



# Evaluating the response of native bees to fuel-reduction treatments in managed conifer forests

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# Many thanks!



**Dr. Katie  
Moriarty**

**Dr. Jake  
Verschuyf**

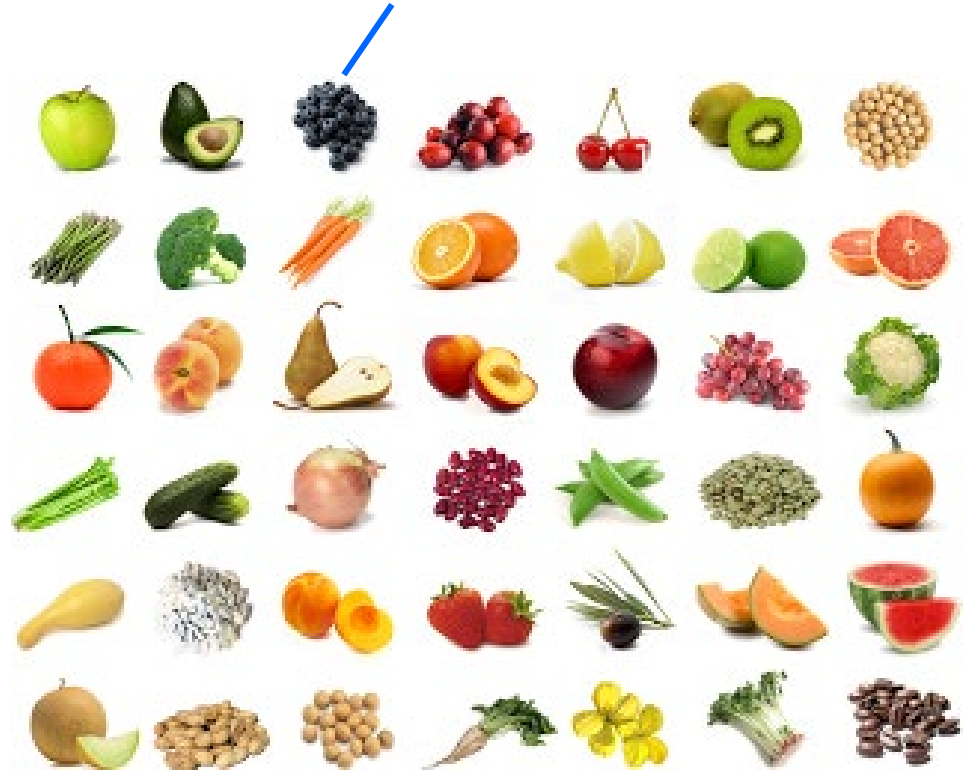
**Megan  
Sampognaro**



**Benny Johnson, Stu Farber, Cedric Twight,  
Kevin Roberts, Dustin Hixon, Mike Jones,  
Kristina Wolf, and summer field technicians**

