

# Replacing non-native grasses with herbaceous native plants to reduce ignition potential of fuel breaks and roadsides

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# Acknowledgements

## Thesis Committee

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- Hilary Young

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## Lab Mates

- Randy Long
- Joanna Tang
- Stephanie Ma
- Shane Dewees
- Maddie Nolan
- Laura Drake-Schultheis

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Highly Disturbed Areas -> invaded by non-native plants

Become annual grasslands....



Fuel Breaks



Road Sides

# Contribution of invasive annual grasses to fires?

- Easily ignitable fuel
- Increase fuel continuity
- Expand the fire season

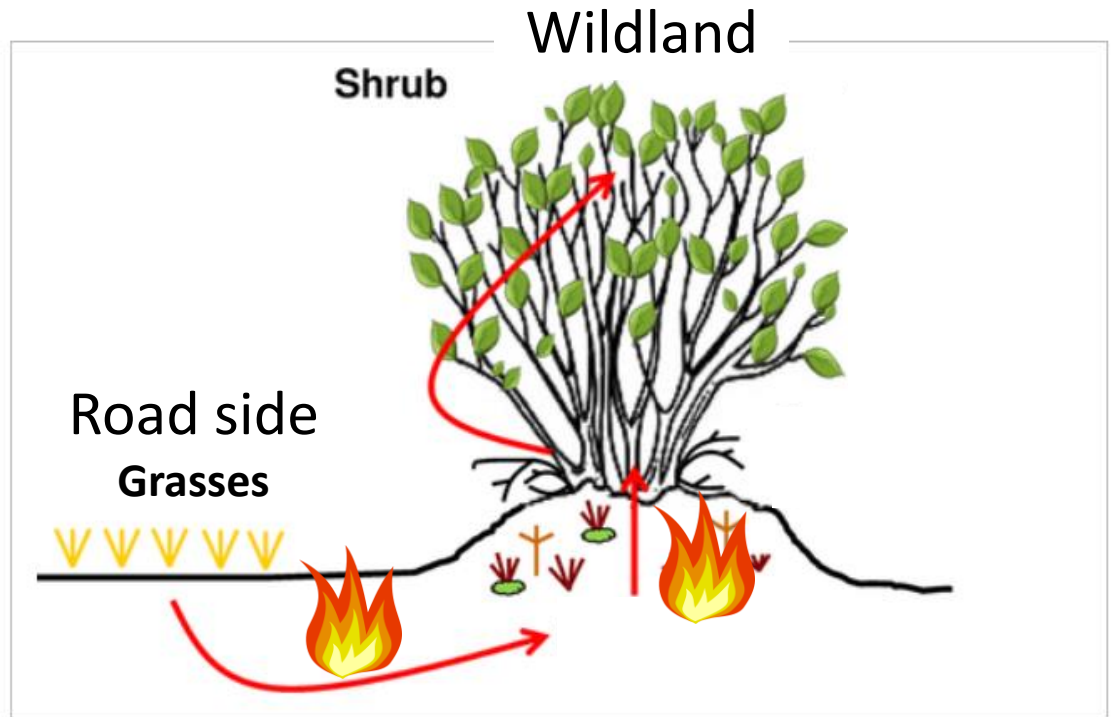
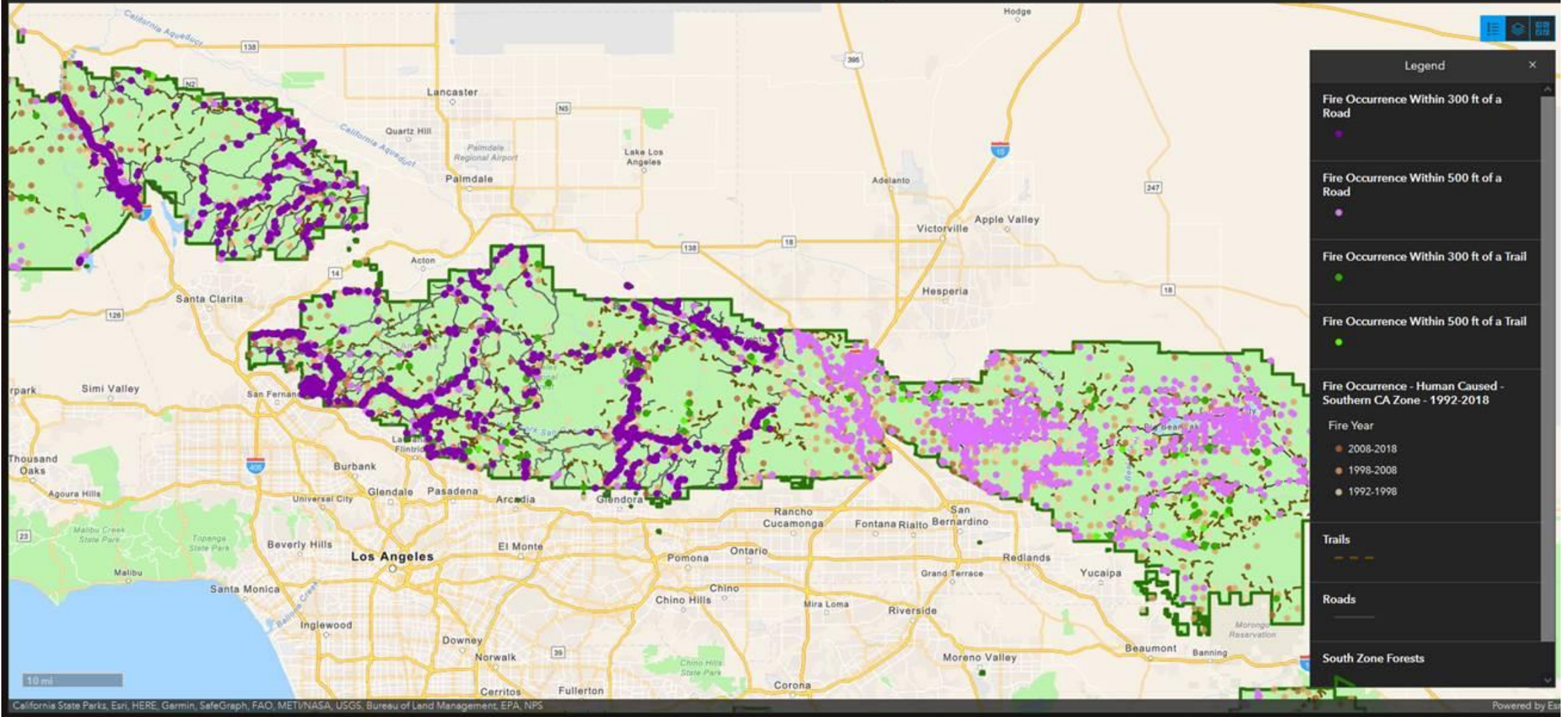


Figure is modified from:

