

# Ecology and conservation of native bees in working forest landscapes



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# Three focal points for today



**Overview of bee ecology and natural history**



**How do bee populations respond to wildfire severity?**



**How do bee communities change over time in timber plantations?**

# Pollinators are critical for supporting human food security and native biodiversity

~75% of agricultural crops benefit from pollinators



~90% of wild flowering plants benefit from pollinators





# There are upwards of 700 native bee species in Oregon!







Bees use a diversity of nest sites, although most nest in the ground



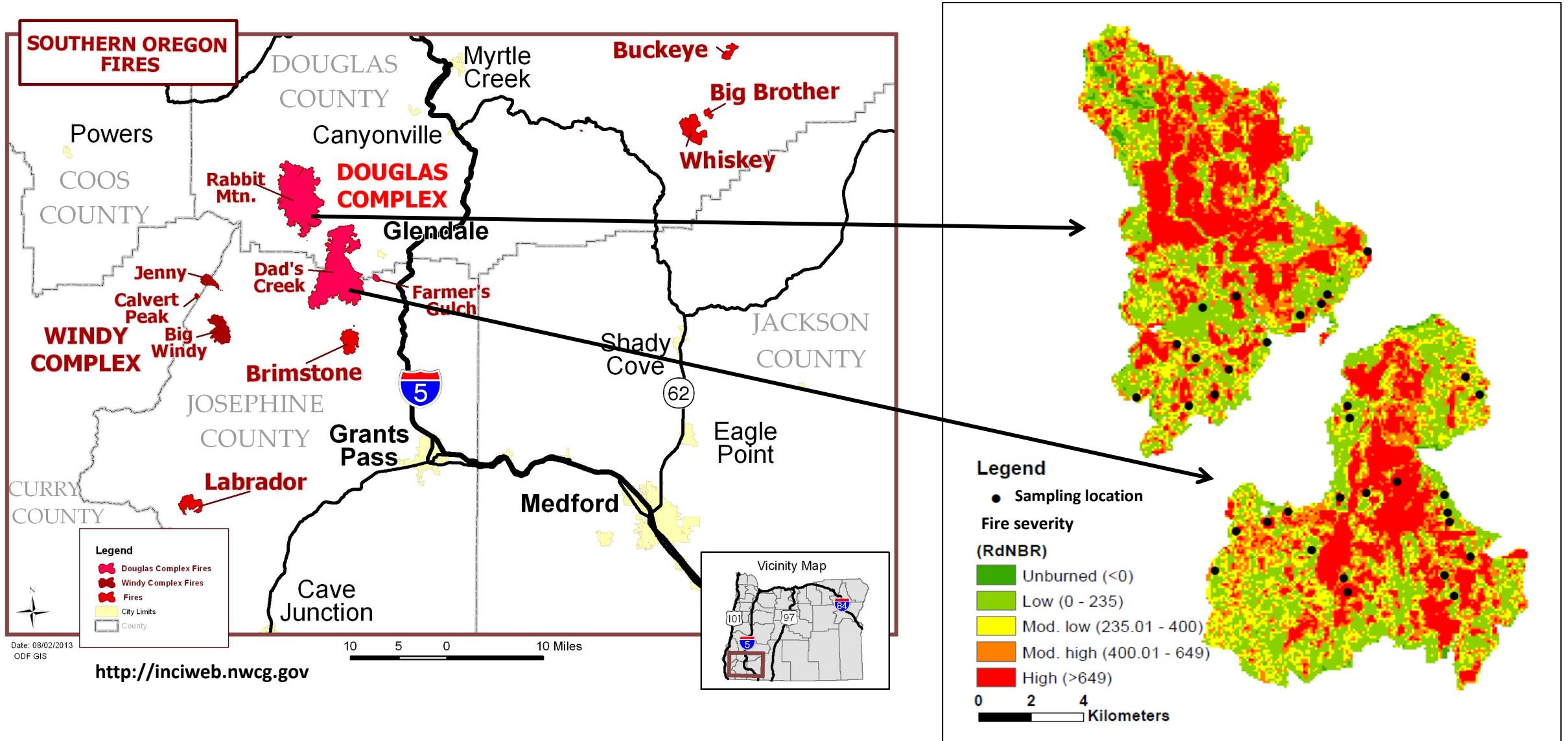
# How do bee populations respond to wildfire severity?