# Pollinators have an outsized impact on human food production and native biodiversity

~75% of agricultural crops benefit from pollinators



>300,000 flowering plant species benefit from pollinators



# There are 4 key pollinator groups in the western U.S.

**Flies**



**Moths & butterflies**



**Beetles**



**Bees**

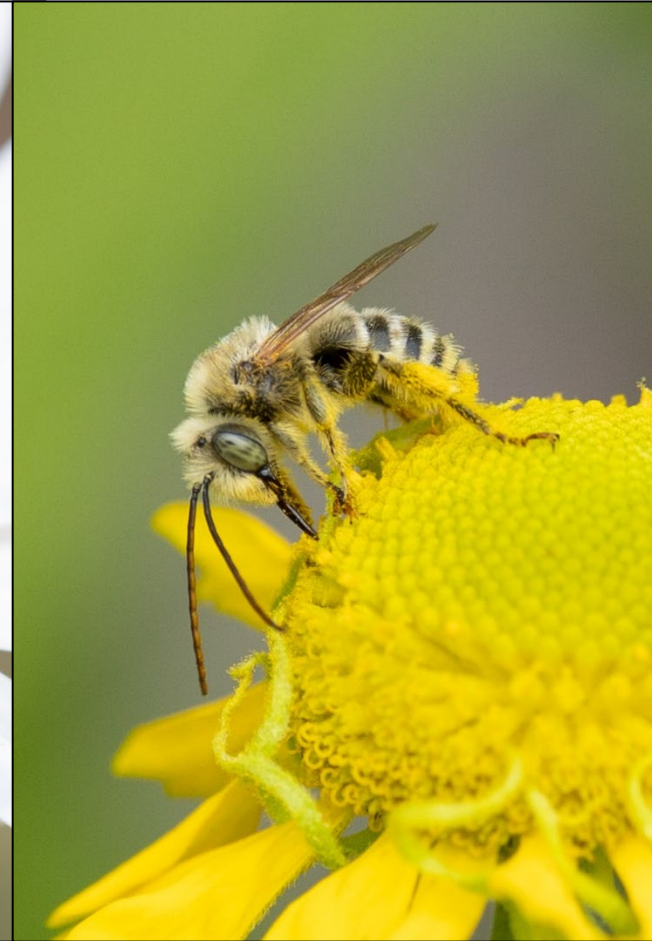




Image courtesy of ODA

# Floral resources and nesting sites are key requirements for bee populations

Bees get all of their food  
from flowers



~70% of all bee species  
nest underground



# Many knowledge gaps remain for forest pollinator research

## A Review of Research Needs for Pollinators in Managed Conifer Forests

James W. Rivers, Sara M. Galbraith, James H. Cane,  
Cheryl B. Schultz, Michael D. Ulyshen, and Urs G. Kormann

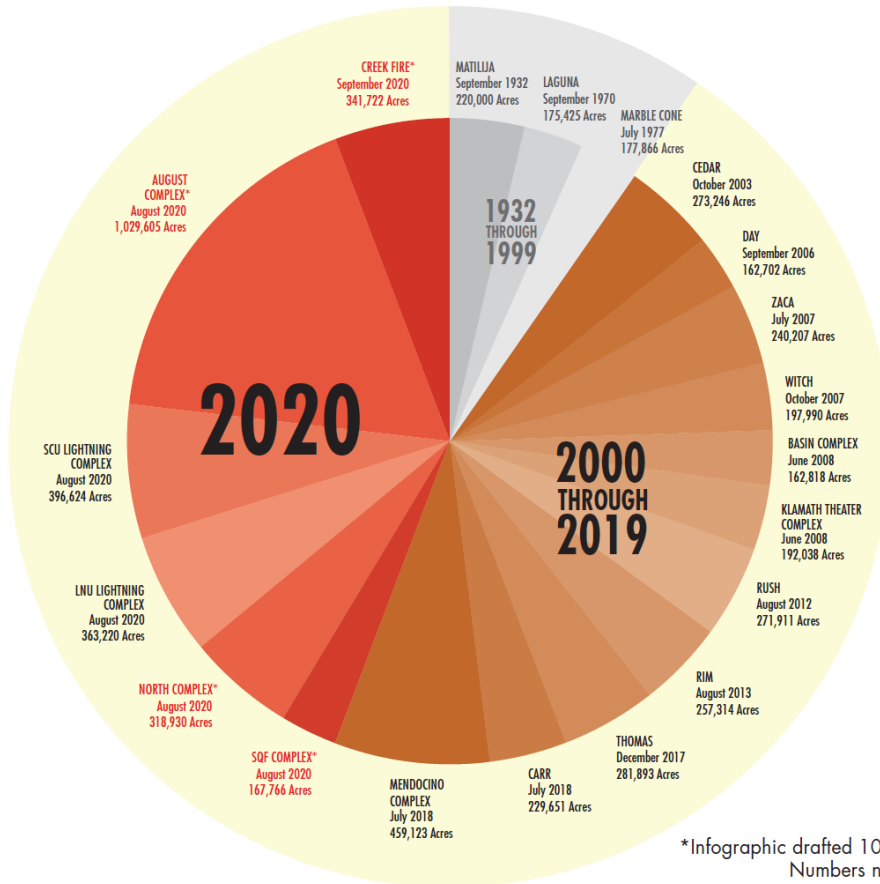
*J. For.* 116(6):563–572  
doi: 10.1093/jofore/fvy052  
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### Key finding:

*Data are lacking on the effects of forest management activities*

# Treatments to reduce fire risk are a management priority throughout western U.S. forests

TOP 20 LARGEST CALIFORNIA WILDFIRES



## *Biden Administration Announces Plan to Spend Billions to Prevent Wildfires*

The plan is an expensive one, but it is only partially funded.