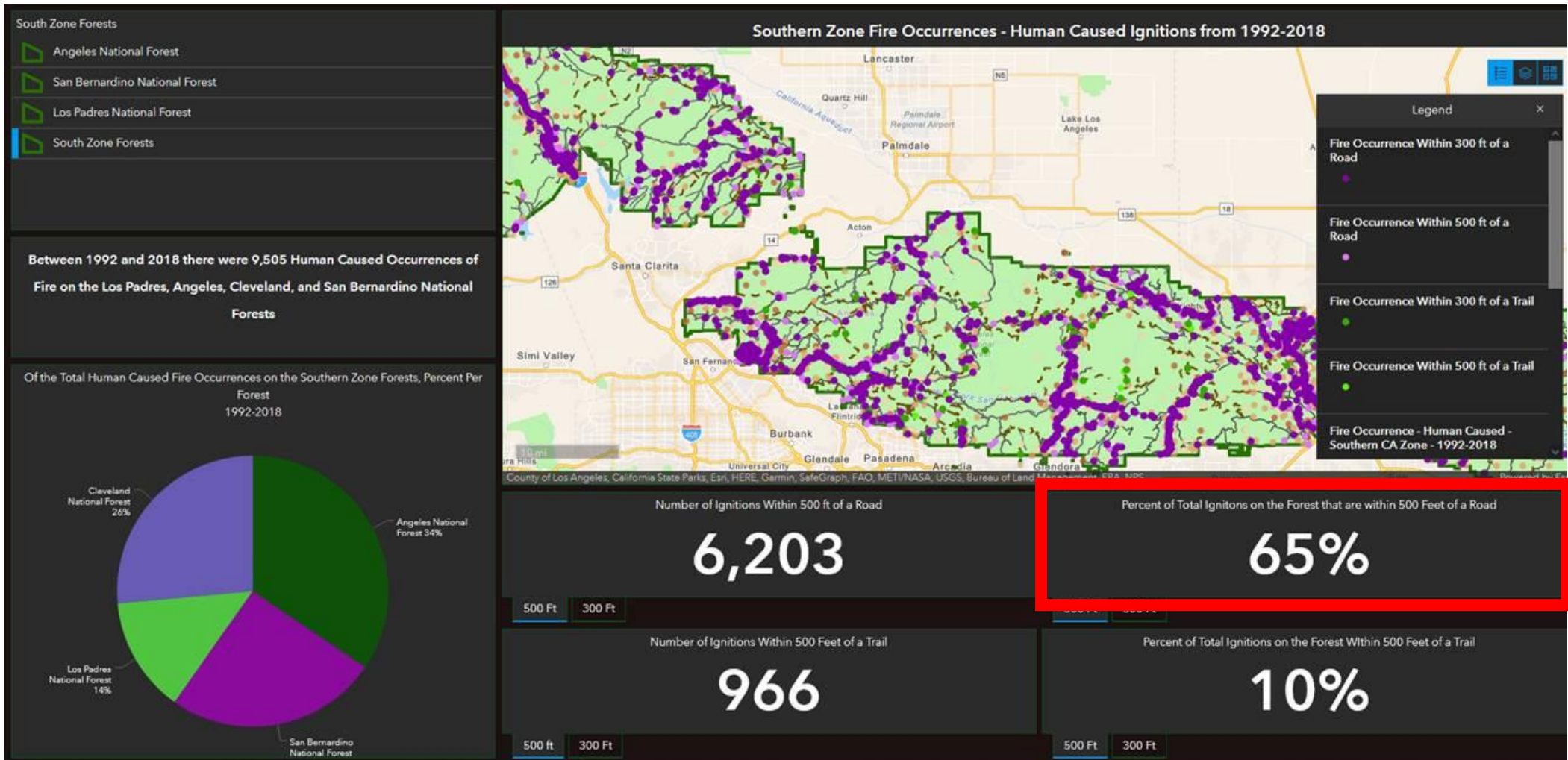
*Spreaders, igniters, and burning shrubs: plant flammability explains novel fire dynamics in grass-invaded deserts*

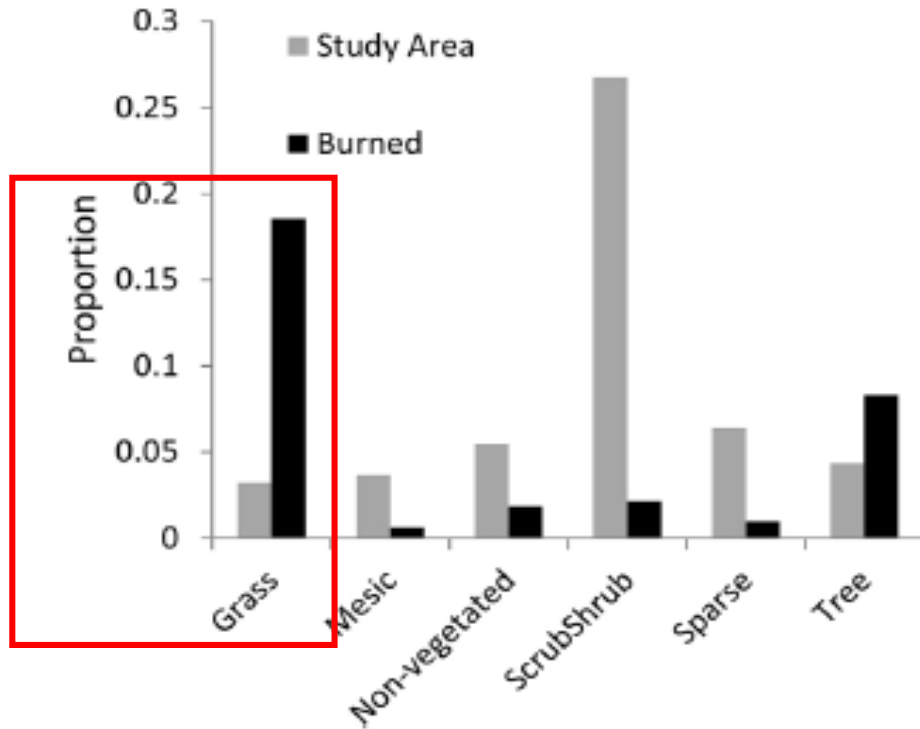
Andres Fuentes-Ramirez, Joseph W. Veldman, Claus Holzapfel, Kirk A. Moloney. 2016.