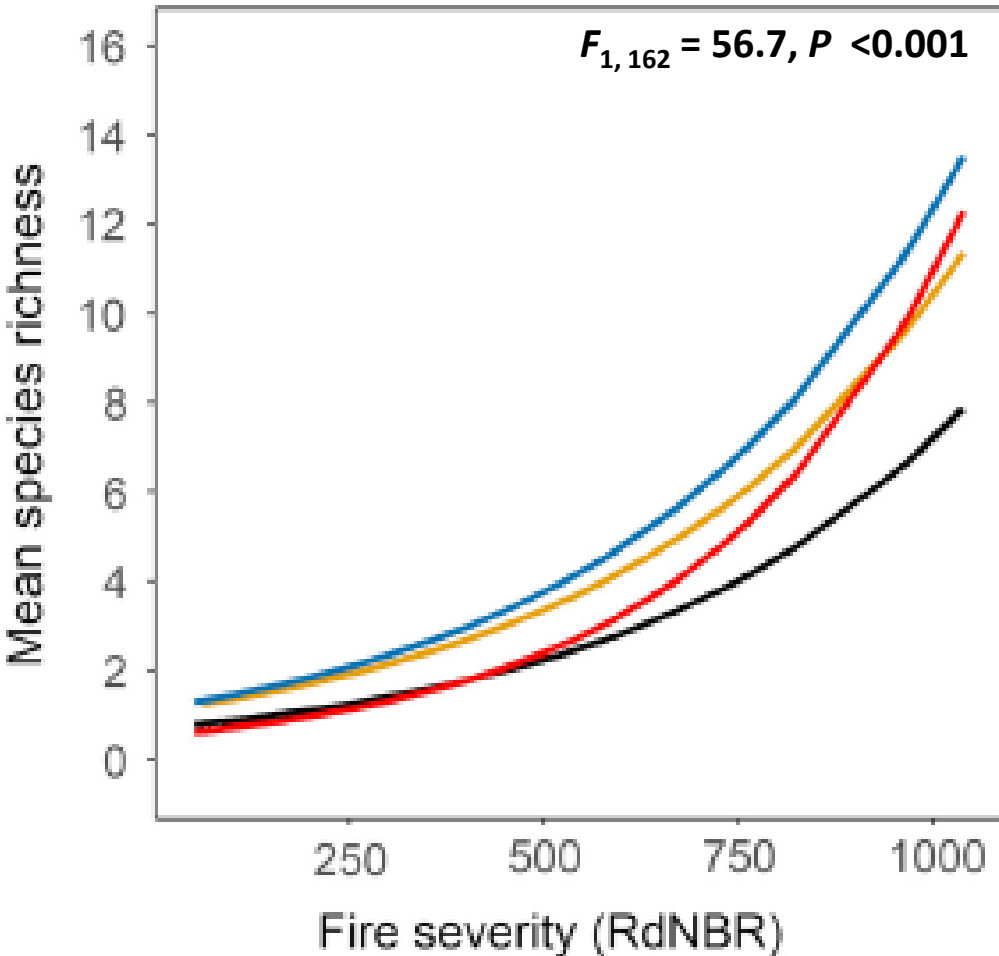
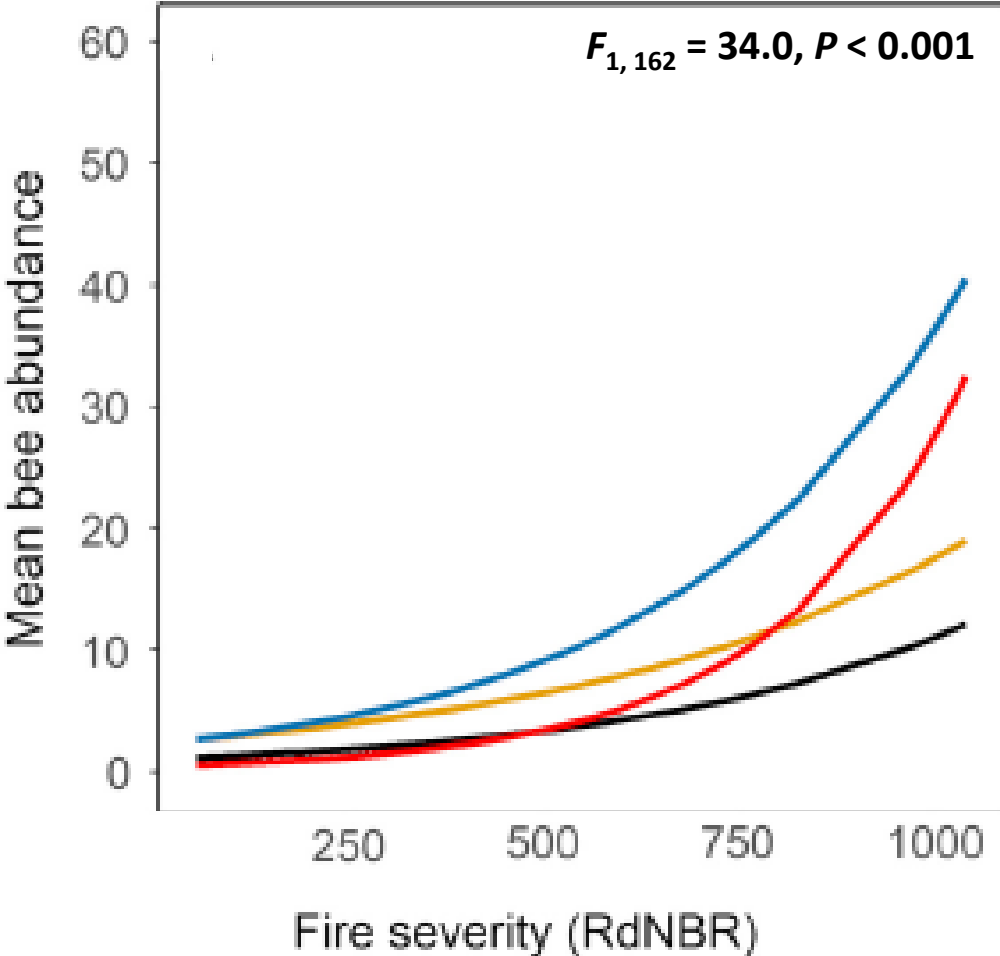
*Dr. Sara Galbraith*



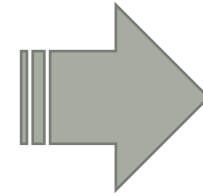
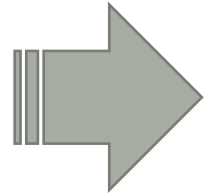
# The Douglas Complex burned in a mosaic of fire severity



# Bee communities were enhanced by increased fire severity



**We hypothesized that fire severity was positively correlated with bee reproduction**



**↑ Offspring number**  
**↑ Offspring quality**

# The blue orchard bee is ideal for assessing bee population response to wildfire

- Native species
- Females are solitary nesters
- Cocoons are readily available
- Use human-provided cavities



OR Dept. Agriculture



# We quantified bee response to wildfire in spring 2017

Placed 2 nest blocks/stand



Added adult cocoons

(20 ♀ + 30 ♂)