By Alyssa Lukpat

Jan. 19, 2022



## Bipartisan Infrastructure Law investments reduce wildfire risk in California

California | Central California DO

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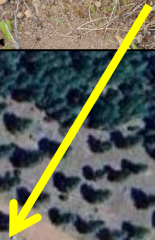
June 26, 2024



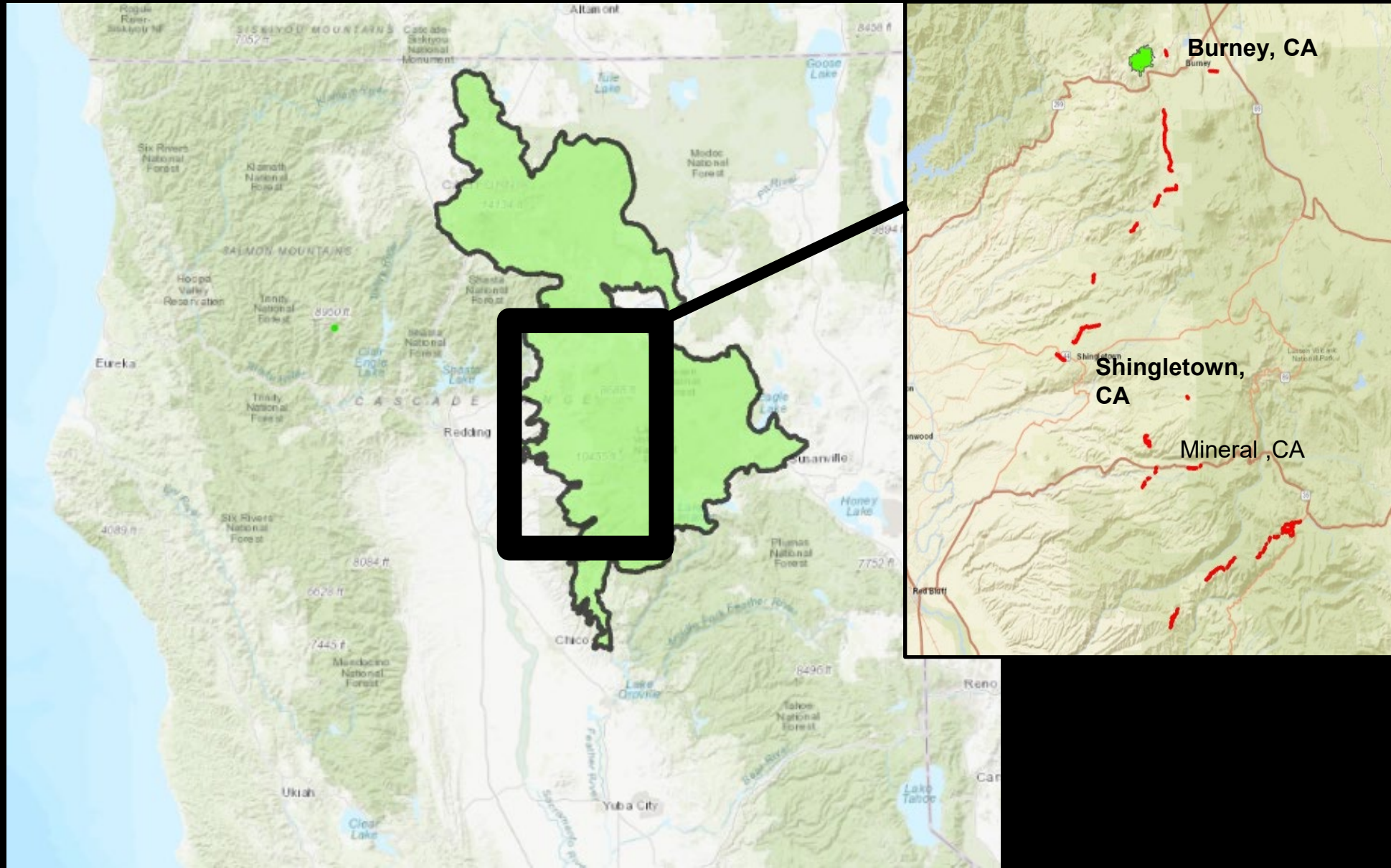
# Our study is evaluating bee communities and their key resources within shaded fuel breaks

