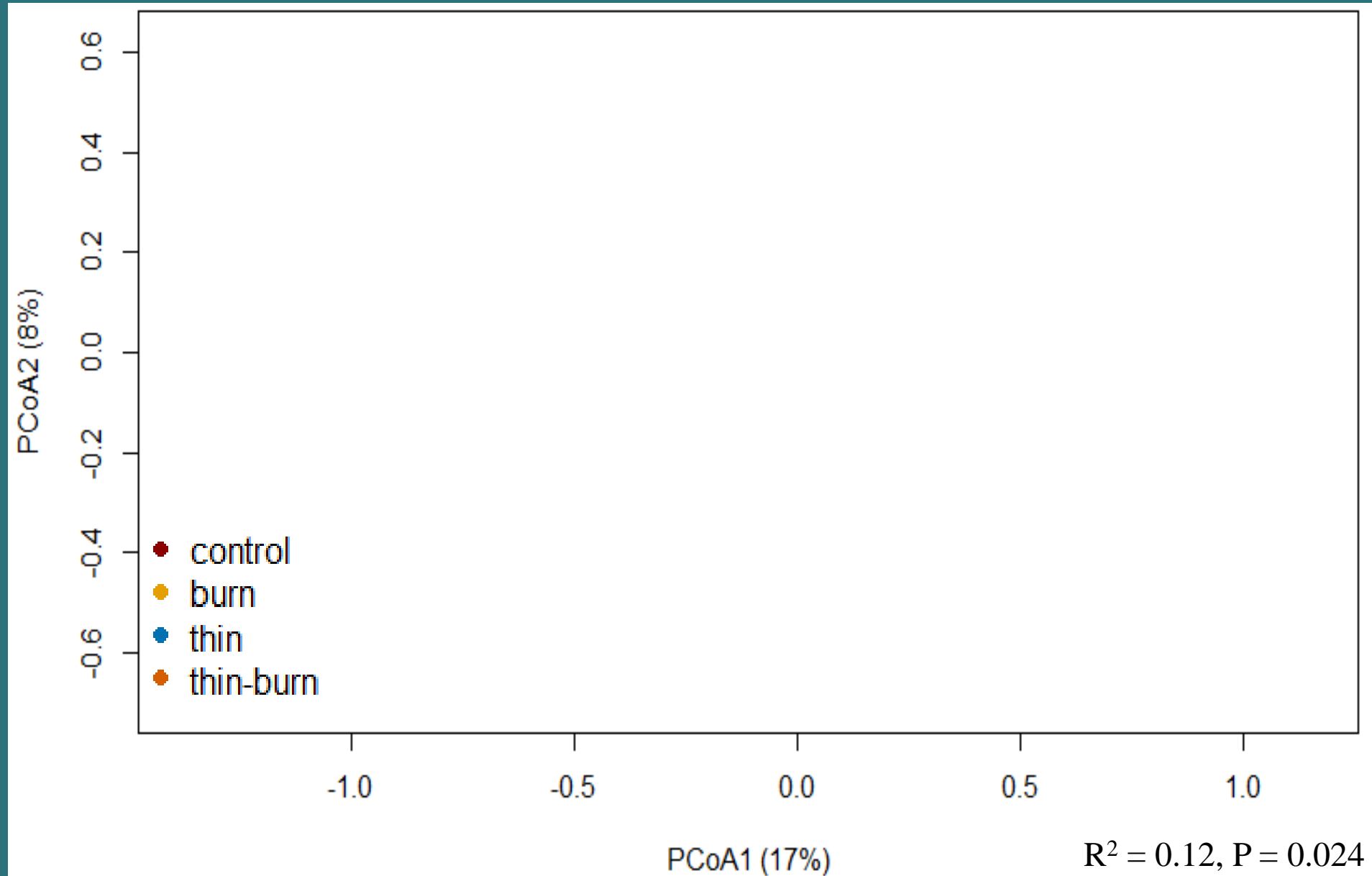
Thinned-only plots were most dissimilar from unmanaged plots