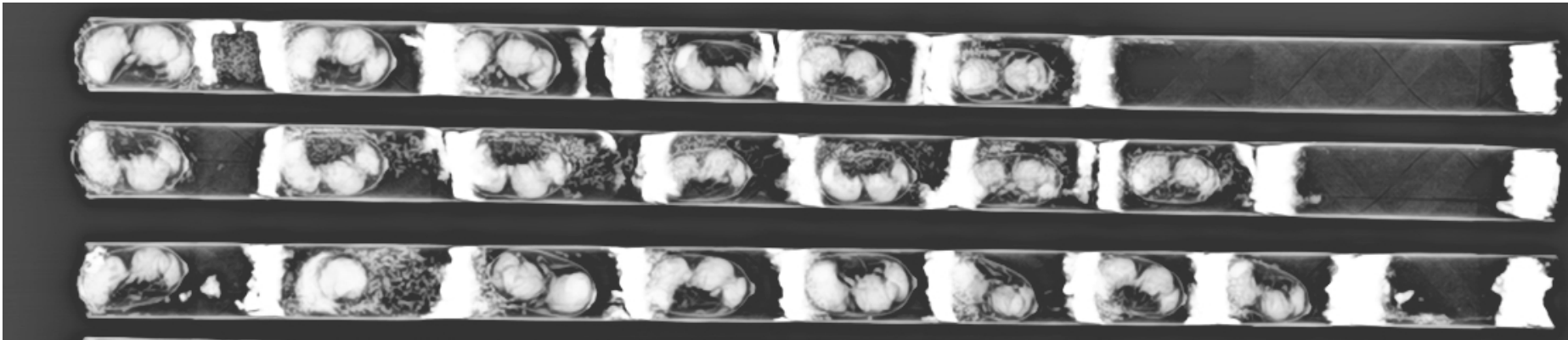


Measured offspring with x-rays



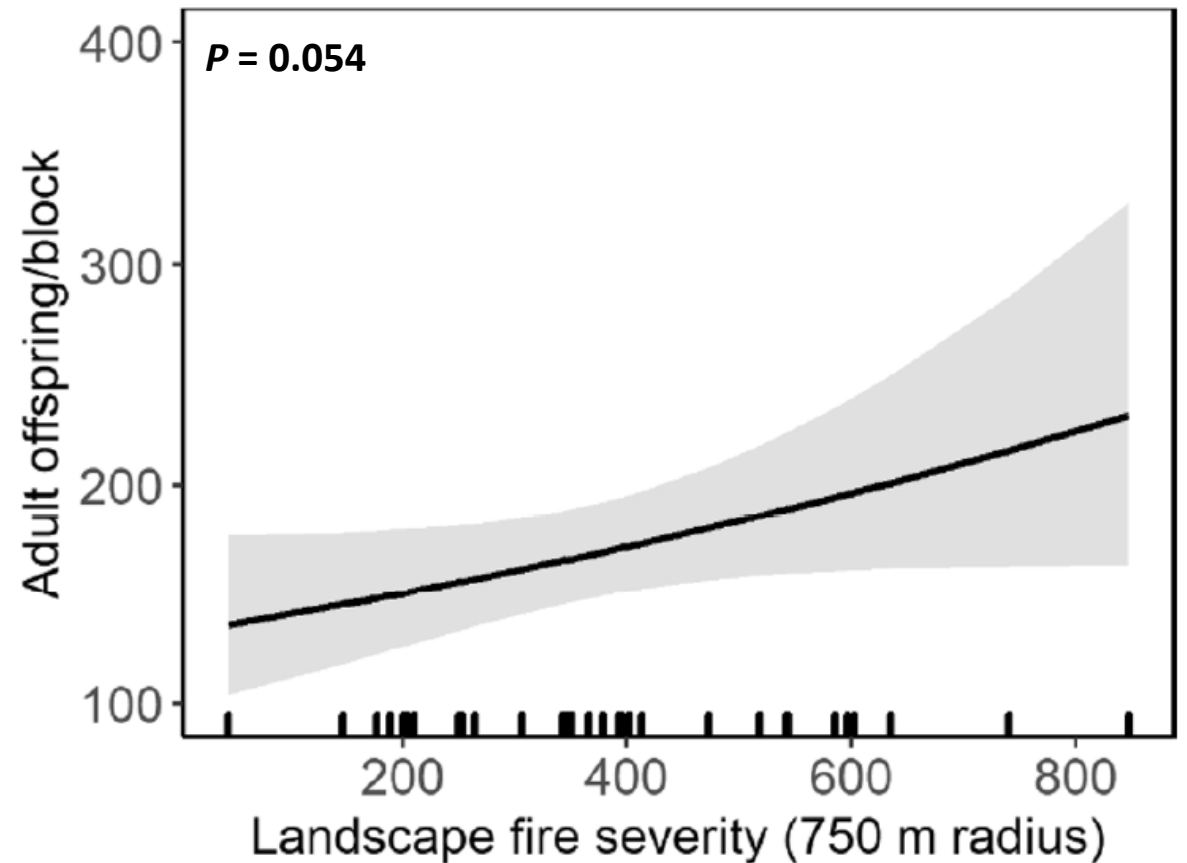
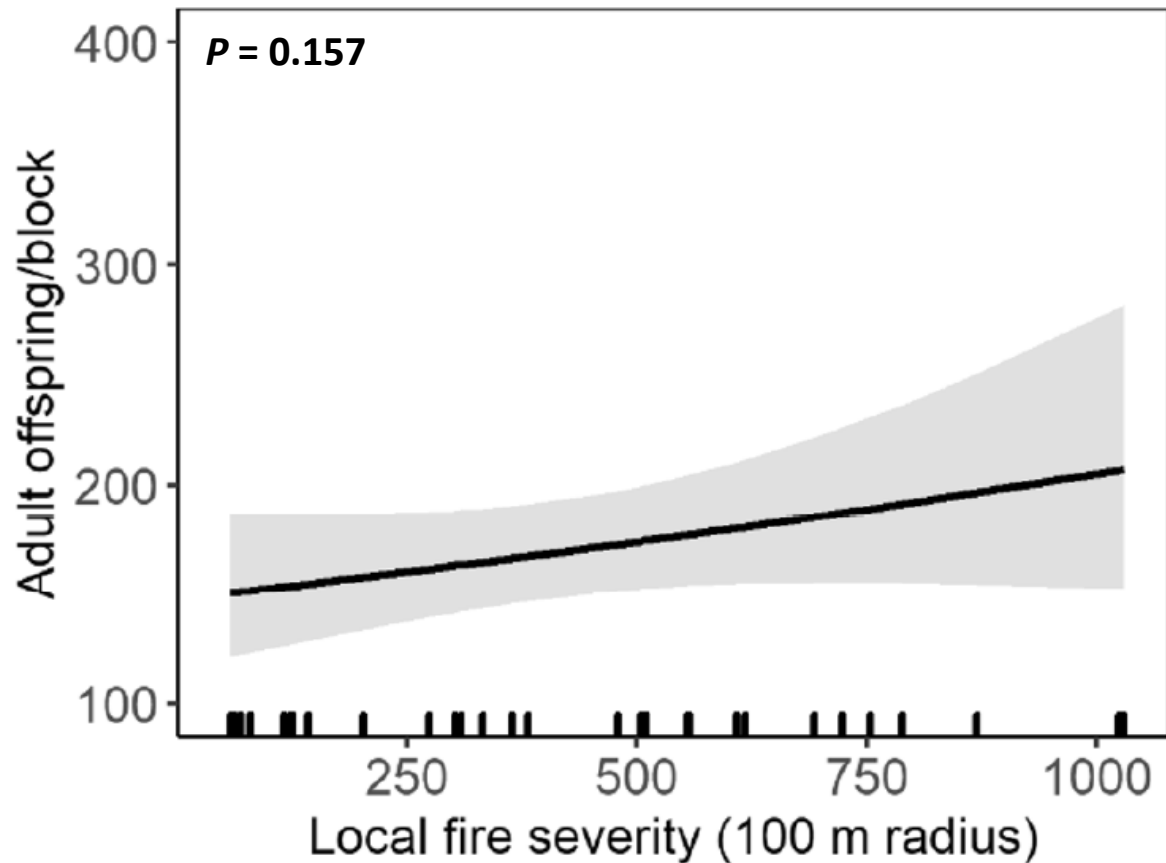
# Offspring production in burned forest was high

- >12,000 provisioned cells from n=32 stands (62 nest blocks)
- 86.9% provisioned nest cells developed into adults
- 10,492 adult offspring (~169 adults/block)