## Hypothesis:

*Larger and more diverse bee communities occur in shaded fuel breaks relative to reference sites*



# We are working in the Cascades Ecoregion of northern CA



# Shaded fuel break treatment

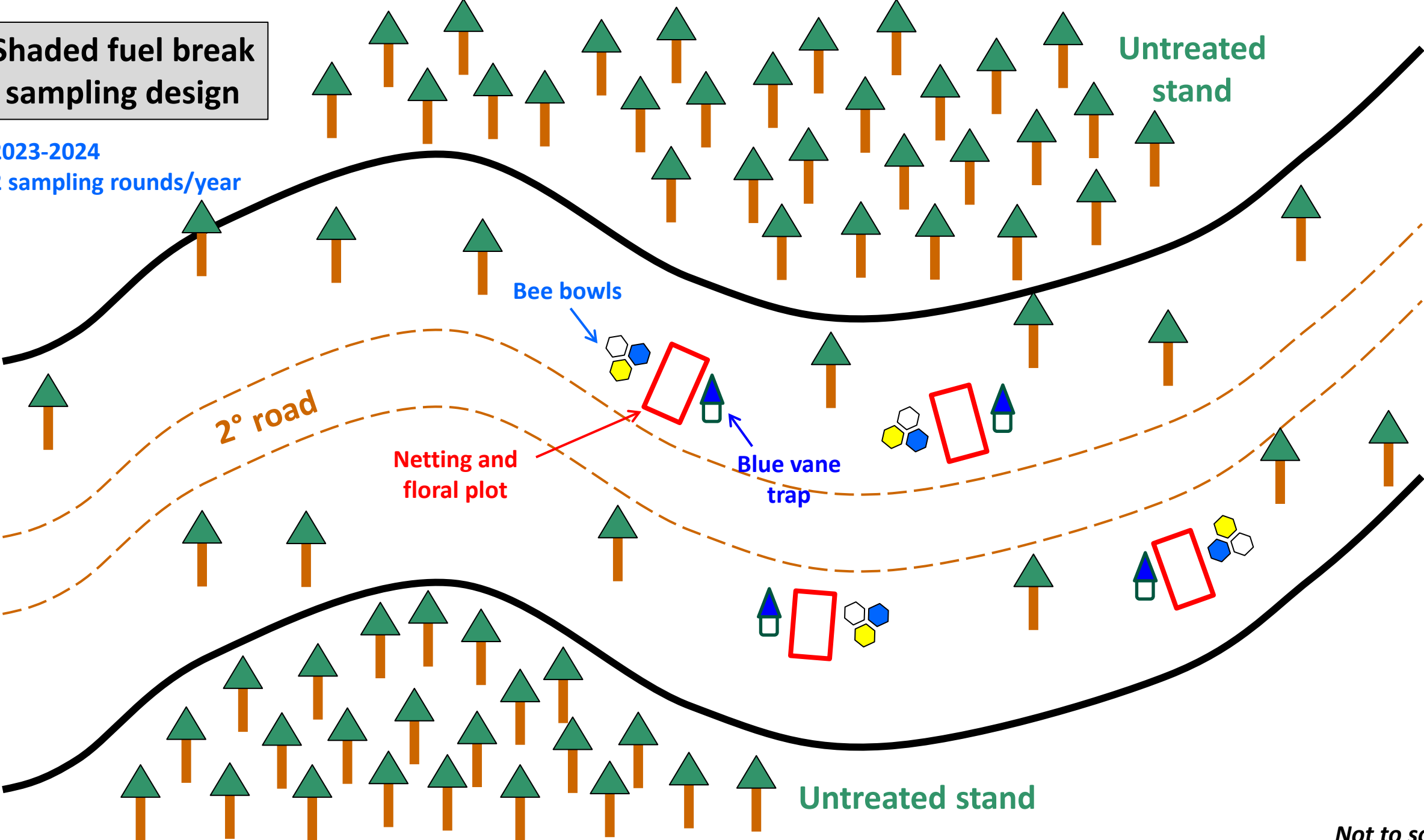


# Untreated reference



**Shaded fuel break  
sampling design**

2023-2024  
2 sampling rounds/year