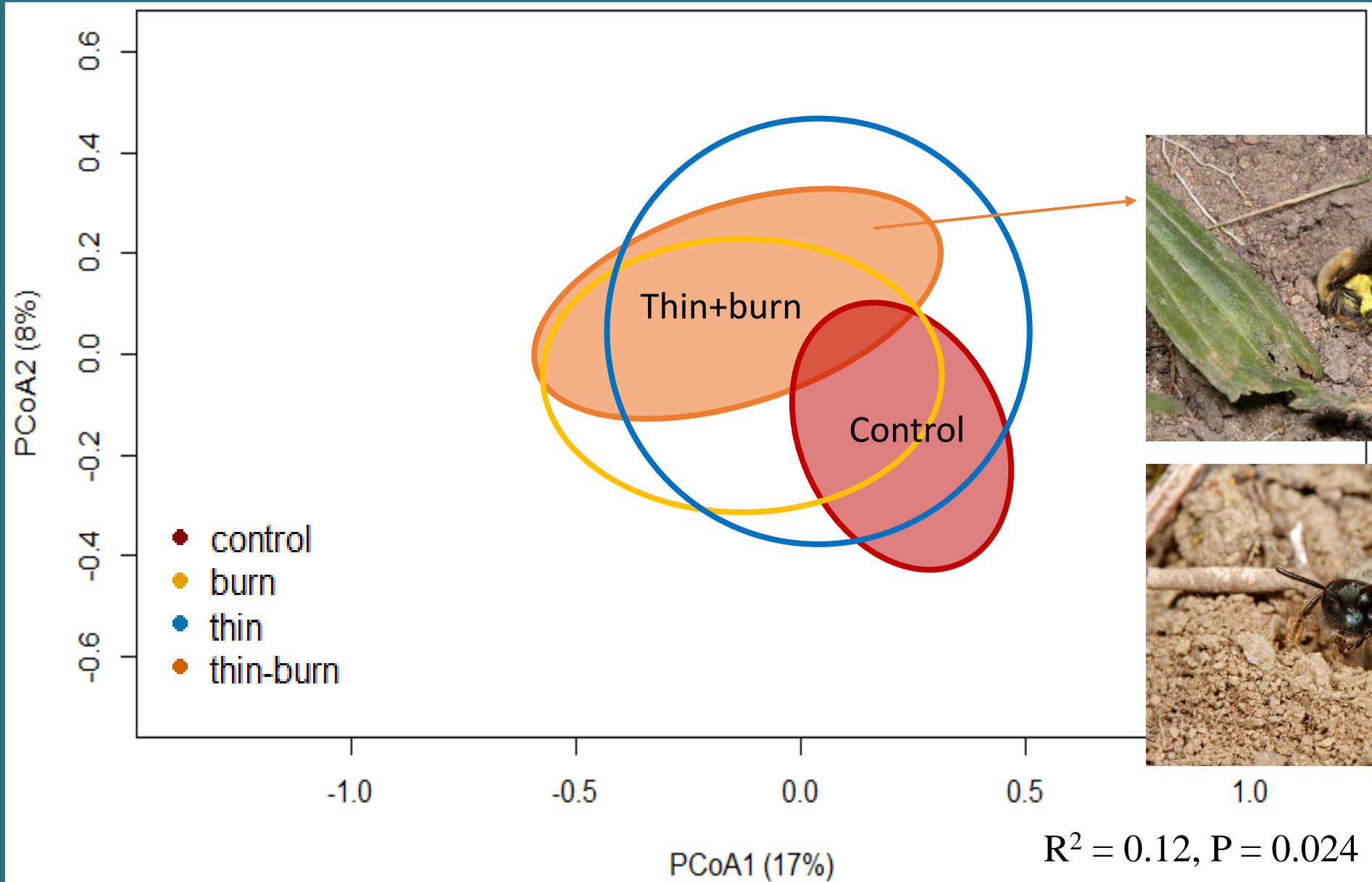
Primitively eusocial bees

Smaller bees