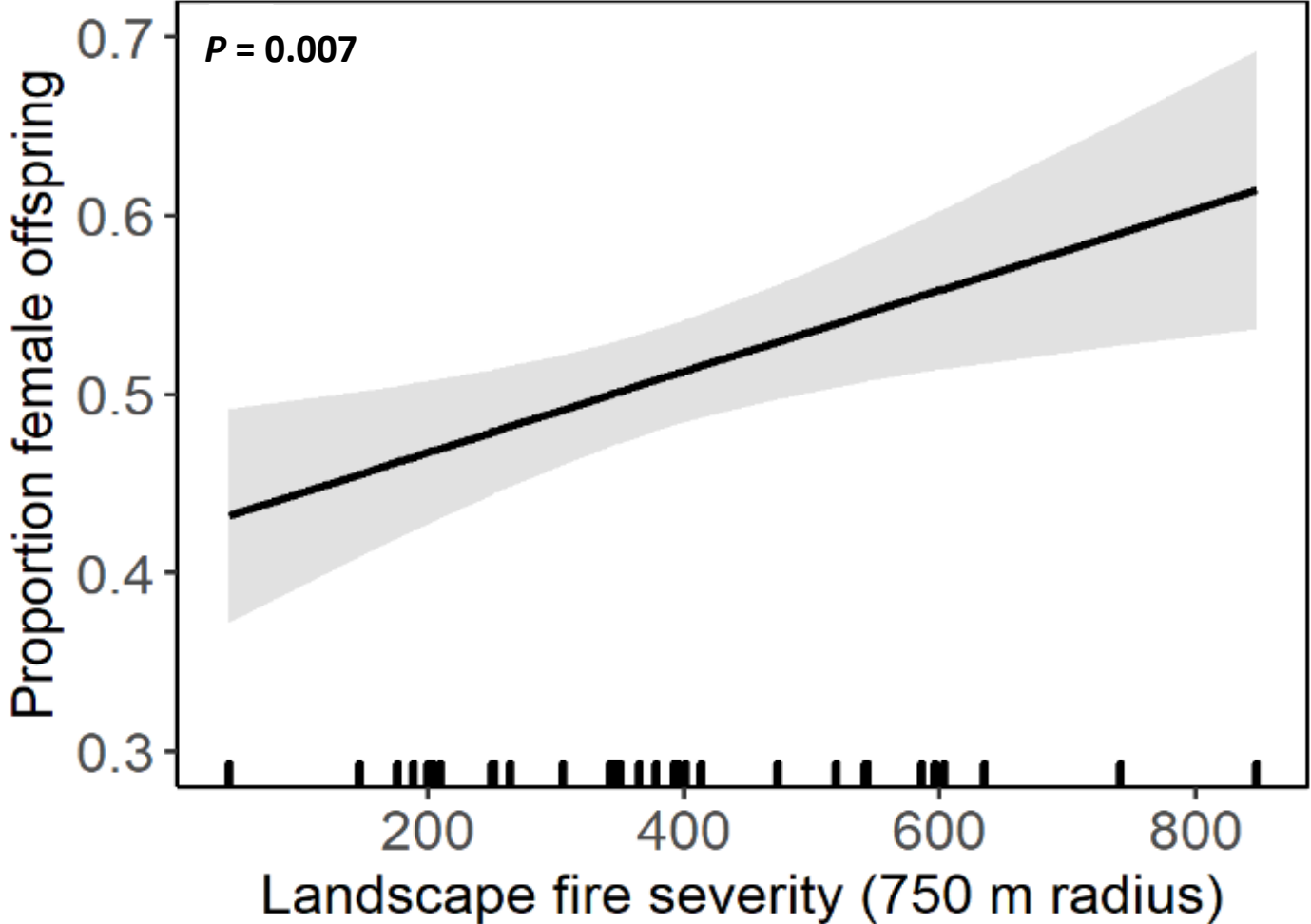


# Slight increase in offspring production with greater fire severity



# More female offspring produced with greater fire severity

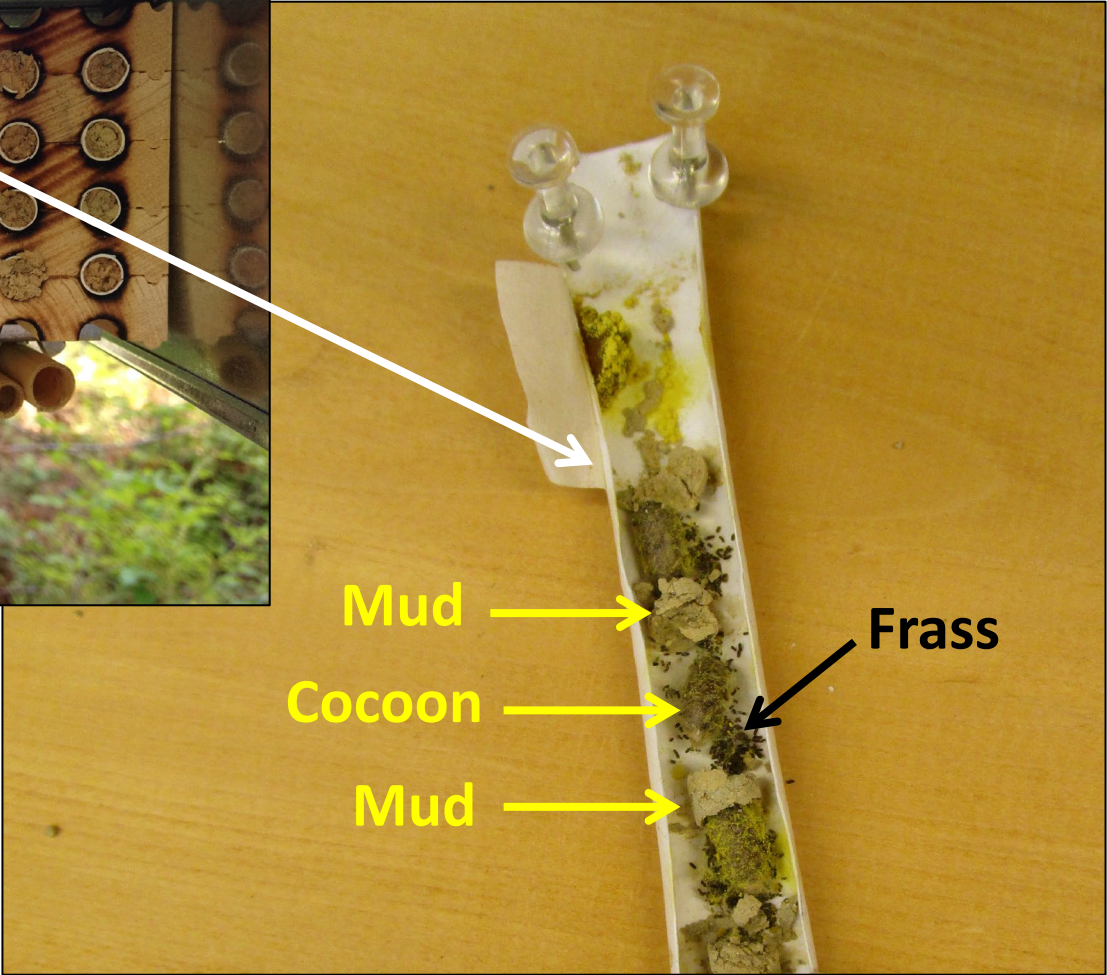
>10% more females produced at high end of fire severity gradient



