



INTEGRATED PEST MANAGEMENT (IPM) TO CONTROL INVASIVE PLANT SPECIES IN A CA VERNAL POOL- GRASSLAND COMPLEX

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Acknowledgements



INVASIVE PLANT SPECIES OVERVIEW

- Decrease native plant biodiversity
- Negatively impacts ecosystem functions
- Habitat modification
- Increase frequency & severity of natural disturbances
 - *Drought*
 - *Wildfire*



How can we mitigate invasive plant impacts?

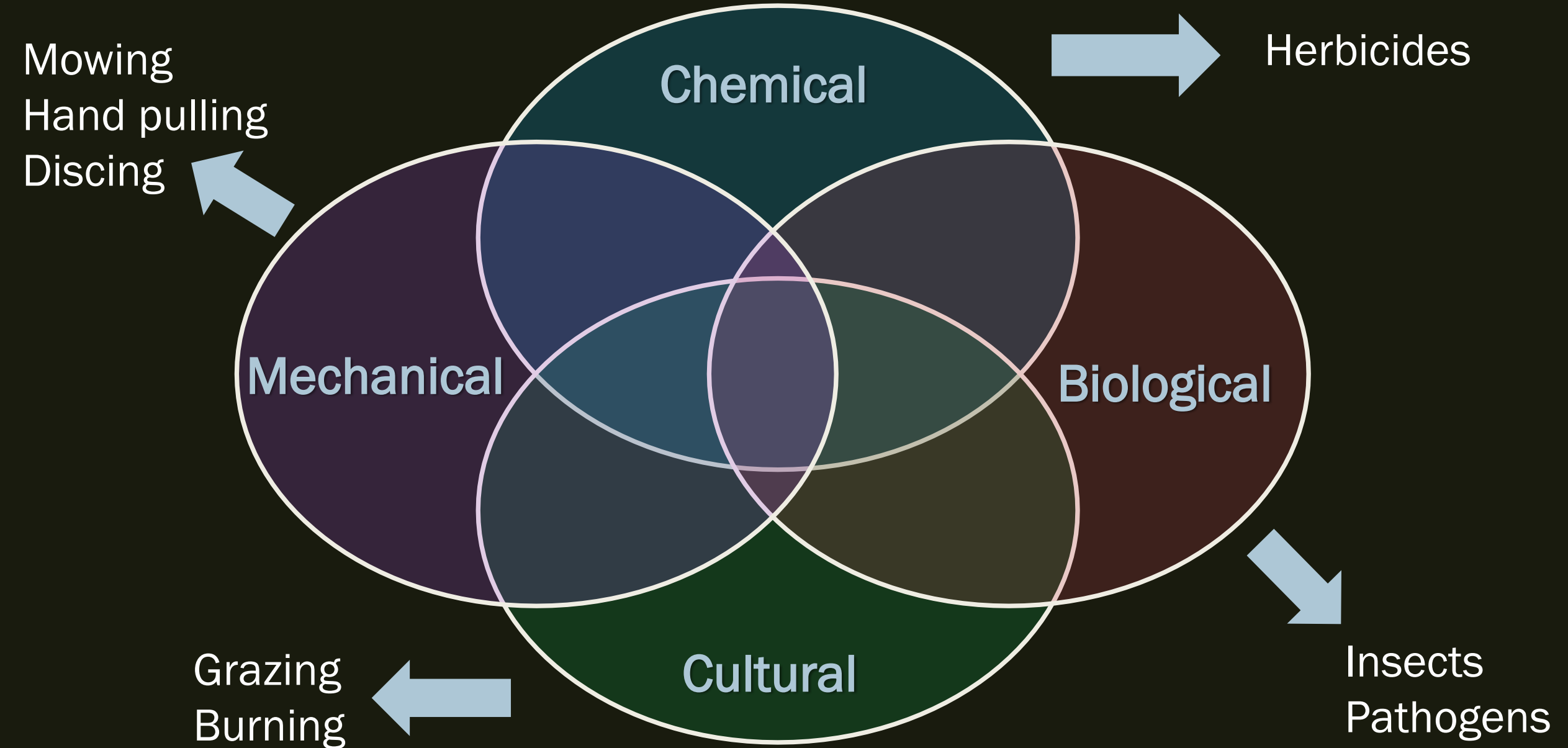


Invasive dominated landscape

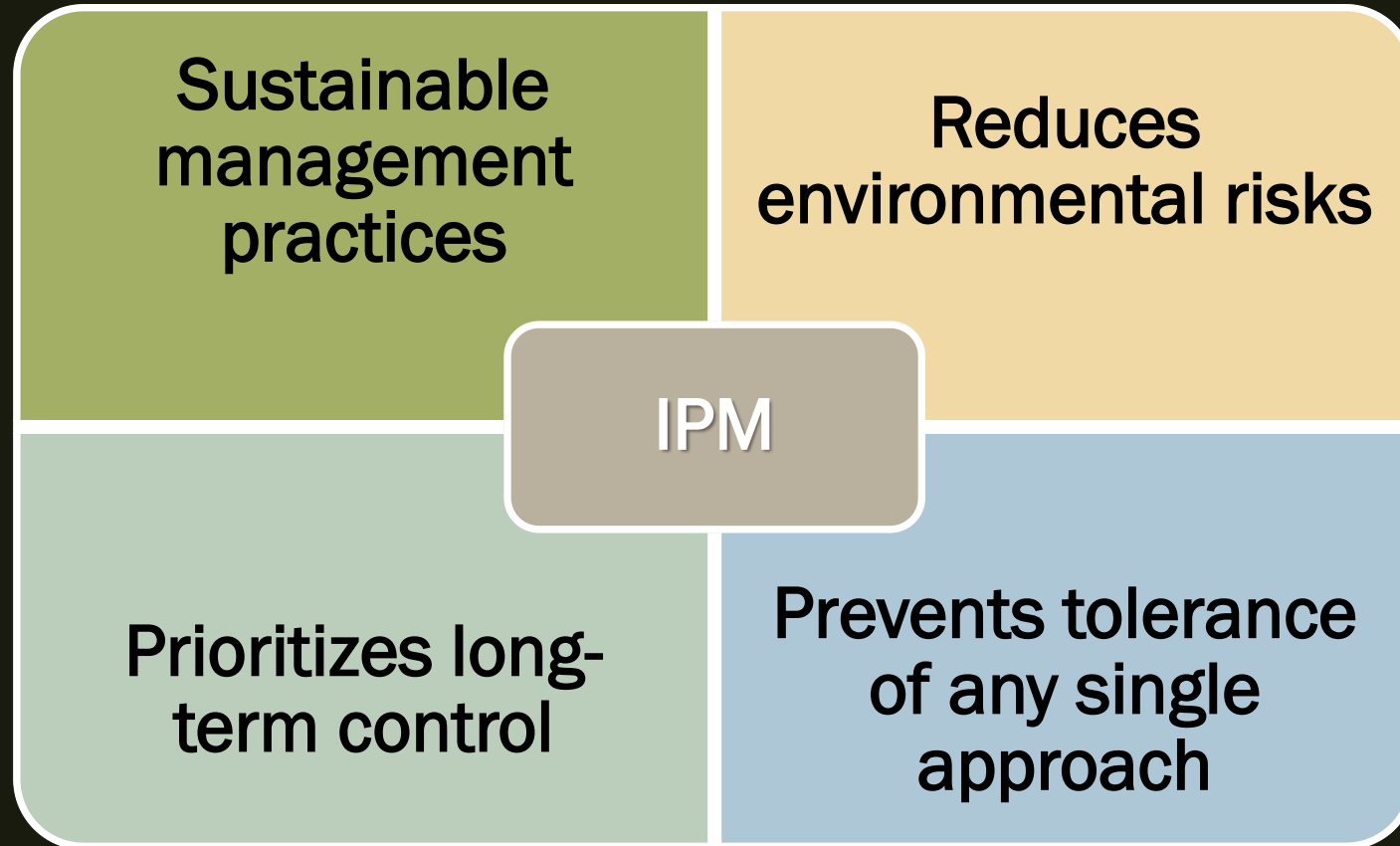


Native dominated landscape

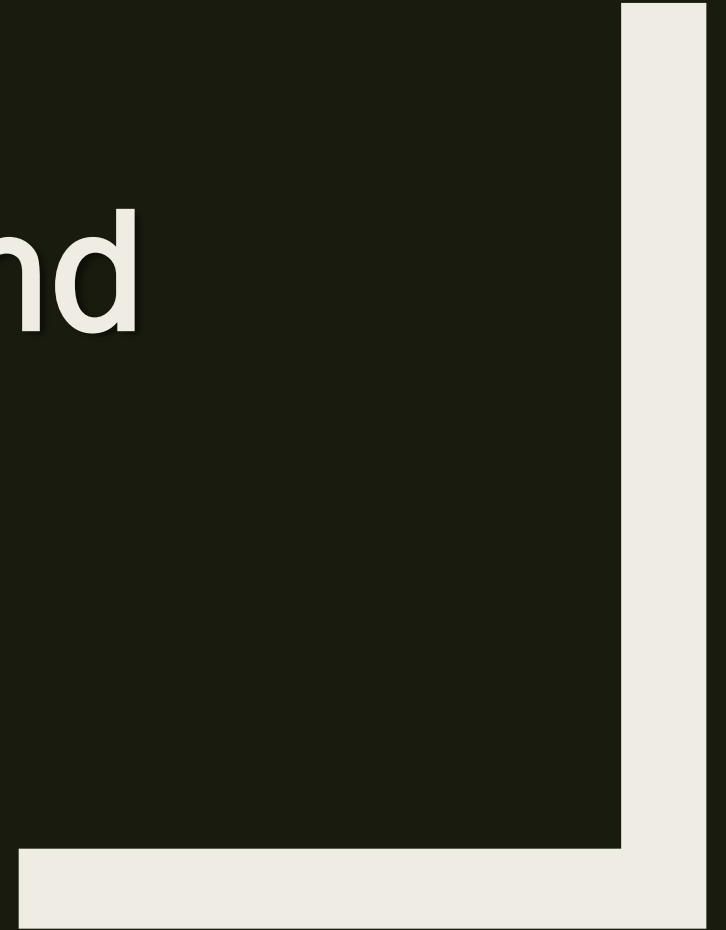
Integrated Pest Management (IPM)