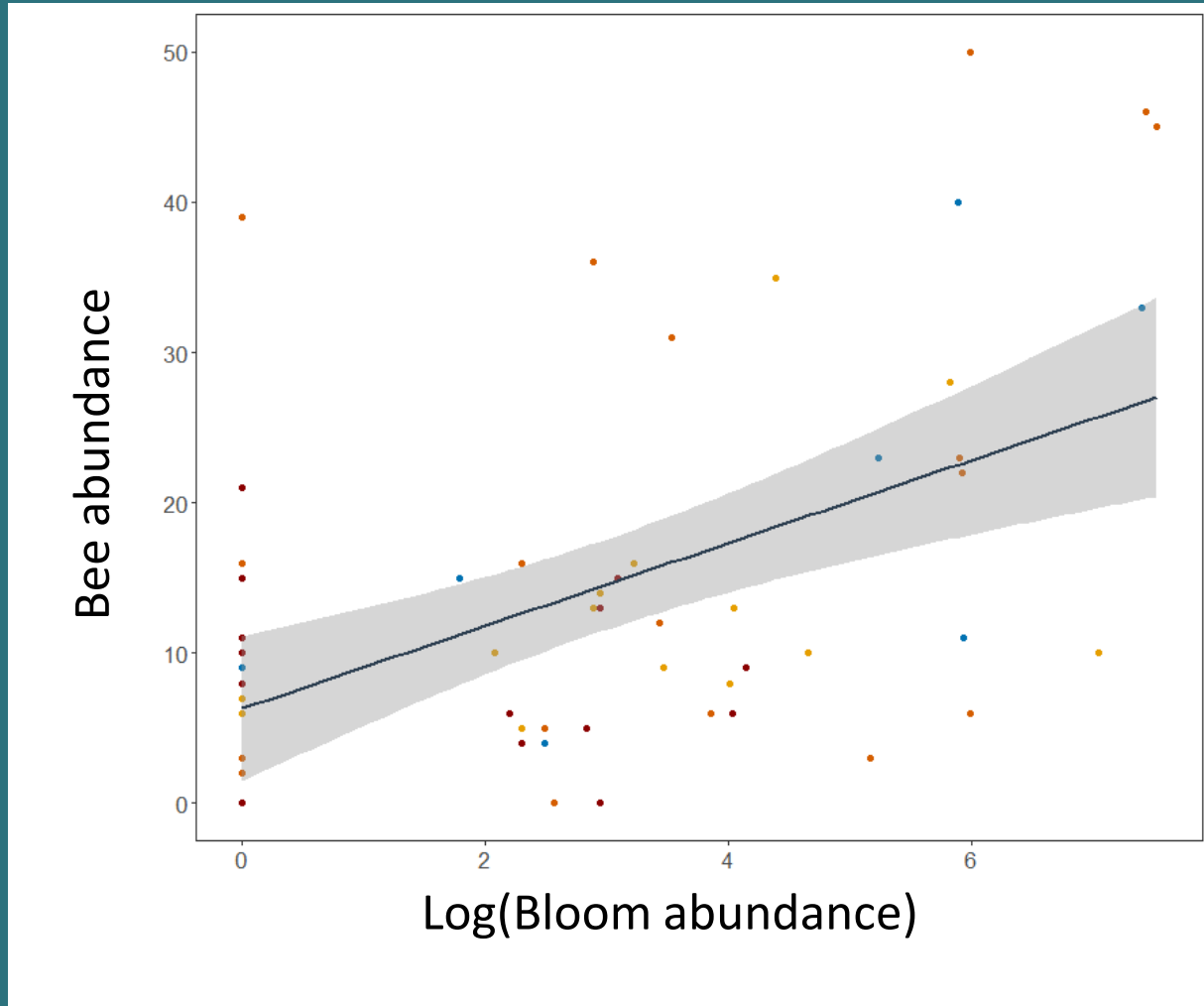
Bee composition varied most between thin+burn and unmanaged plots