### Southern Zone Fire Occurrences - Human Caused Ignitions from 1992-2018

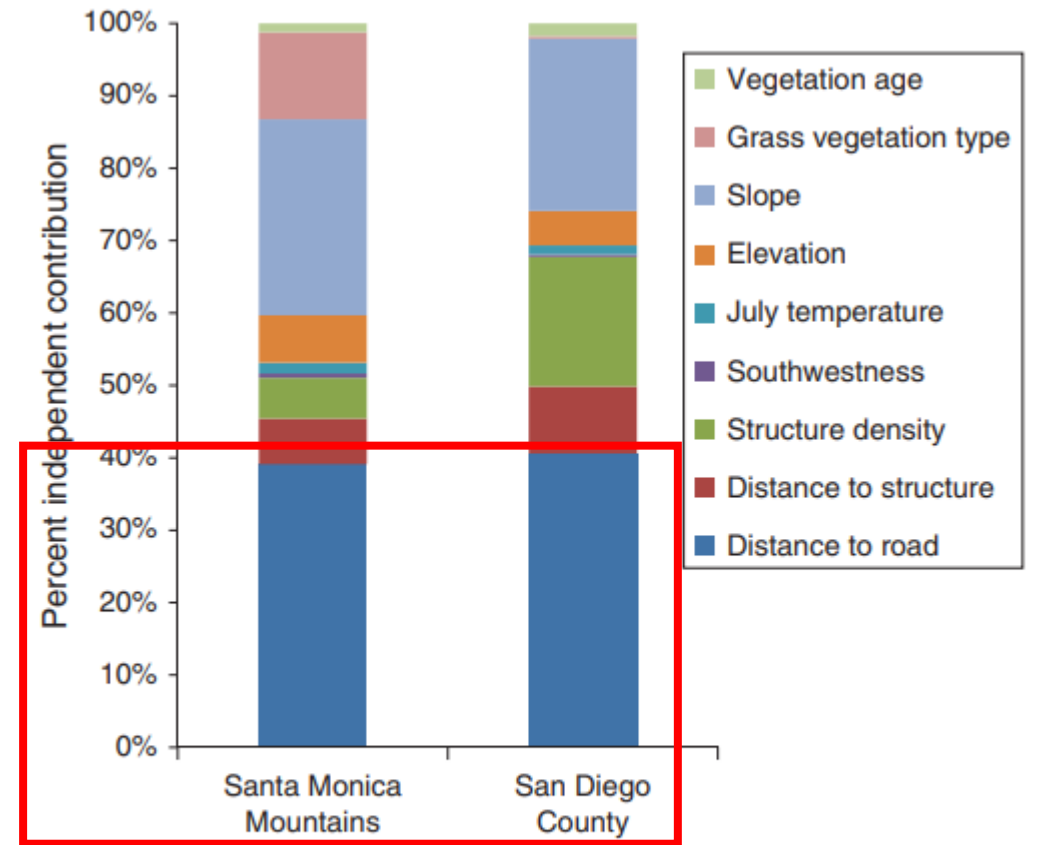


Provided by USFS, Forest Ignitions Data





**Fig. 5.** Proportion of cover class in the study area and proportion of cover class burned by fire at least once from 1970 to 2010 in the Desert Renewable Energy Conservation Plan (DRECP) study region.



**Fig. 4.** Percent independent contribution of variables in hierarchical partitioning models explaining patterns of all ignitions in the Santa Monica Mountains and San Diego County.