*Not to scale!*

# We used passive traps and netting off flowers to characterize bee communities

Blue vane trap



Bee bowls



Netting insect from flowers



# Accomplishments from the 2023-24 field seasons

## Established 34 sampling sites

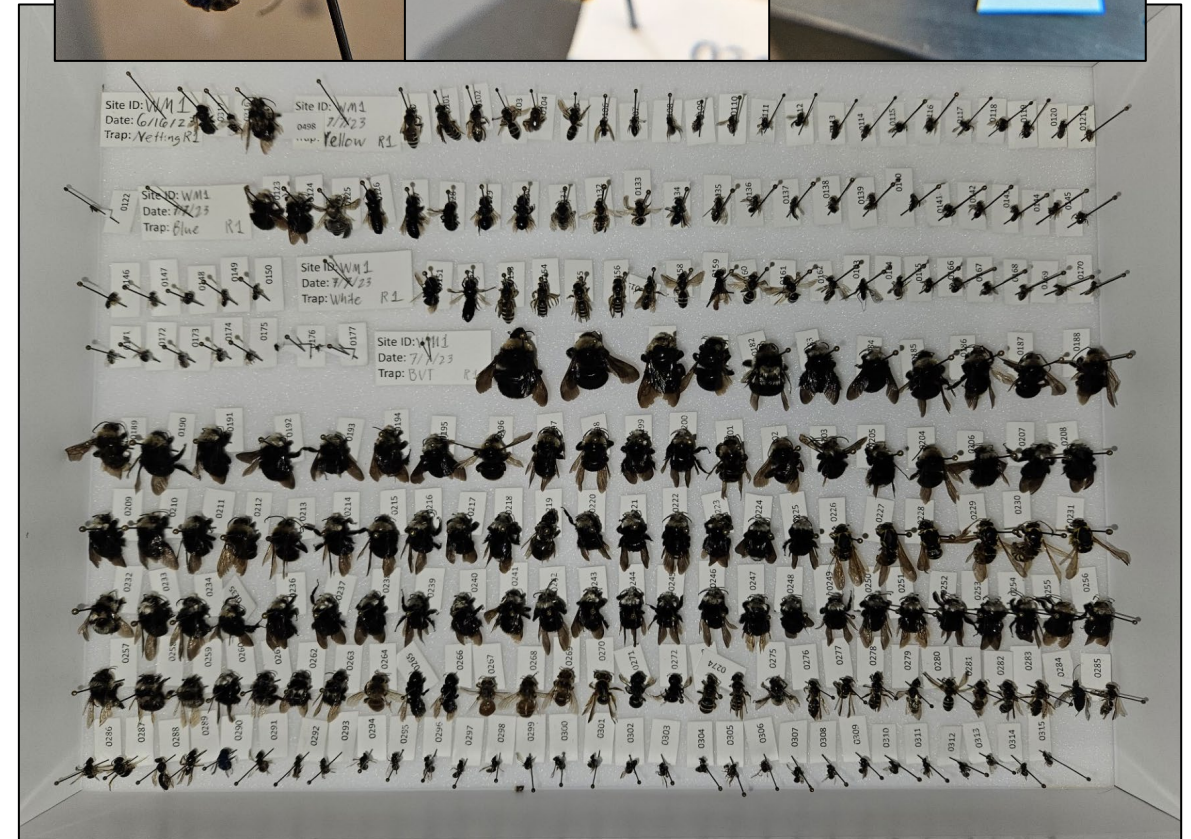
- 2023: 252 person-days in field
- 2024: 216 person-days in field