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IPM in Wetland Habitats



Grazing For Conservation

Cattle's taste for non-native grasses helps vernal pools thrive

Vernal pools are small, seasonal wetlands that form on open grasslands with winter rains. But non-native grasses threaten to overtake these unique habitats. Thankfully, cattle love the taste of non-native grasses! With good grazing practices, cattle help keep non-native grasses in check and vernal pools healthy.



A cow can eat about **50 lbs** OF GRASS a day

90% OF THE PLANTS growing on California's grasslands are non-native species



Conservancy fairy shrimp eggs



Vernal pool tadpole shrimp



Sacramento Orcutt grass seed



Vernal pool fairy shrimp

Vernal Pools provide many important ecosystem services. Not only do they provide a unique habitat for many plants and animals, but they also take care of us! Vernal pools catch rain, filter runoff and recharge groundwater supplies. Migrating birds on the Pacific Flyway also use vernal pools as a rest stop.

LESS THAN **10%** of California's vernal pools remain

20 threatened and endangered species live in and around California's vernal pools.

California tiger salamander



Butte County meadowfoam seed



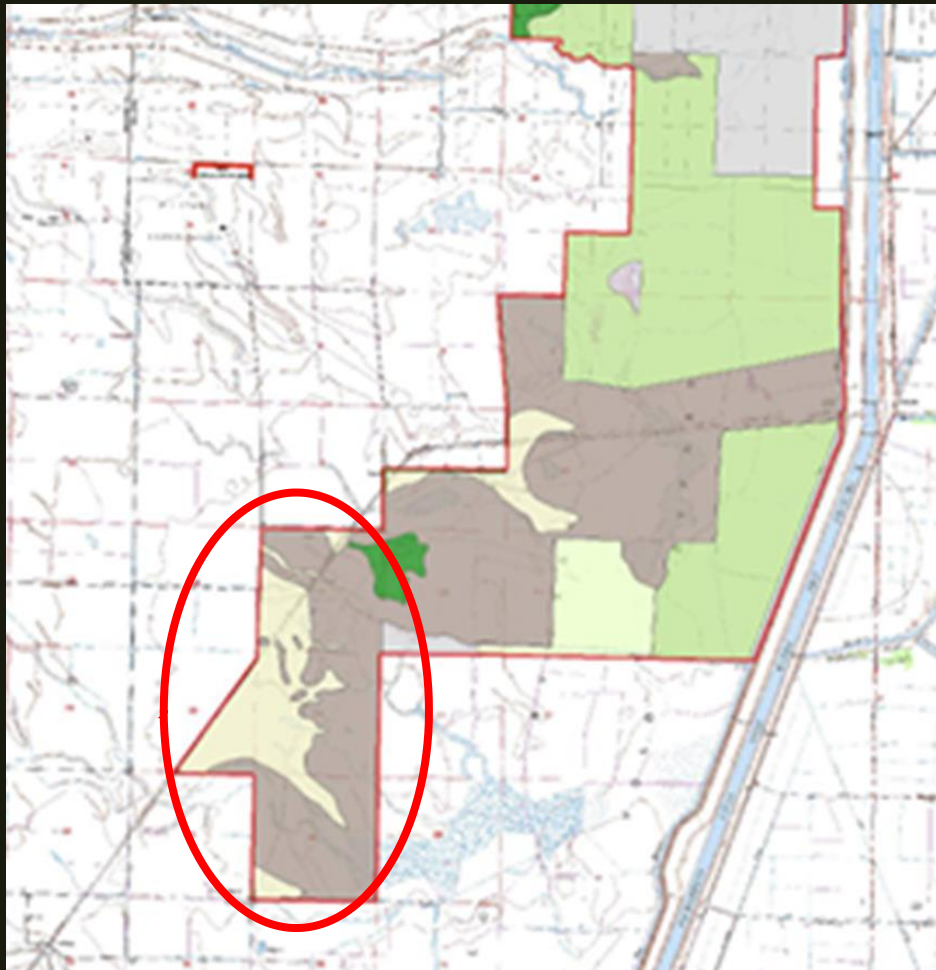
WHY ARE THESE SYSTEMS IMPORTANT?