**Grass dominated  
and flammable**



**Use native species  
to  
reduce wildfire risk**



# Desirable Fuel Characteristics?

## Traits Influence Plant Flammability

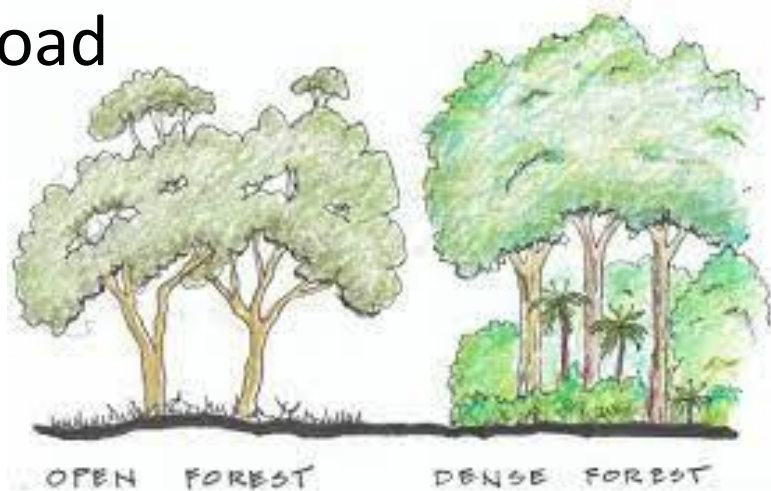
- High live fuel moisture content



- Produces less litter



- Smaller fuel load





## Central Question--How do native and non-native plants differ?

- Fuel (fire) characteristics and ecological traits



# Restoration Project

- Los Padres National Forest
- Santa Barbara, CA
- 108, 1.25m x 1.25m plots





### **Outplanted “Bunch grassland”**

- **Perennial grasses + forbs**



### **Seeded “Annual wildflowers”**

- **Annual forbs and small blubs**

## **Current Vegetation “Control”**

- **Annual grasses**
- **Mustard**
- **YST**



# Measurements

- Preliminary results, 2020-2023

## Fuel / Fire

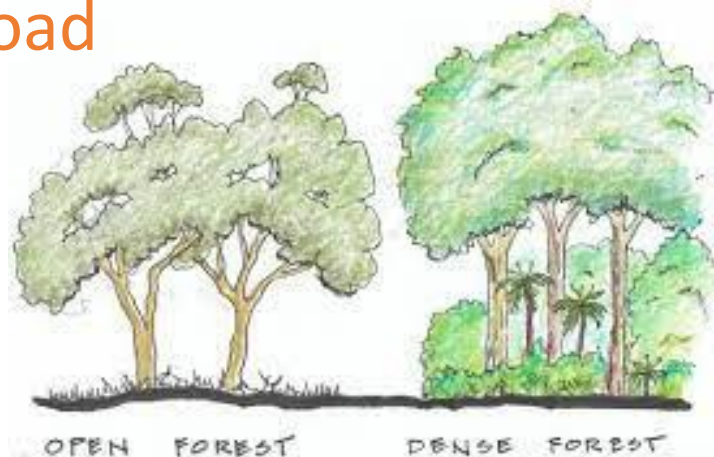
- Live fuel moisture



- Litter depth and cover



- Fuel load

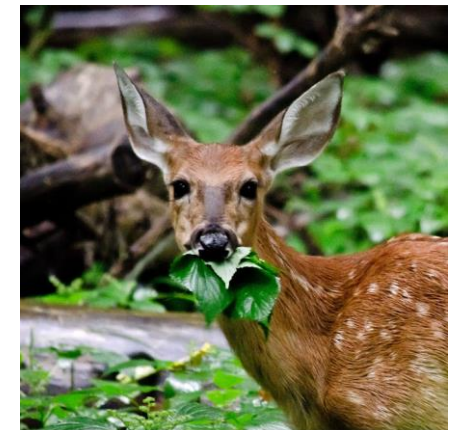


## Ecological

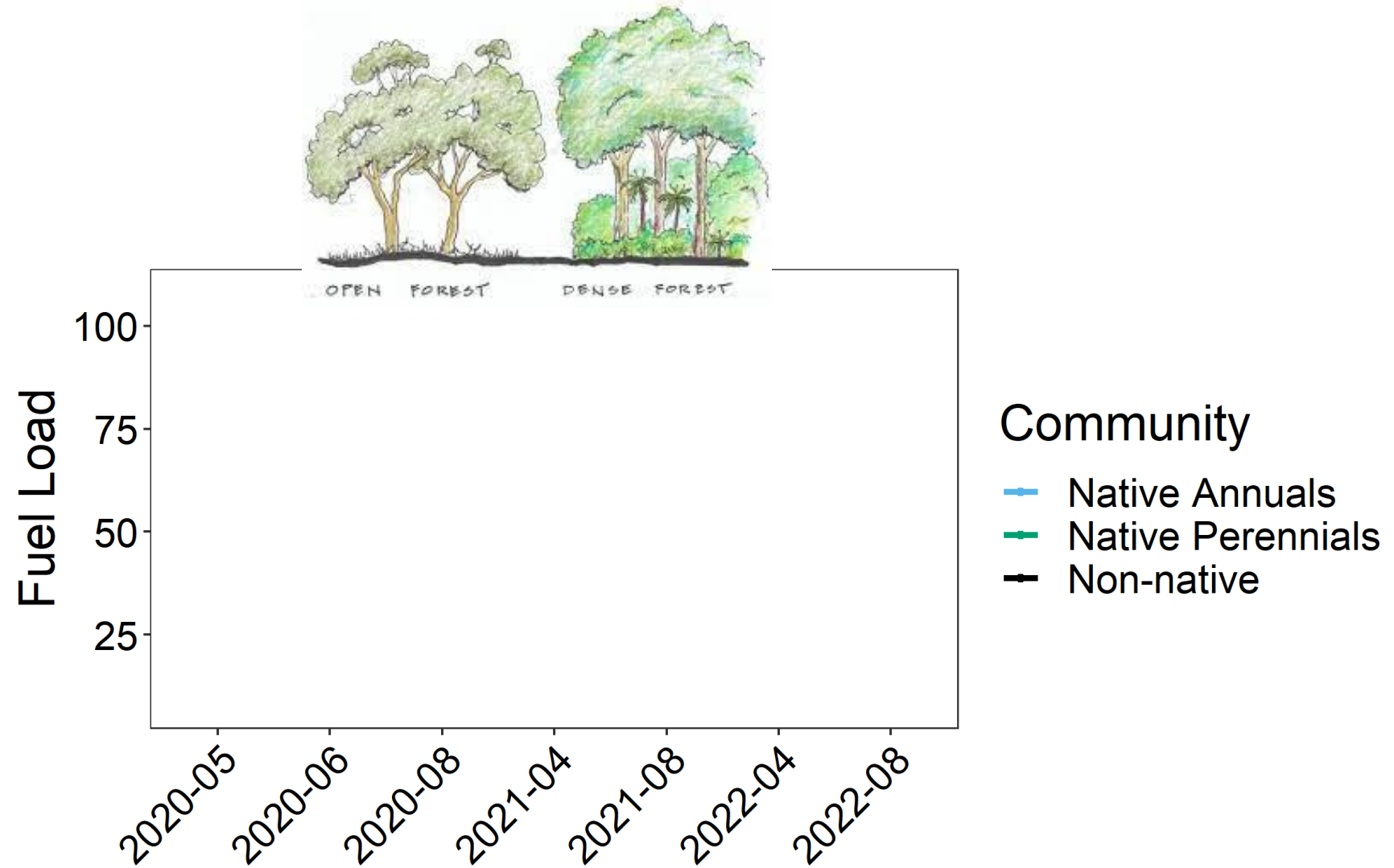
- Floral availability  
And diversity



- Herbivory?