*Females are ~15% larger and require ~25% more food than males*



# How does fire severity influence offspring provisioning?



Nicole Bell



Andy Moldenke

# Female foraging was limited a small number of plant groups

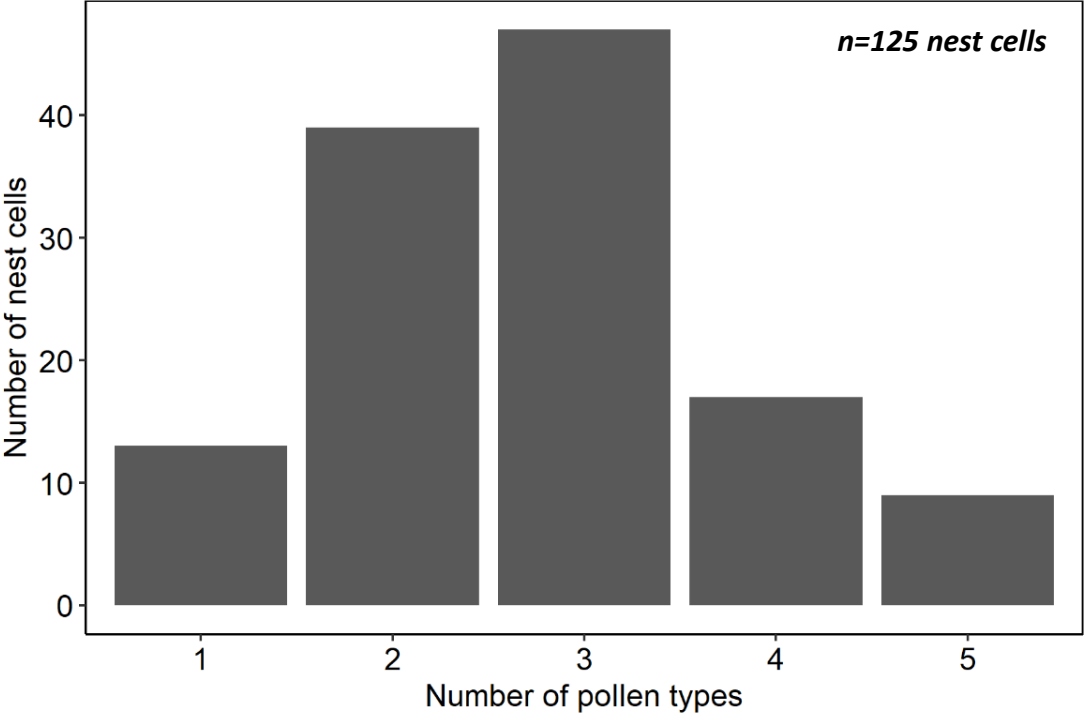
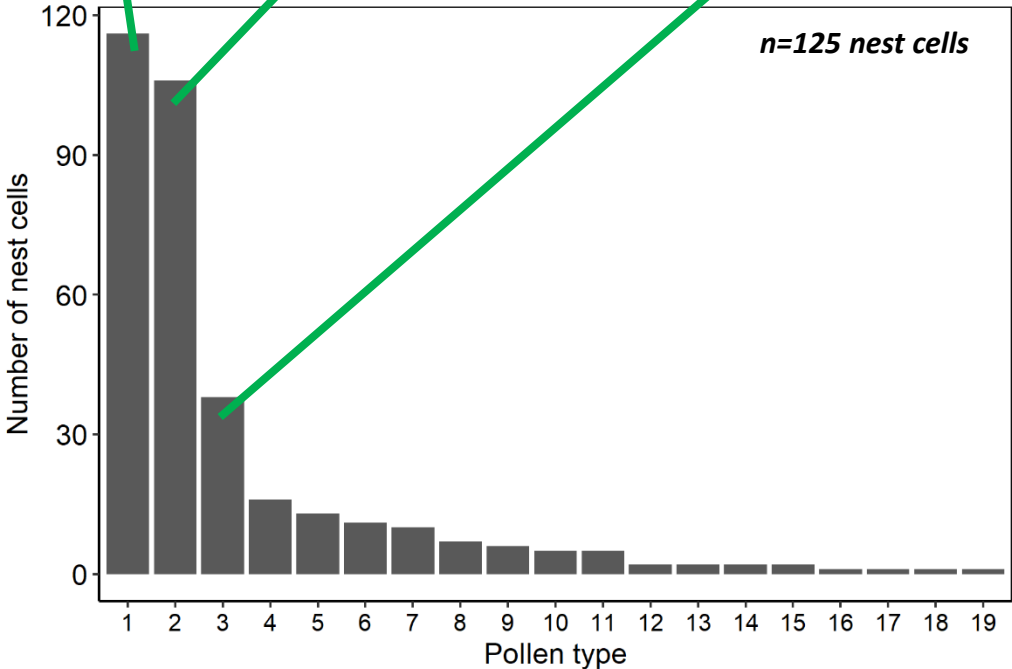
92.8%  
*Corylus cornuta*