- Nutrient cycling/Filter run-off
- Recharge groundwater
- Flood control
- Migratory bird stopover sties
- Economic benefits → pasture
- Social benefits → aesthetics & education



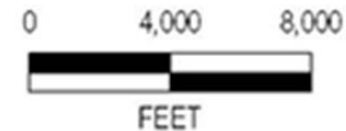
- Wet phase
- Dry phase
- Biodiversity hotspot → endemic species

Yolo Bypass Wildlife Area: Vernal Pool Site



LEGEND

-  Project Boundary
-  Prime Farmland
-  Farmland of Local Potential Importance
-  Unique Farmland
-  Farmland of Local Importance
-  Grazing Land
-  Other Land



Base Images: USGS Clarksburg 1980, Davis 1992, Sacramento West 1980, and Saxon 1968

How does IPM influence grazing as a weed management strategy?

Fall grazing



Invasive dominated community



Will IPM impact the current plant community composition?

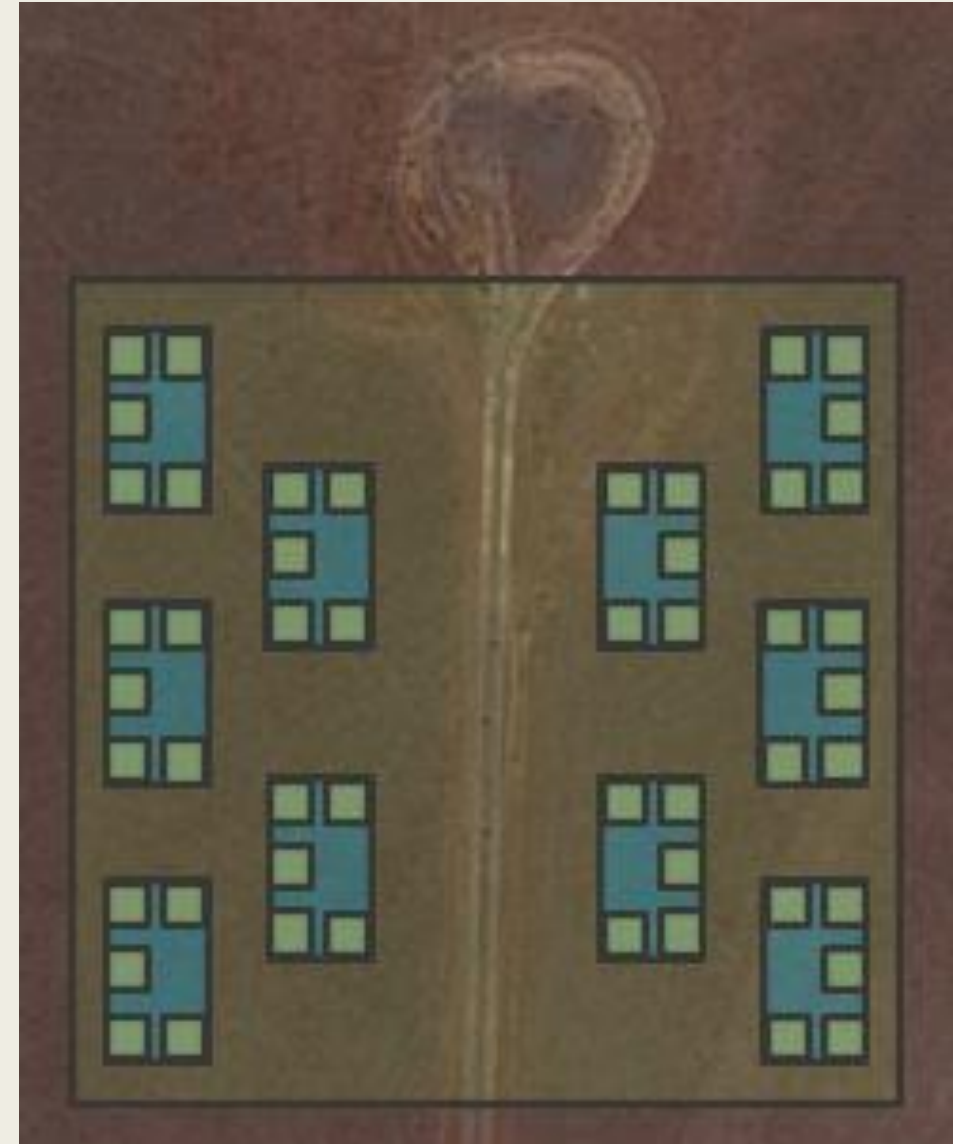
Experimental Design

Study design:

- 10 blocks → 12 m x 19 m
- 50 plots → 5 m x 5 m
- Blocks were randomly distributed within **1-hectare** of vernal pool-grassland habitat.

Treatments:

1. Control = **C**
2. Grazing (Oct-Dec) = **G**
3. Grazing + Herbicide [clethodim] (Early-May) = **GH**
4. Grazing + Mowing (Late May) = **GM**
5. Grazing + Herbicide + Mowing (Late May) = **GHM**