# Fuel / Fire Traits

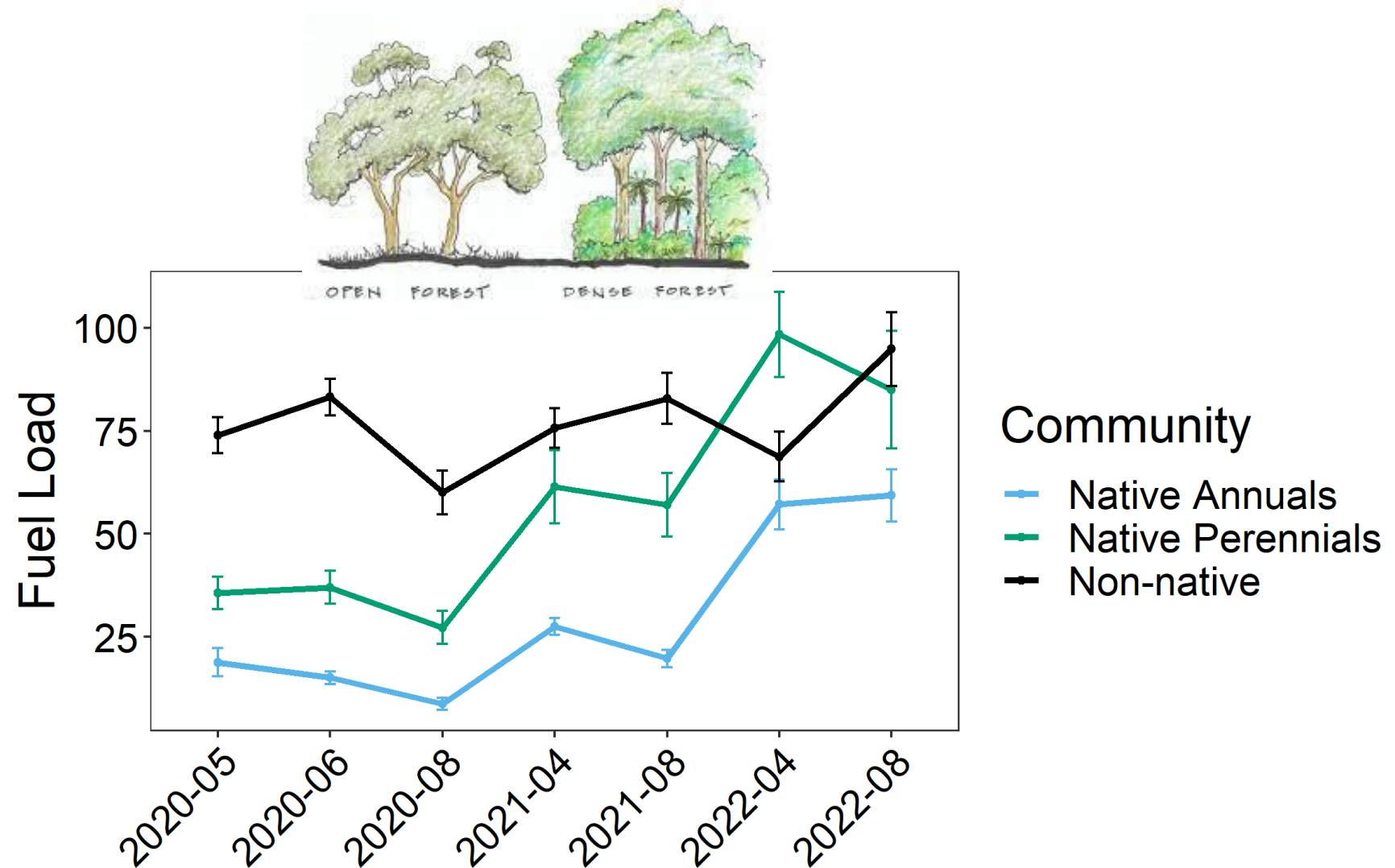


# Fuel / Fire Traits

## Summary:

By three years,

- **Native perennials and non-natives** were **EQUAL** in fuel load

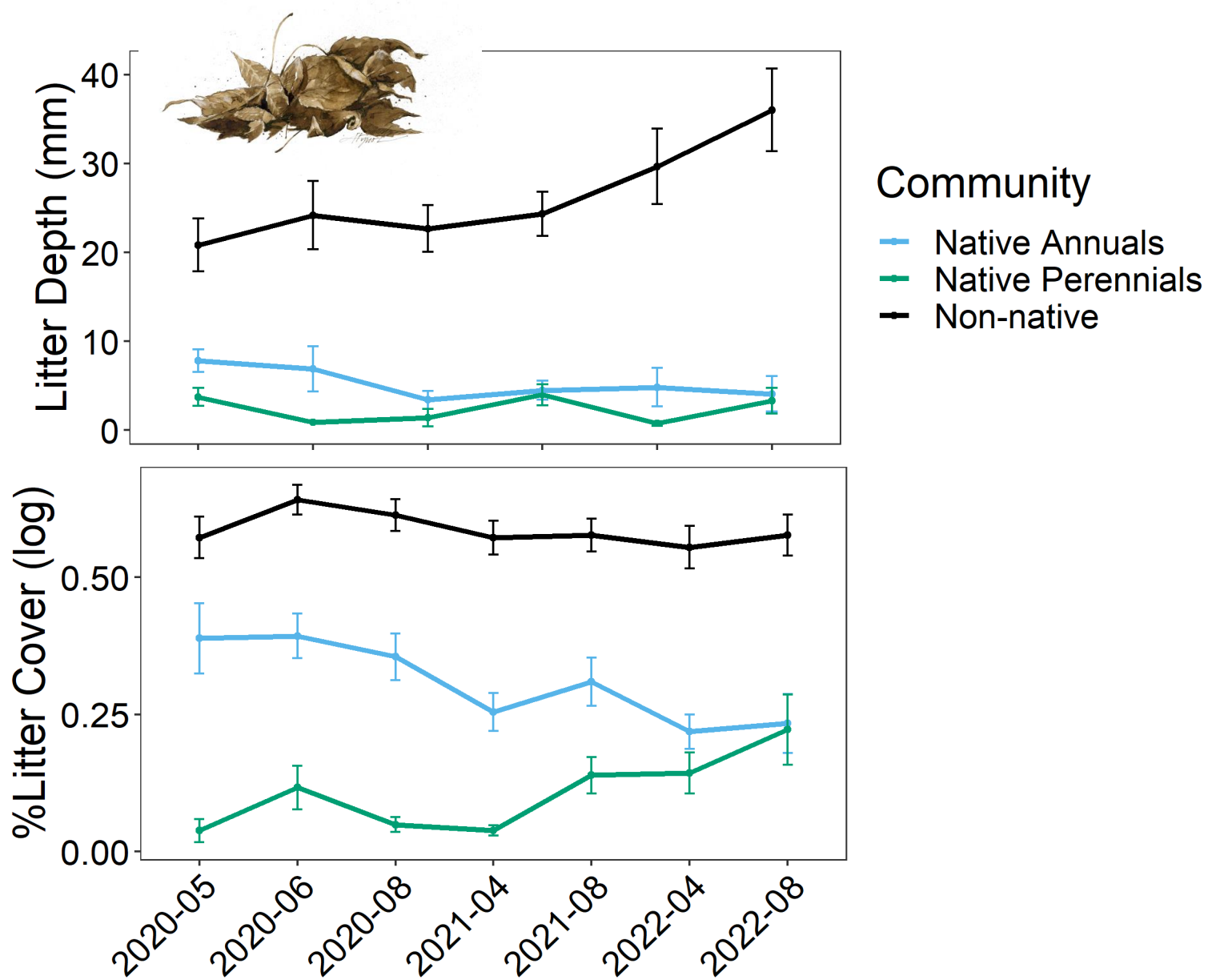




## Summary:

For **ALL** three years,

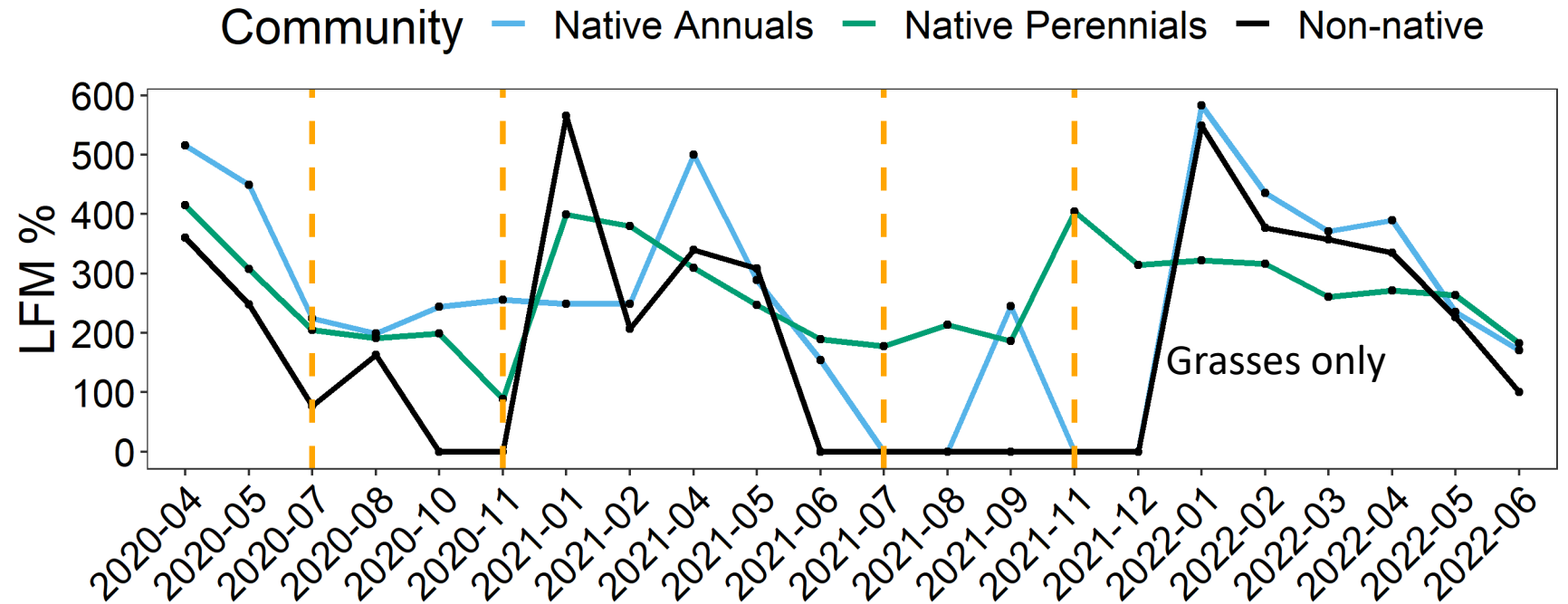
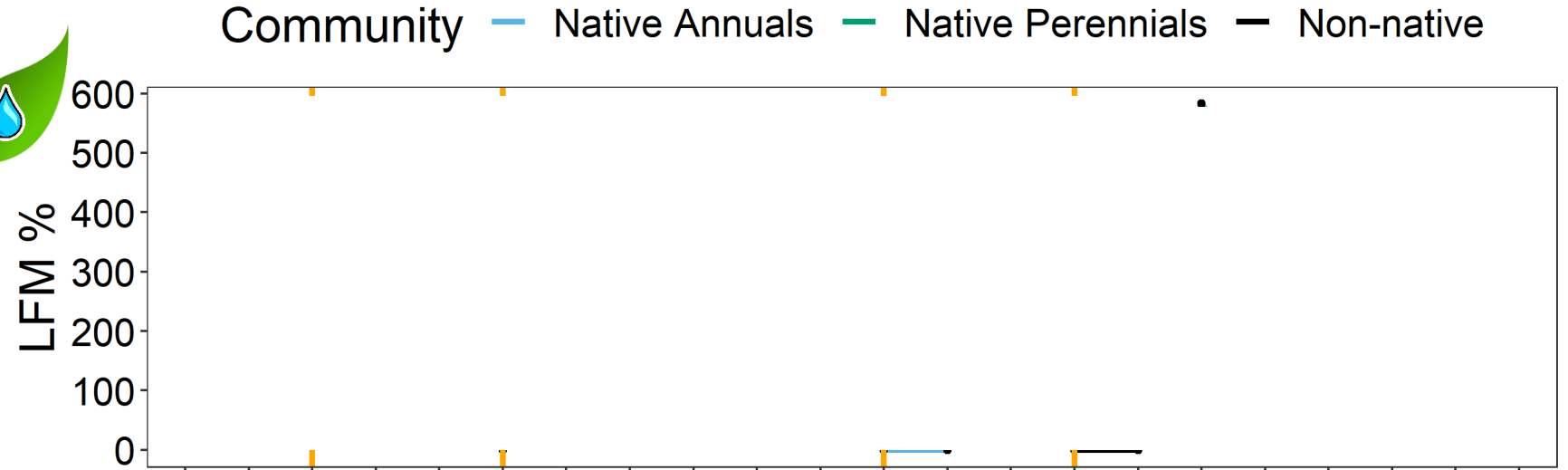
- **Non-native species, most litter cover and depth**
- Litter depth **did NOT** change for native communities