## Sampling extent

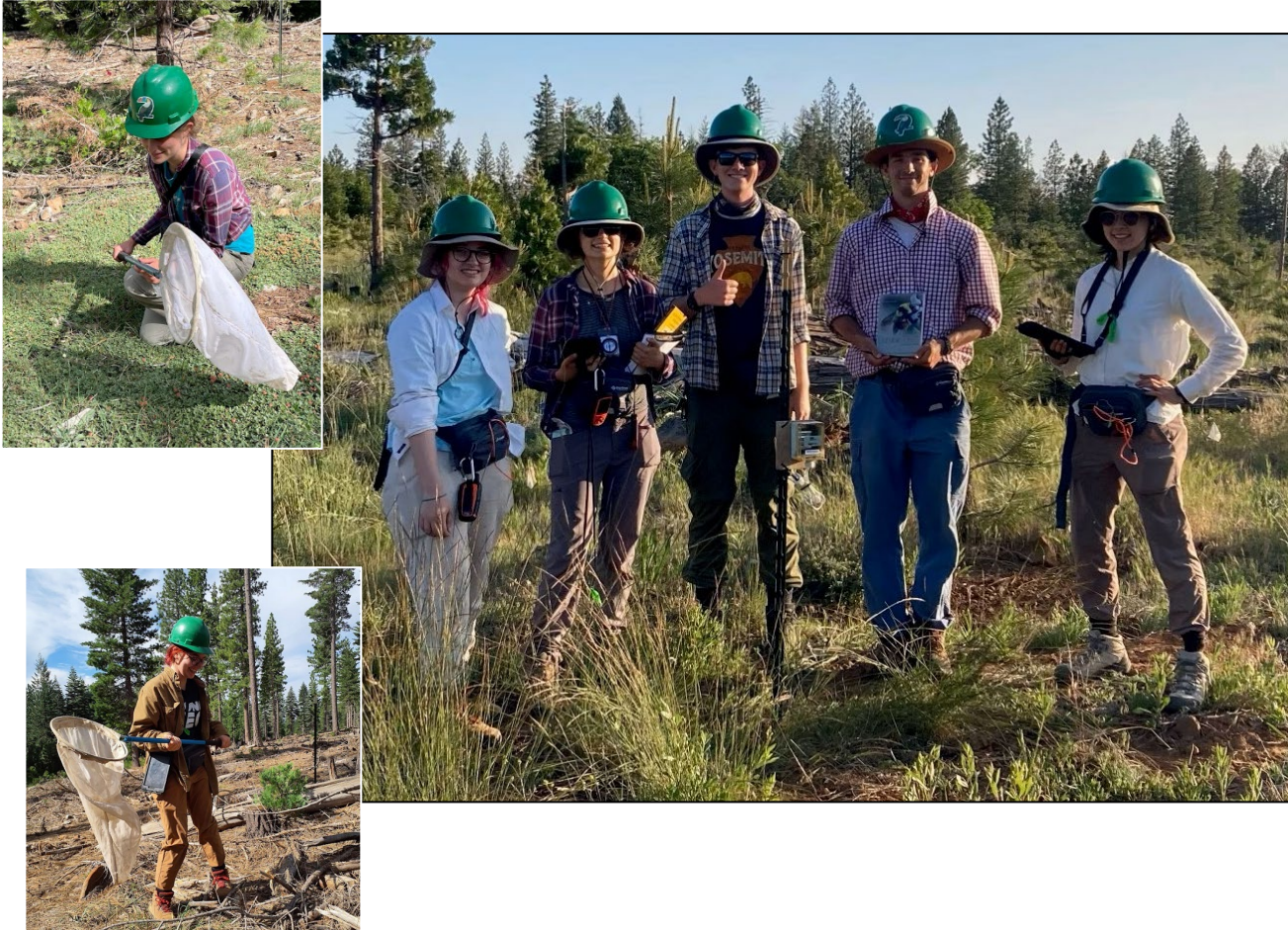
- 2 rounds of netting + floral resources
- 2 rounds of passive trapping
- site-scale vegetation measures

## Captured >20,500 bees, flies, and wasps!

- 13,844 specimens in 2023
- 6,678 specimens in 2024



# We have had 18 undergraduates and young professionals involved in our research



**Christoph Anderson**  
2024 CoF Mentored  
Employment Program



**Sophia Gutierrez**  
2024 OSU URSA-  
Engage Program



# We undertook field tours with stakeholders on 1-2 July 2024

Dustin Hixon from  
WM Beaty cleaning bees



Handout from field tour

## Evaluating native bee response to fuel-reduction treatments in managed conifer forests

### Project Objectives

- Quantify the native bee communities that use shaded fuel breaks and contrast them with bee communities in untreated reference areas.
- Evaluate the extent to which local floral resources and the time since treatment influence native bee communities in shaded fuel breaks.