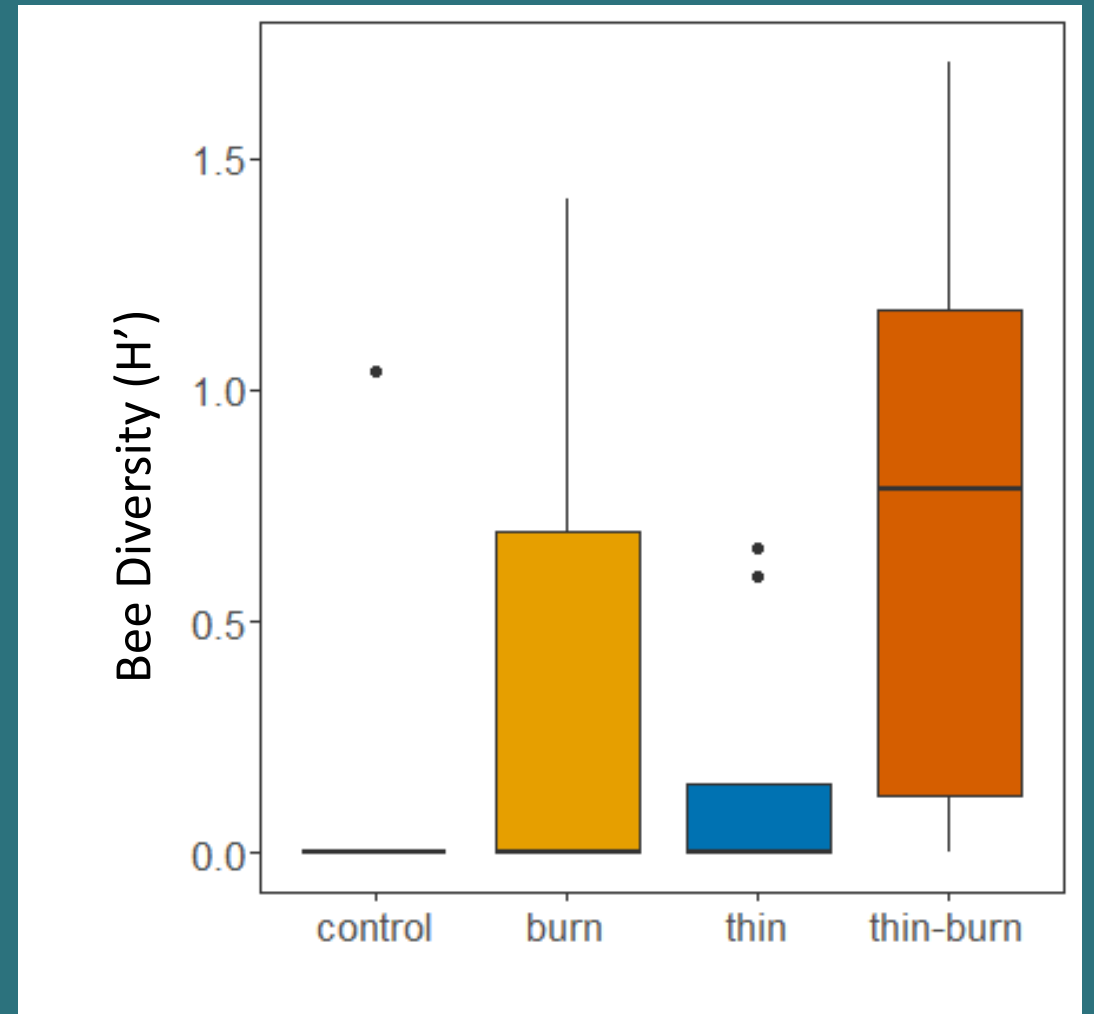
Burning has a stronger overall effect than thinning when comparing thin+burn - unmanaged plots



Floral abundance and diversity positively affected bee communities in spring



Management positively affected bee communities in summer



More intense management increased bee diversity and abundance, and diverse management supports a functionally diverse bee community



Temperate
forests & bees

Deciduous
forests and
bees

CA forests and
bees



What do we know about bees in our forests?