84.8%  
Ericaceae



30.4%  
*Hosackia crassifolia*



# Key project takeaways

Recently burned forest provides habitat for native bees

More female offspring were produced in high fire severity areas

Females foraged on similar plants across the fire severity gradient



# How do bee communities change over time in timber plantations?



*Dr. Rachel Zitomer*

# Intensive forest management accelerates canopy closure and alters plant communities

2 years post-harvest



15 years post-harvest



Scott Harris

# Focal questions

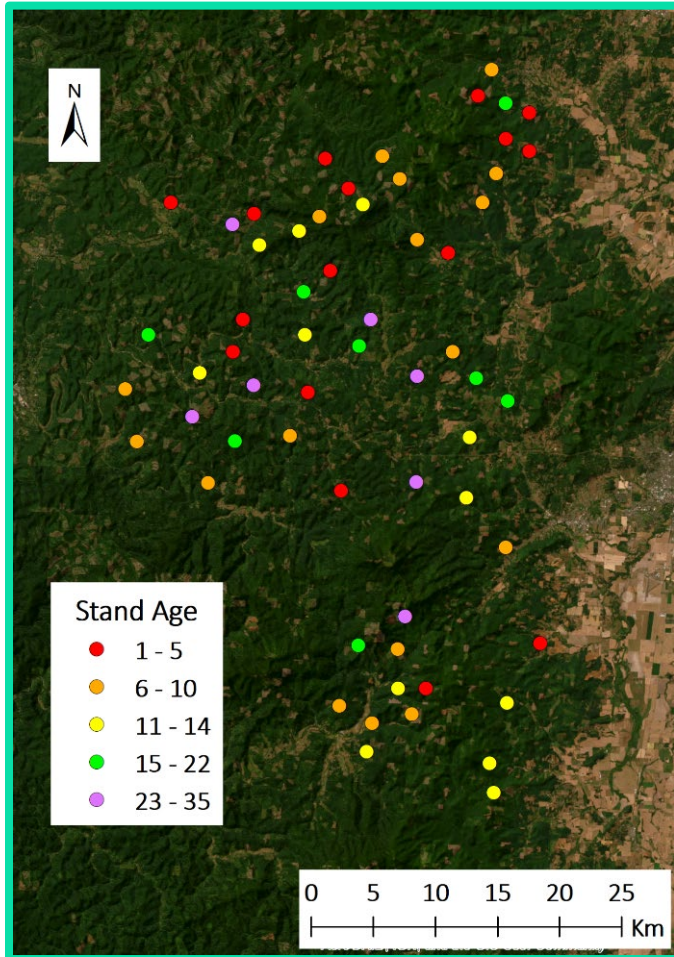
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- Which bees occur in intensively managed conifer forests?
- How is bee diversity related to stand age and floral resources?
- How does bee community composition change over time?





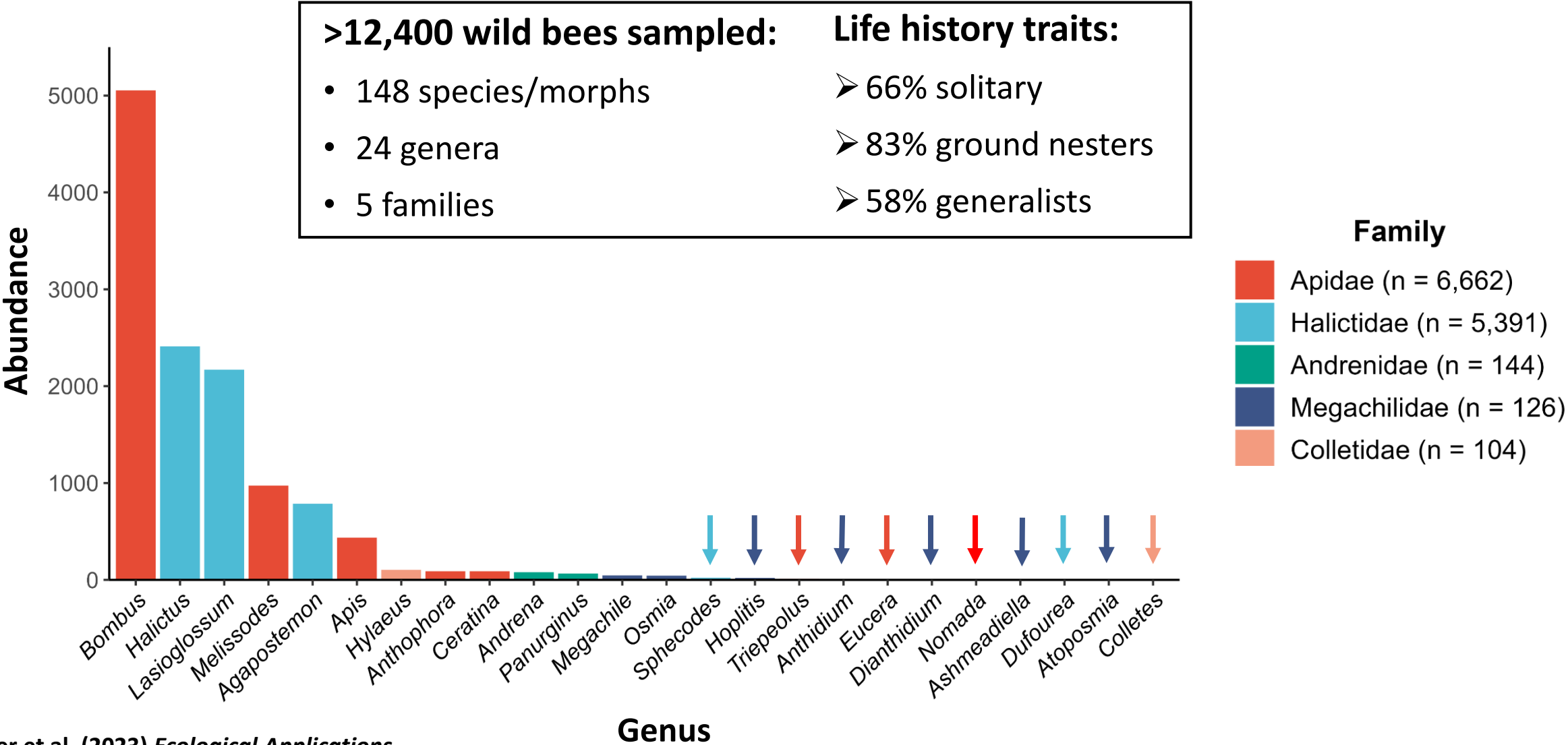
# We assessed bee diversity in n=60 intensively managed Douglas-fir stands