# Summary:



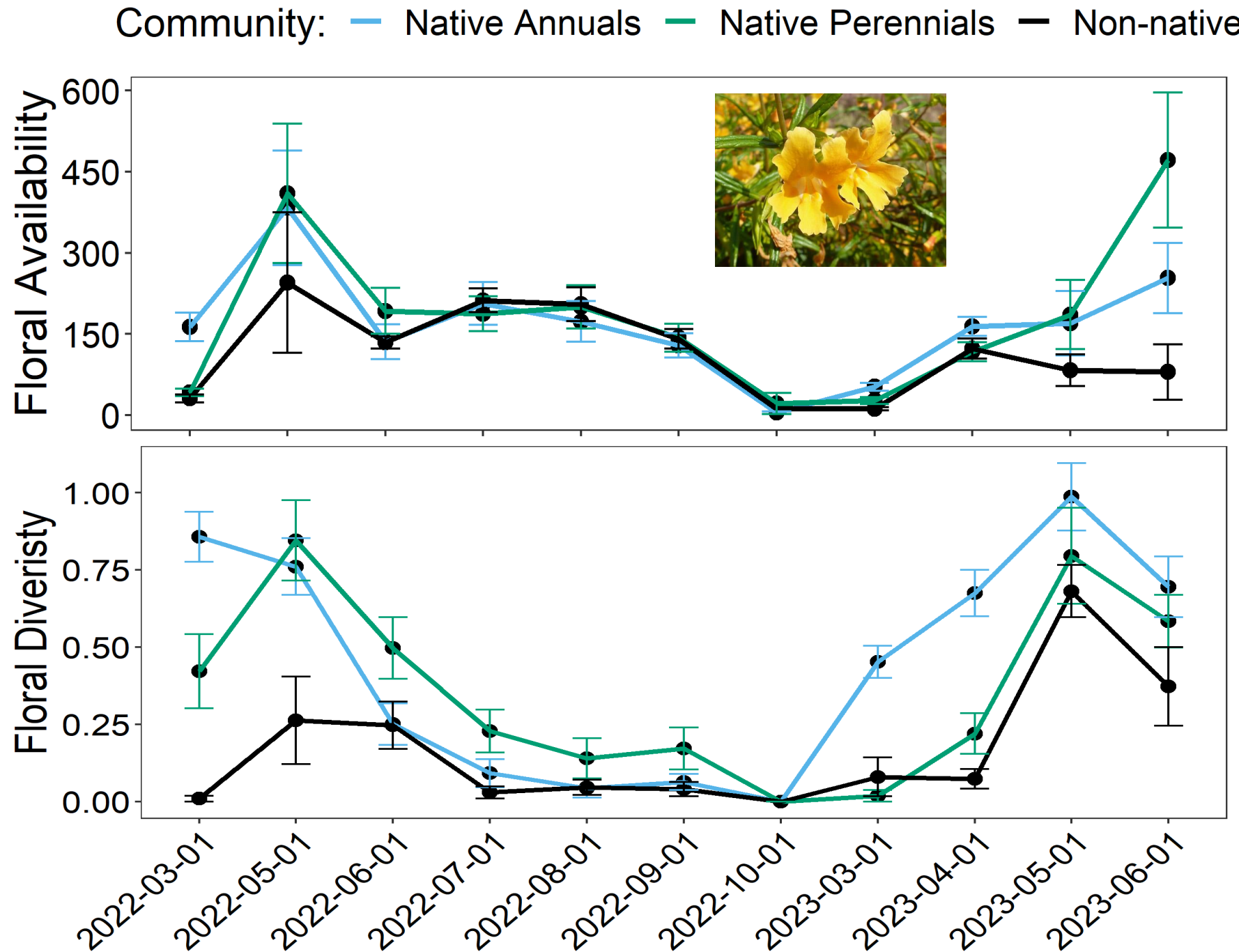
- LFM- driven by species phenology, summer drought
- **Native communities** retain LFM for longer over summer
  - **6 months!**



# Ecological Benefits

## Summary:

- **Native communities, more flowers** in spring and **greater diversity** year round
- Non-native communities had one dominant species