**Herbicide
Early-May**



**Grazing
October-December**



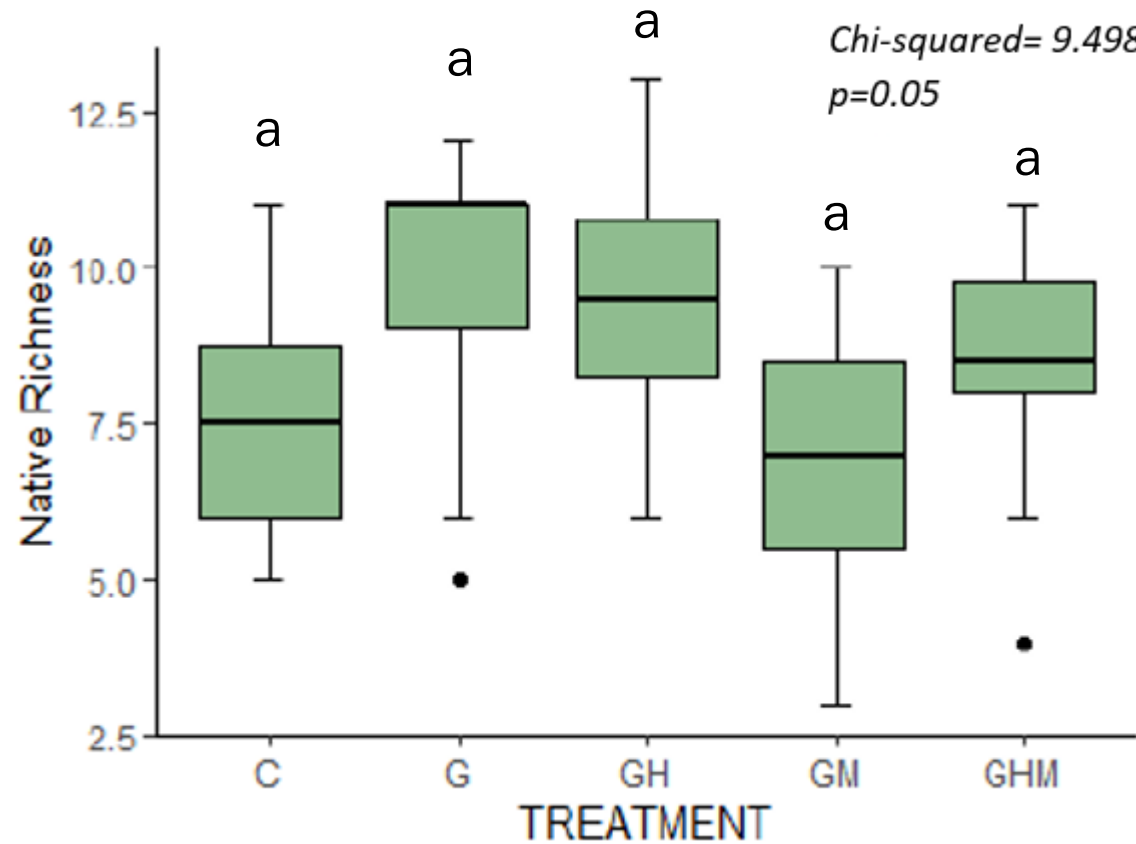