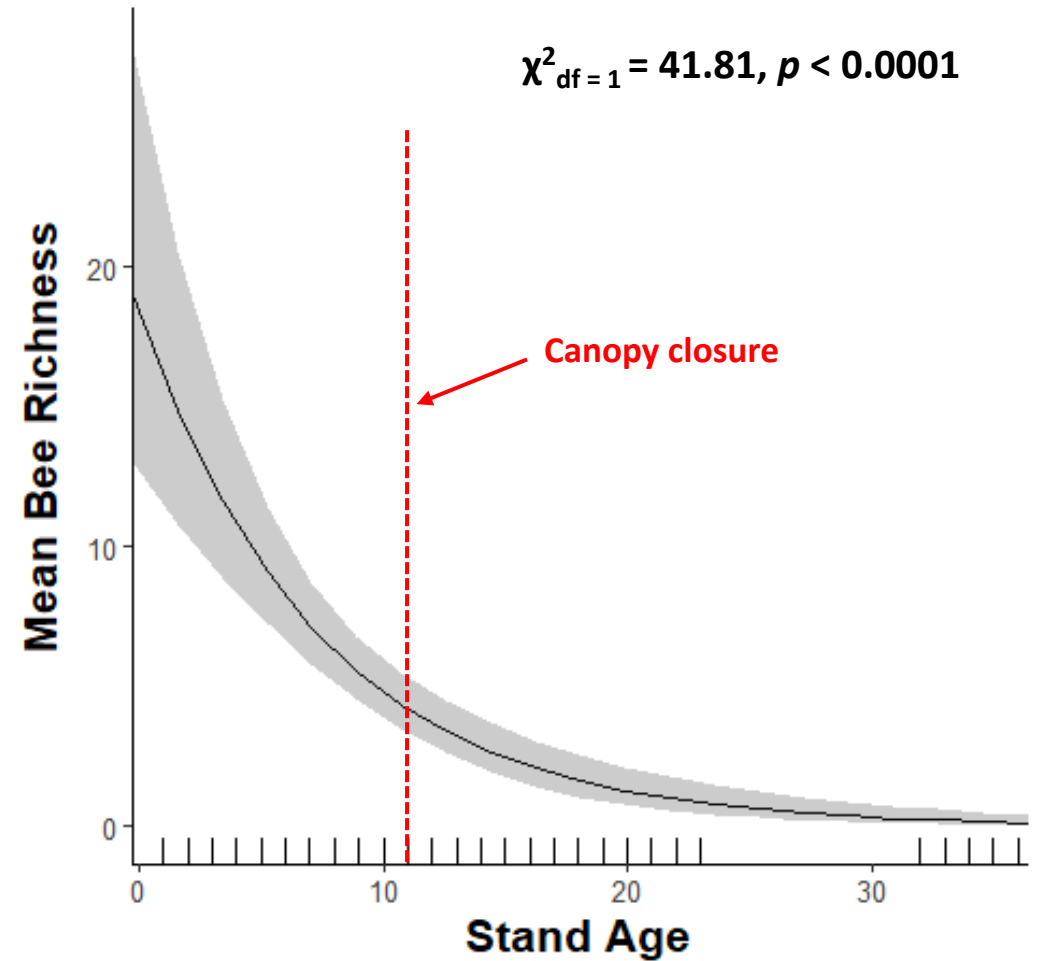
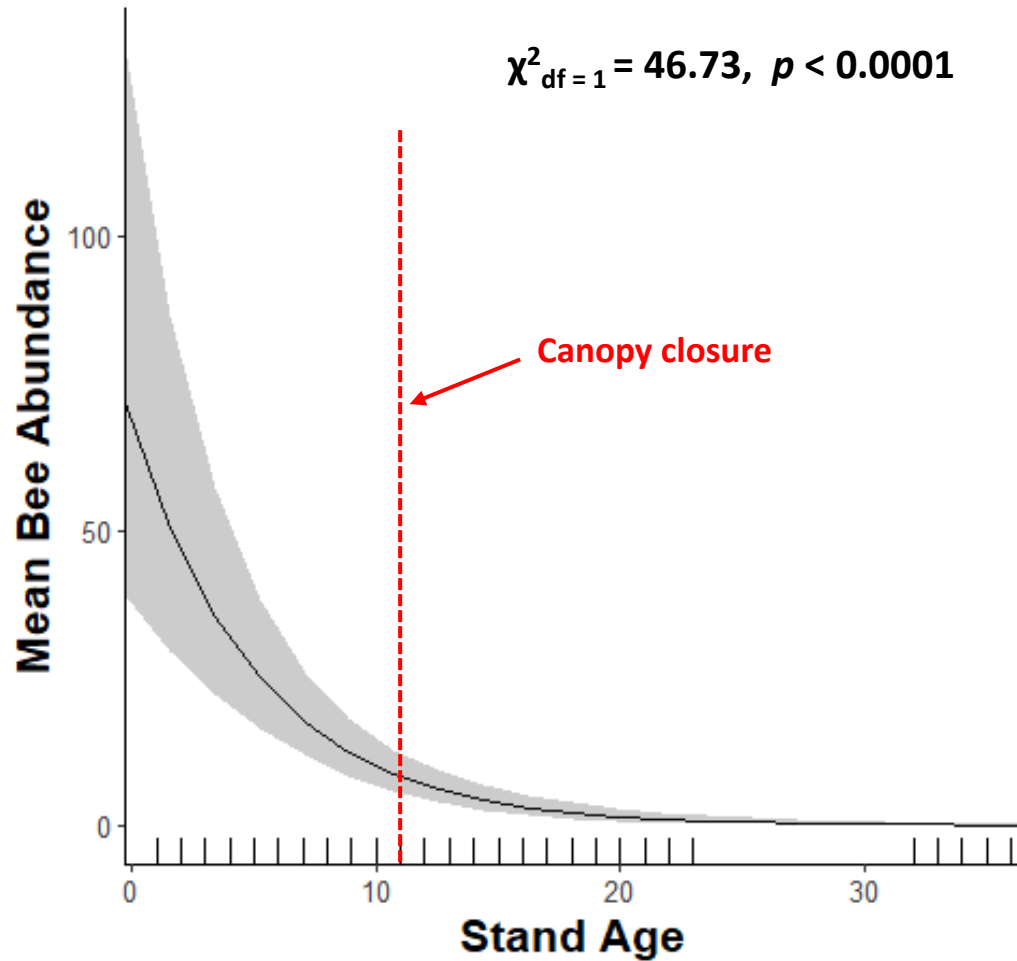
- 1-35 y post-harvest at start of study
- 4 Landowners (ODF + 3 private industrial)
- Sampled May-July 2018-2019; 3 rounds/year