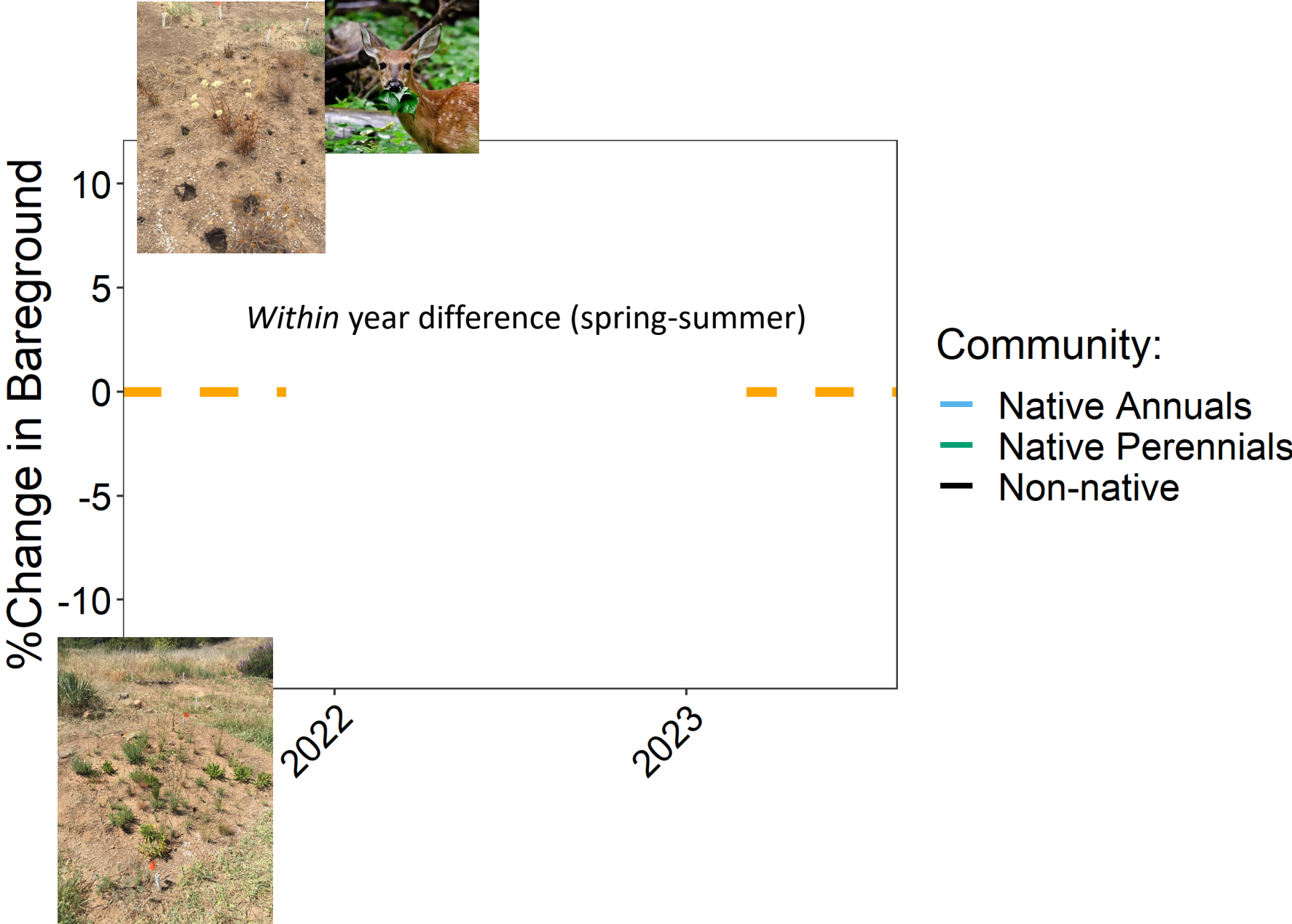


**FEBURARY**

**JUNE**



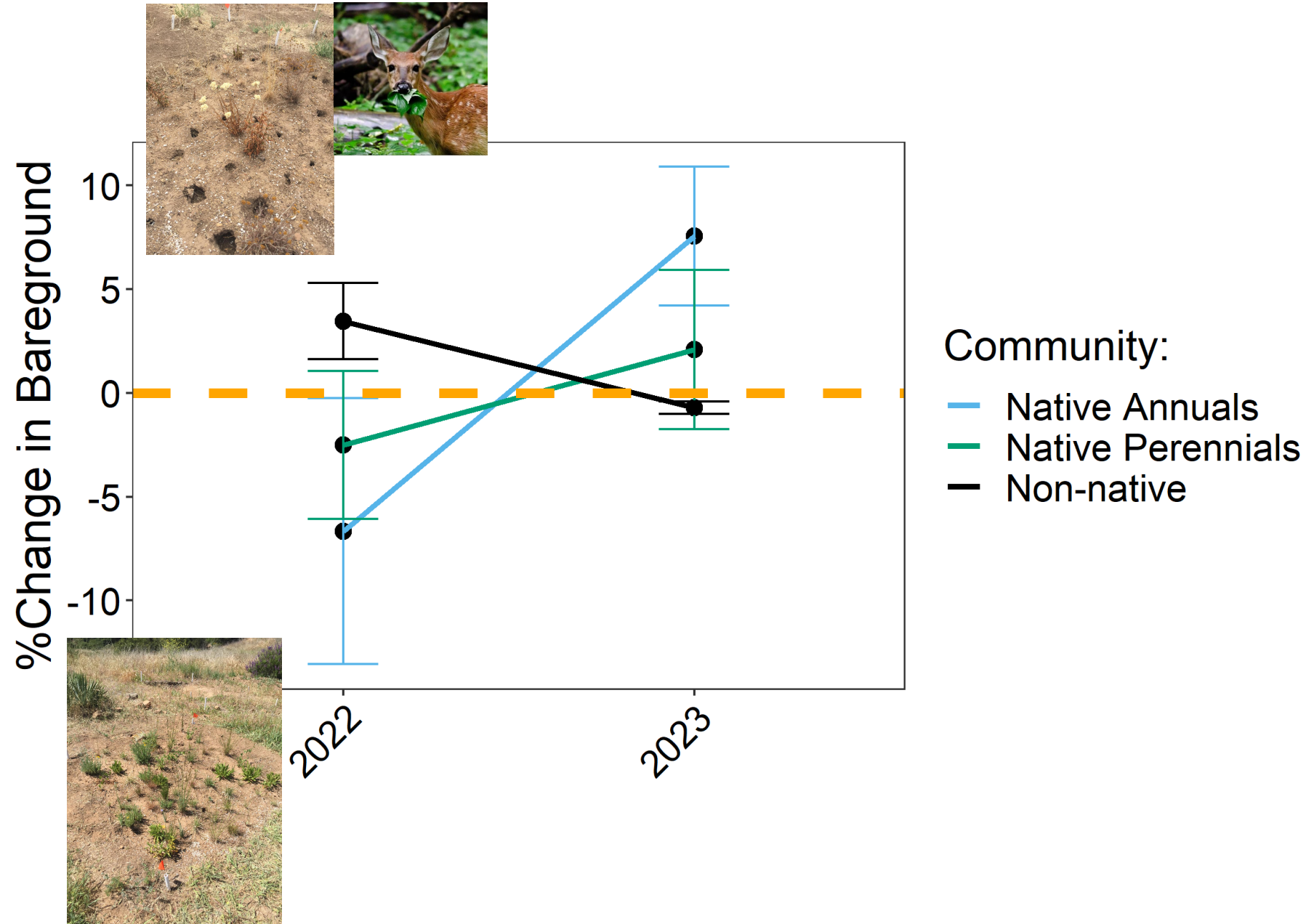
# Ecological Benefits



# Ecological Benefits

## Summary:

- **Native communities** had more deer/gopher herbivory and disturbance



# Central Question--How do native and non-native plants differ?

- Fuel (fire) characteristics and ecological traits

## RESULT

### Native

vs

### Non-native

- ✓ High summer LFM
- ✓ Less Litter

Low/dead  
Lots of litter

--Equal fuel load--

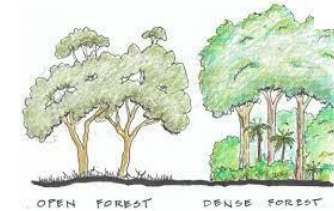
- ✓ Greater availability/diversity
- ✓ More evidence of use