### Background

- Nearly 90% of the world's flowering plants and 35% of agricultural crops benefit from animal pollinators, especially native bees.
- Forests are home to many native bee species, but our understanding of how forest management influences bee communities is still in its infancy.
- Given the expanding footprint of wildfire in western North America, quantifying how bee communities respond to fuel-reduction treatments has become a research priority.



*Insect pollinators – such as this native long-horned bee – are a critical element of biodiversity and provide key ecosystem functions, ultimately providing hundreds of billions in ecosystem services annually across the globe.*

### Approach and Preliminary Findings


- We are sampling 26 shaded fuel break sites and 8 reference sites during the 2023-2024 bee flight seasons.
- We use passive traps and netting off flowers to quantify bee diversity, and we measure floral resources and habitat characteristics as study covariates.
- In 2023 alone we captured nearly 14,000 insect specimens, the majority of which were native bees. We captured > 4.3x more specimens, on average, in shaded fuel break sites relative to reference sites.
- Formal specimen identification will take place in fall 2024, yet preliminary observations indicate a wide diversity of bee families, genera, and species are present.



*Bumble bees (Bombus spp.) are often found in managed forests, and they were one of the more abundant groups that were captured within shaded fuel break sites in our study.*

# We've been sharing our findings via scientific conferences and outreach presentations


## 2024 Western Forestry Graduate Research Symposium

 Oregon State University  
College of Forestry

### Do fuel-reduction treatments in managed forests affect native bee communities?

Megan Sampognaro<sup>1</sup>, Katie Moriarty<sup>2</sup>, Jake Verschuyt<sup>2</sup>, James W. Rivers<sup>1</sup>

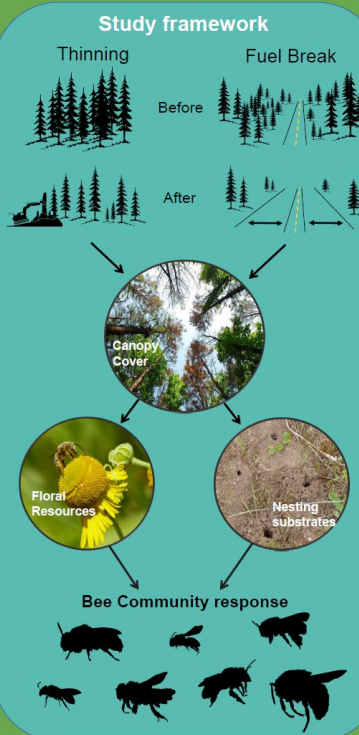
<sup>1</sup> Oregon State University: Forest Engineering, Resources and Management ; <sup>2</sup> National Council for Air and Stream Improvement

 Oregon State University  
College of Forestry

#### Background

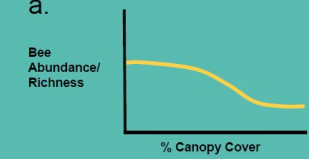
- ❖ Native bees are vital to food security and biodiversity. Many species are in decline due to a range of threats.
- ❖ Severe wildfires have increased in the western U.S. over the past several decades.
- ❖ Fuel reduction techniques are used to lessen the effects of wildfire and mitigate timber loss.
- ❖ The effect of fuel reduction treatments on bees and factors affecting bees is unknown.
- ❖ **Importance:** As large fires become more frequent and fuel reduction treatments expand, this work will provide a framework for land managers to consider native bee communities in future fuel management decisions.

#### Study framework

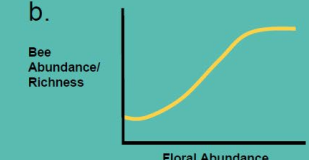


#### Predicted Results

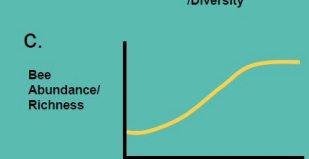
a.



b.



c.



**Hypotheses:** We predict that treatments with:


- a. Less canopy cover
- b. More floral resources
- c. More nesting resources

will increase native bee abundance and diversity.