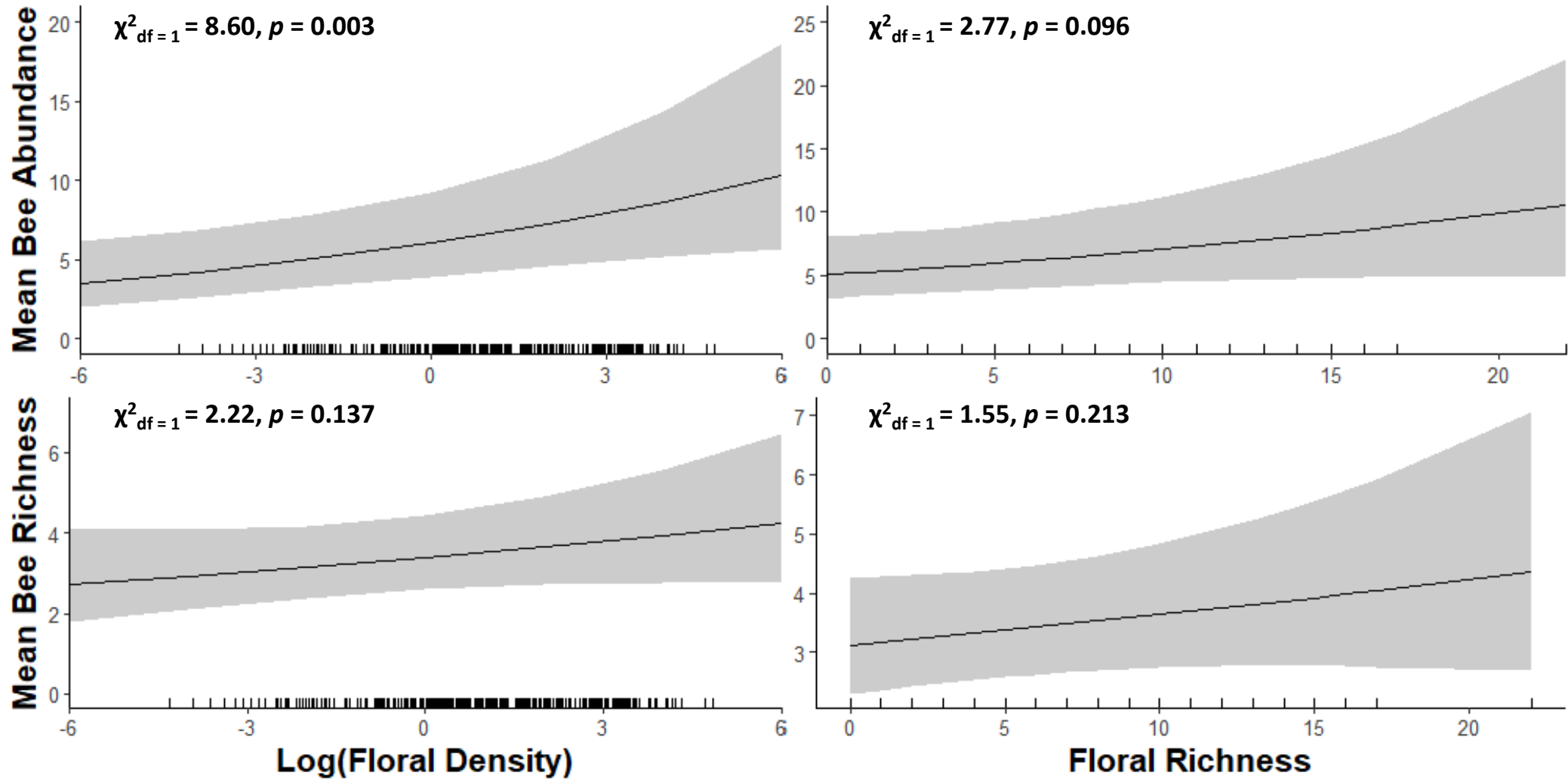
# We detected nearly 20% of the Oregon bee fauna on our sites!



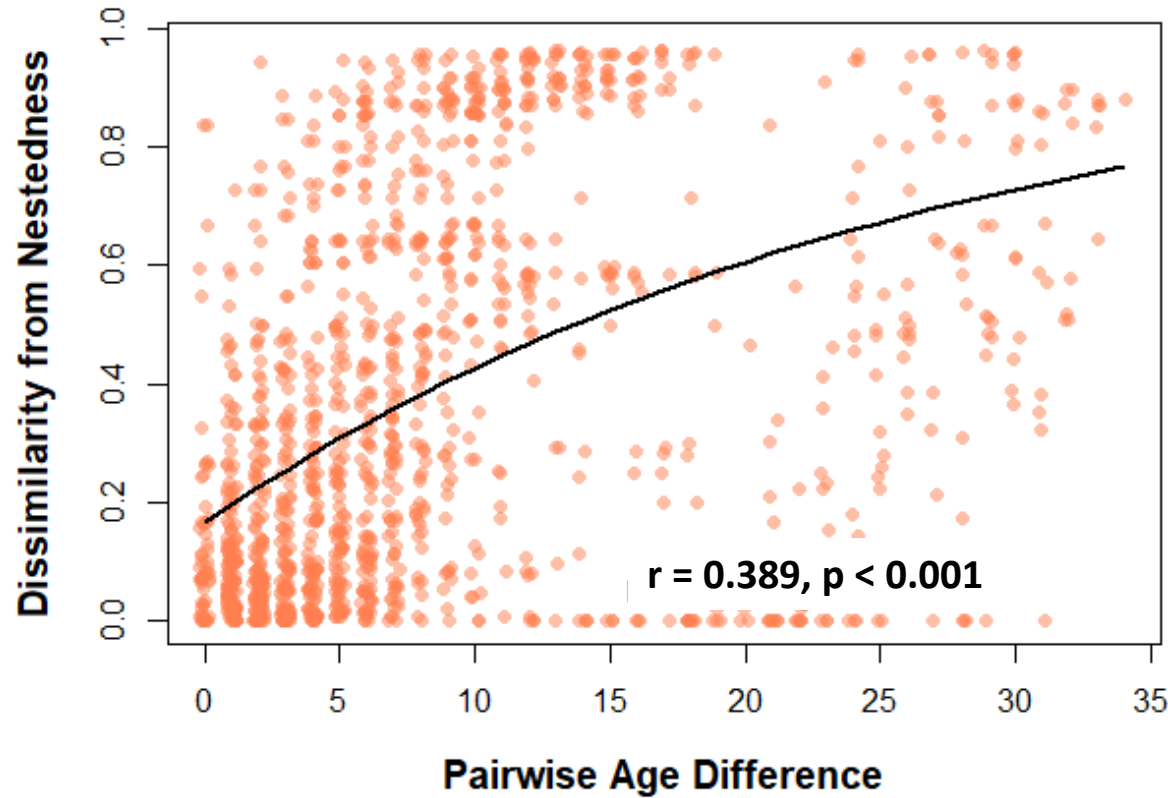
# Stand age had a strong effect on bee abundance and richness



# Floral density was more important than floral richness



# Bee species in older stands were nested subsets of those in younger stands, not different species



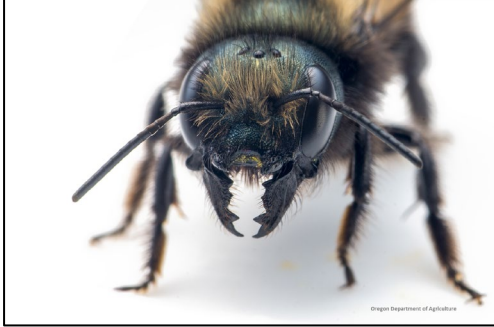
# Key project takeaways

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- ~20% of Oregon's native bee species were found in intensively managed timber plantations
- Floral resources had a relatively small influence on native bee communities
- Bee communities were ephemeral due to rapid canopy closure



# Three take-home points for today



**Bees are critically important pollinators in PNW forests**



**Burned forests can provide good bee nesting habitat**



**Bee communities are ephemeral in timber plantations**

# Many thanks to...

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