ARTICLE |  Full Access

Bee diversity decreases rapidly with time since harvest in intensively managed conifer forests


Rachel A. Zitomer, Sara M. Galbraith, Matthew G. Betts, Andrew R. Moldenke, Robert A. Progar, James W. Rivers 

ORIGINAL ARTICLE

Agricultural and Forest
Entomology



Prescribed fire is associated with increased floral richness and promotes short-term increases in bee biodiversity in the ponderosa pine forest of the Southern Rocky Mountains

Ryleigh V. Gelles^{1,2} | Thomas S. Davis^{1,2}  | Kevin J. Barrett³

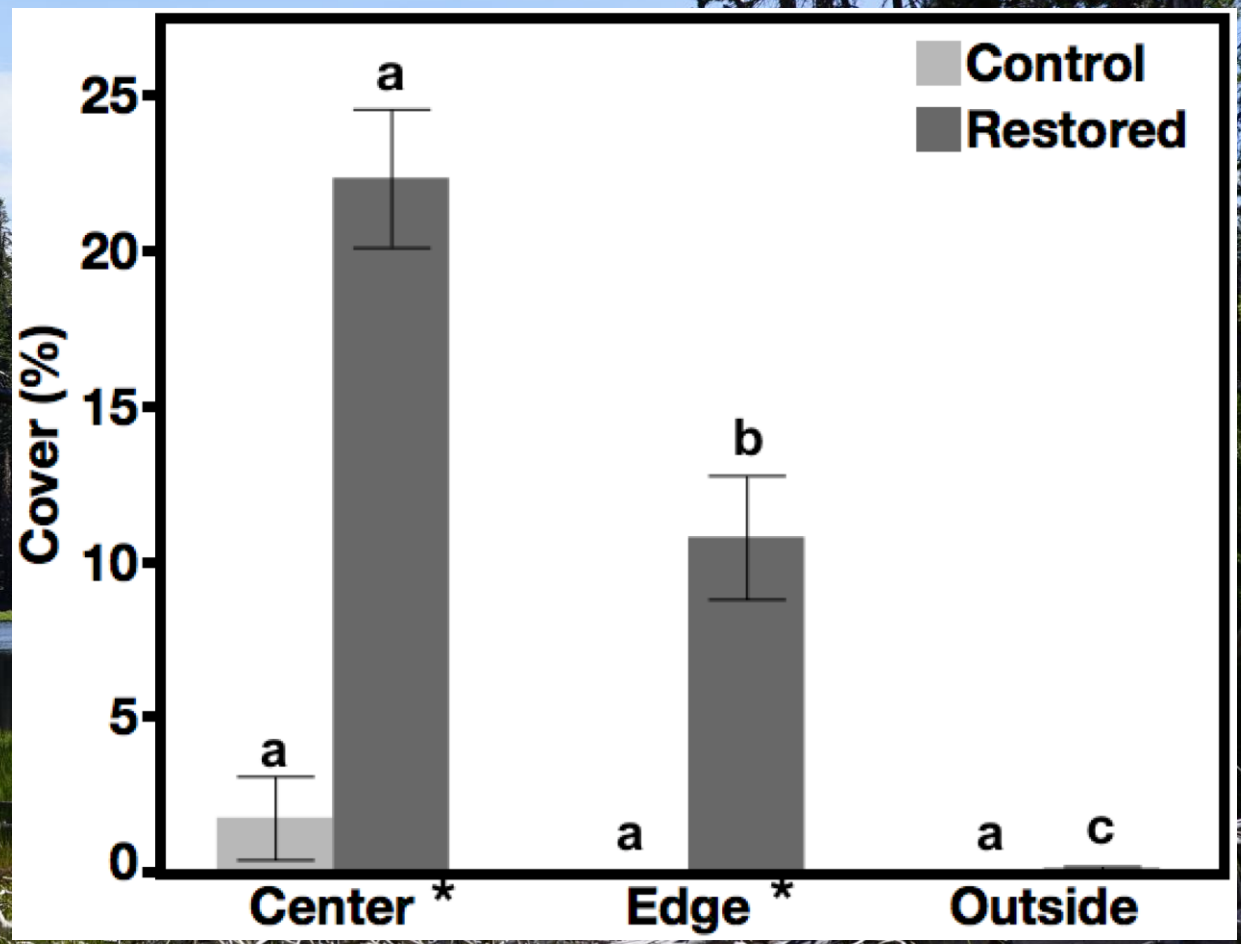
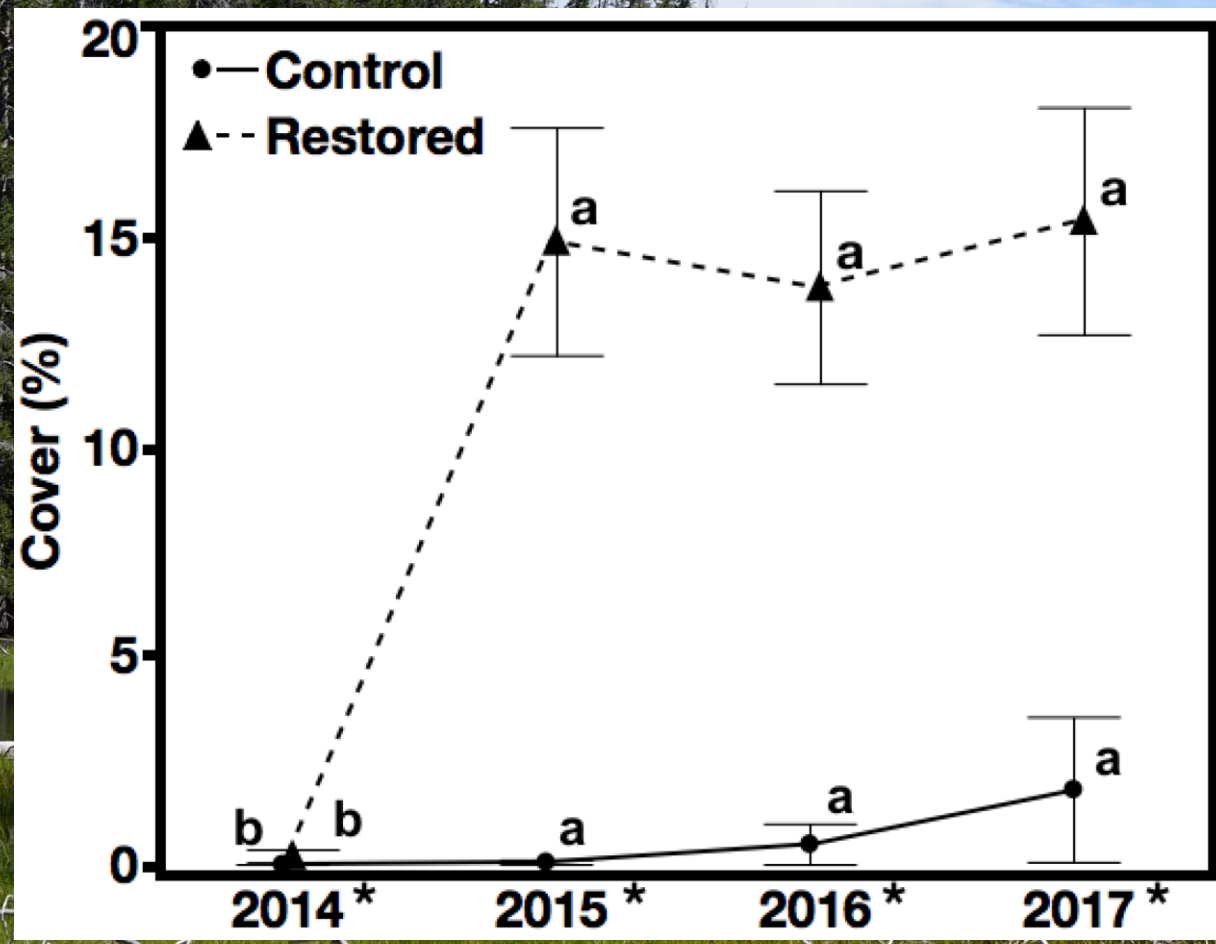