Single species  
Use decreased

## TRAITS

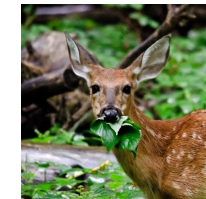
### Fuel / Fire

- Fuel moisture content
- Litter depth and Cover
- Fuel load



### Ecological

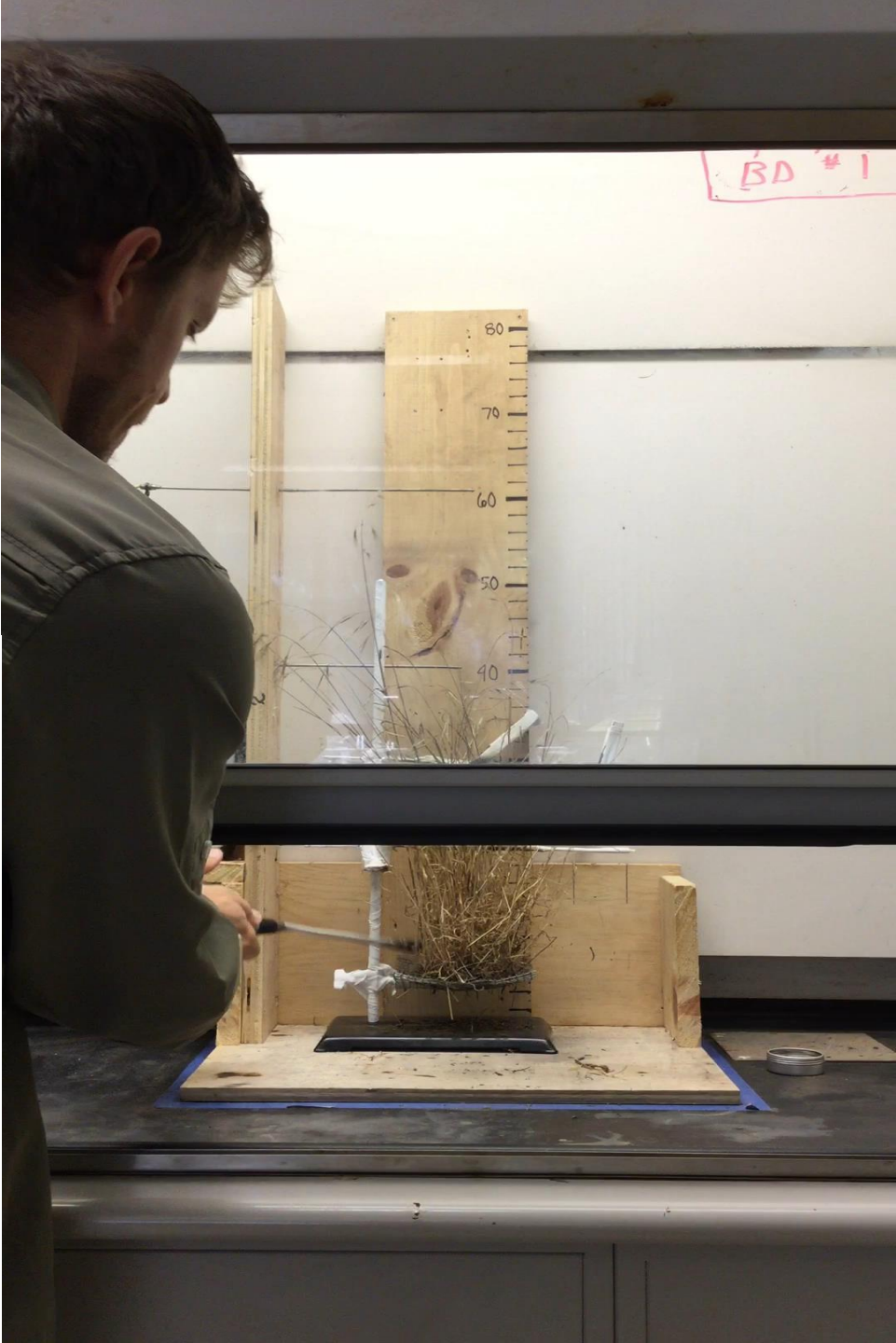
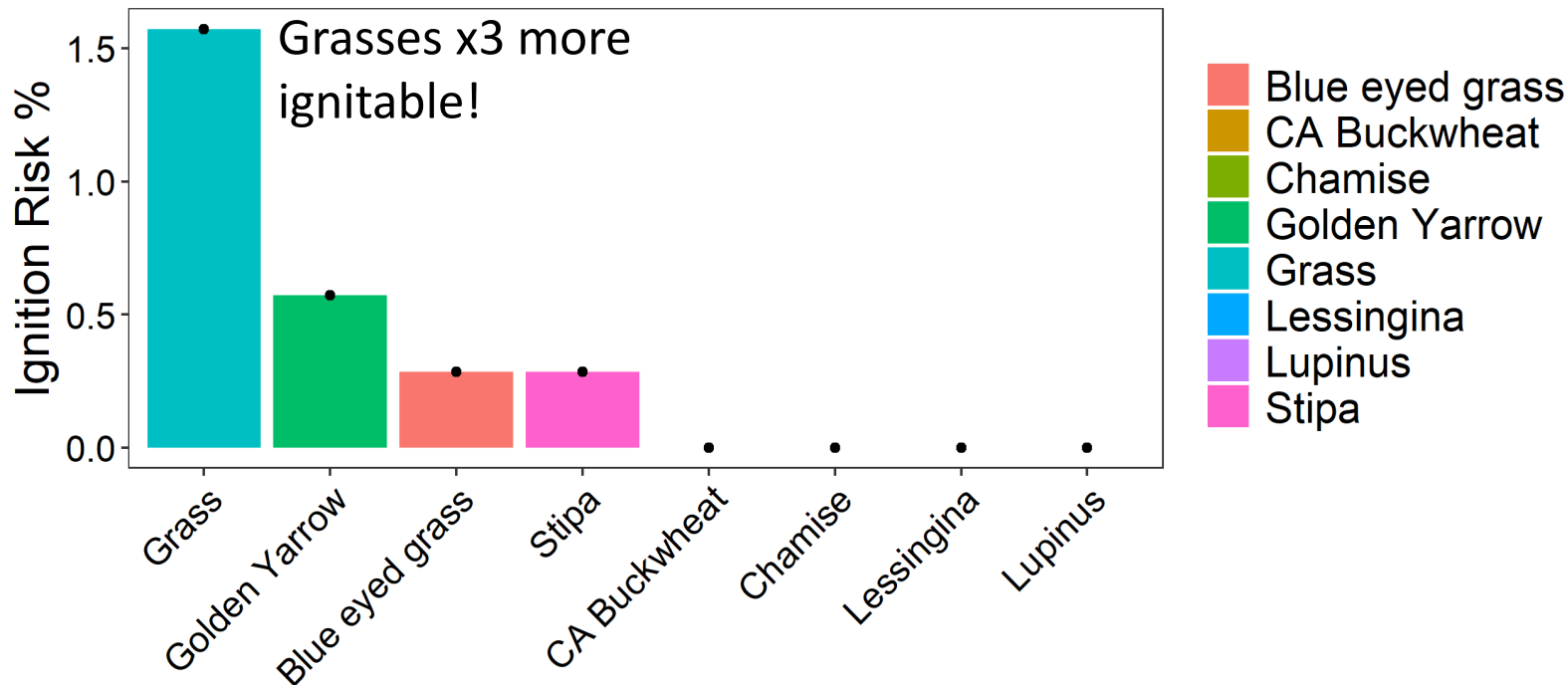
- Pollinator services
- Forage



# Bonus Data!

Are they actually less ignitable?

- Take plants into the lab
- Hot metal balls (975°C) and torches
- Measure ignition!





# Central Question--How do native and non-native plants differ?

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## Conclusions:

- Significant **benefits for reducing fire hazard** and **increasing desirable ecosystem services** by using **herbaceous native species**.
- **Implications-** managers should **prioritize greatly limiting** the amount of **annual non-native grasses** in high risk ignition areas.

**'Win Win' scenario for managers and ecologists!**