#### Methods


- ❖ Summer of 2023 and 2024
- ❖ Sampling of bee communities, floral and resources (3 rounds per year)

Passive




Blue Vane Traps

Active




Pan Traps  
Netting


Thanks to our collaborators:





Thanks to our funder:

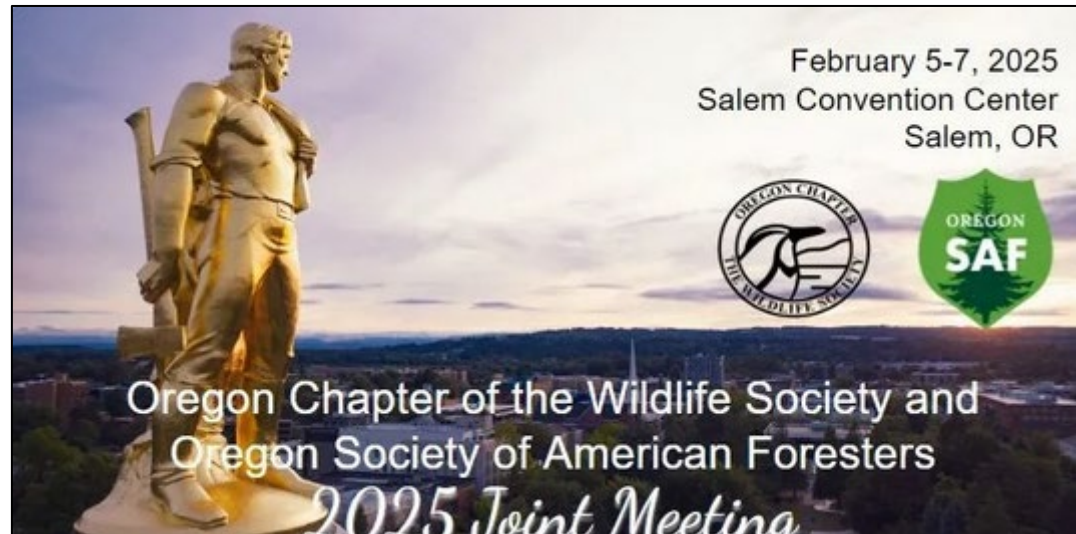


**Tribal Nations Acknowledgment:** We recognize we work on land that belonged to the Tribal Nations of Modoc, Pit River, Achumawi, Maintain Maidu, Yana, Cayuse, Umatilla, Walla Walla, Northern Wintu, and others who managed this land using prescribed fire until their genocide and forcible removal by the state of California. We aspire to help heal damage done by settler colonialism by honoring Tribal Sovereignty Rights, and taking our work beyond the land acknowledgment. A map of Tribal Nations (and their websites) in our study area can be found by scanning the QR code.



February 5-7, 2025  
Salem Convention Center  
Salem, OR



Oregon Chapter of the Wildlife Society and  
Oregon Society of American Foresters  
*2025 Joint Meeting*

# Project timeline and next steps

Activity	2024	2025			
	W	Sp	Su	F	W
Final specimen prep and identification					
Data analysis and thesis writing					
ORTWS-OSAF conference presentation					
WFGRS conference presentation					
Megan Sampognaro M.S. defense					
Project update to CalFire EMC					
Final report to CalFire EMC					
Submission of journal articles					
Additional conference presentations					



# Forest Practice Regulations and Critical Monitoring Questions being addressed in our study

Theme	FPRs	Article	Critical Monitoring Questions
<b>6. Wildfire Hazard</b>	14 CCR § 1038, 1051.4, 1052.4	Article 2. Timber Harvesting Plan	Are the FPRs and associated regulations effective in...  (b) treating post-harvest slash and retaining wildlife habitat structures, including snags and large woody debris?  (c) managing fuel loads, vegetation patterns and fuel breaks for fire hazard reduction?
	14 CCR § 913.4 [933.4, 953.4]	Article 3. Special Prescriptions	
	14 CCR § 917 (937, 957)	Article 7. Hazard Reduction	
<b>9. Wildlife Habitat: Cumulative Impacts</b>	14 CCR § 919, 939, 959	Article 9. Wildlife Protection Practices	Are the FPRs and associated regulations effective in...  (a) characterizing and describing terrestrial wildlife habitat and ecological processes?  (b) avoiding significant adverse impacts to terrestrial wildlife species?