1. What does a healthy forest bee community look like?

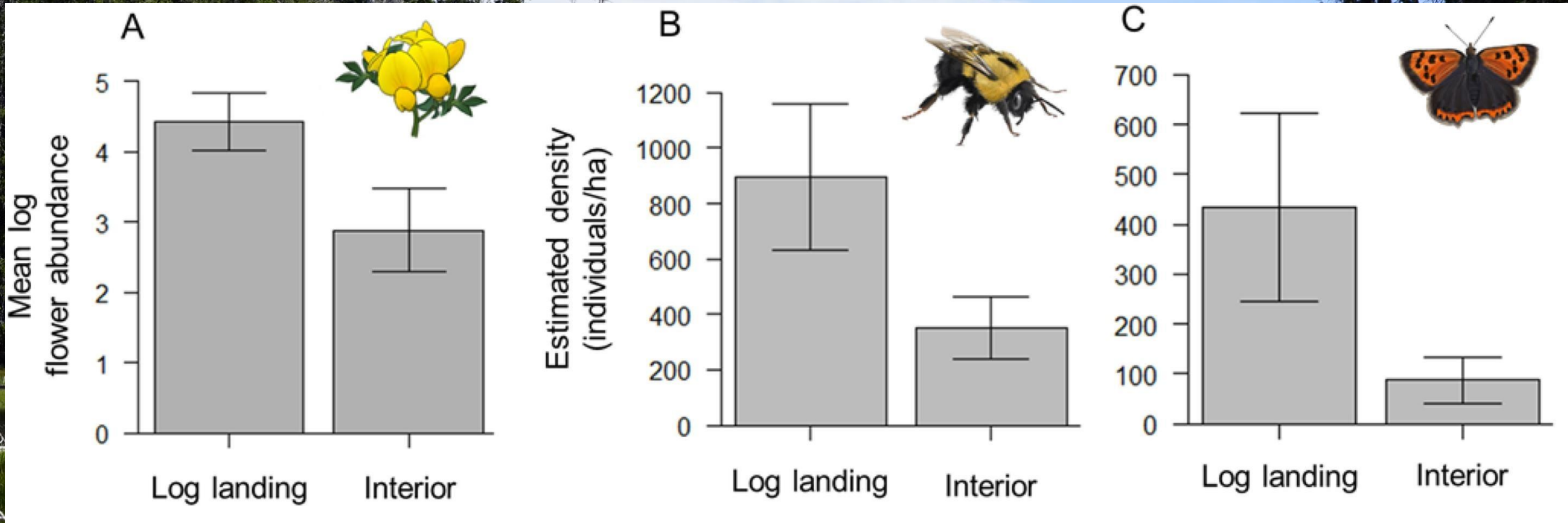


2. If floral diversity is driving bee communities in forests, how do we increase floral abundance and diversity post-harvest?

Slash Pile Burn Scar Restoration: Tradeoffs between Abundance of Non-Native and Native Species



Microhabitats created by log landings support abundant flowers and insect pollinators within regenerating mixed-oak stands in the Central Appalachian Mountains



References

Smith, C., Harrison, T., Gardner, J., & Winfree, R. (2021). Forest-associated bee species persist amid forest loss and regrowth in eastern North America. *Biological Conservation*, 260, 109202.

Harrison, T., Gibbs, J., & Winfree, R. (2018). Forest bees are replaced in agricultural and urban landscapes by native species with different phenologies and life-history traits. *Global Change Biology*, 24(1), 287-296.

Lee, M. R., McNeil Jr, D. J., Mathis, C. L., Grozinger, C. M., & Larkin, J. L. (2021). Microhabitats created by log landings support abundant flowers and insect pollinators within regenerating mixed-oak stands in the Central Appalachian Mountains. *Forest Ecology and Management*, 497, 119472.

Sexton, I., Turk, P., Ringer, L., & Brown, C. S. (2020). Slash pile burn scar restoration: Tradeoffs between abundance of non-native and native species. *Forests*, 11(8), 813.

Chase, M. H., Fraterrigo, J. M., Charles, B., & Harmon-Threatt, A. (2023). Wild bee response to forest management varies seasonally and is mediated by resource availability. *Forest Ecology and Management*, 548, 121426.

Chase, M. H., Charles, B., Harmon-Threatt, A., & Fraterrigo, J. M. (2023). Diverse forest management strategies support functionally and temporally distinct bee communities. *Journal of Applied Ecology*, 60(11), 2375-2388.