**Mowing + Herbicide
Mid-May**



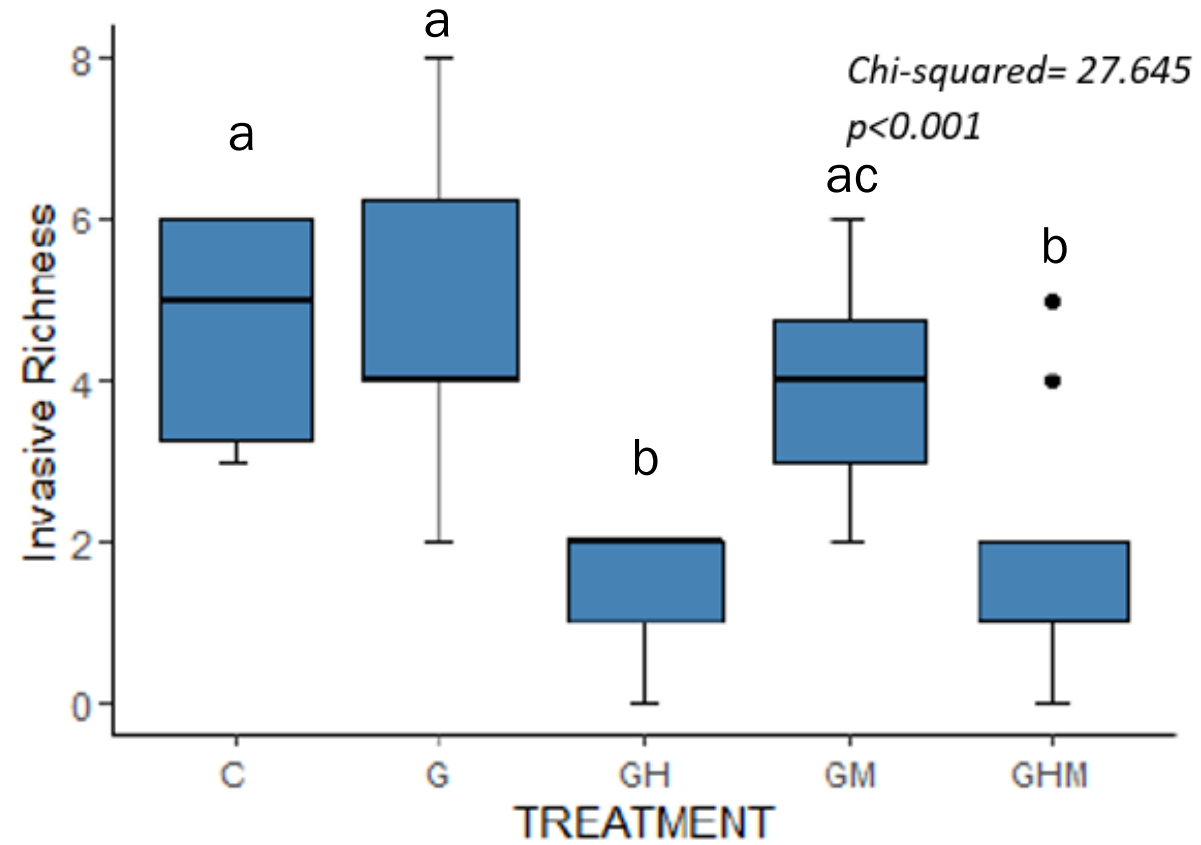
Control



Results: Species Richness

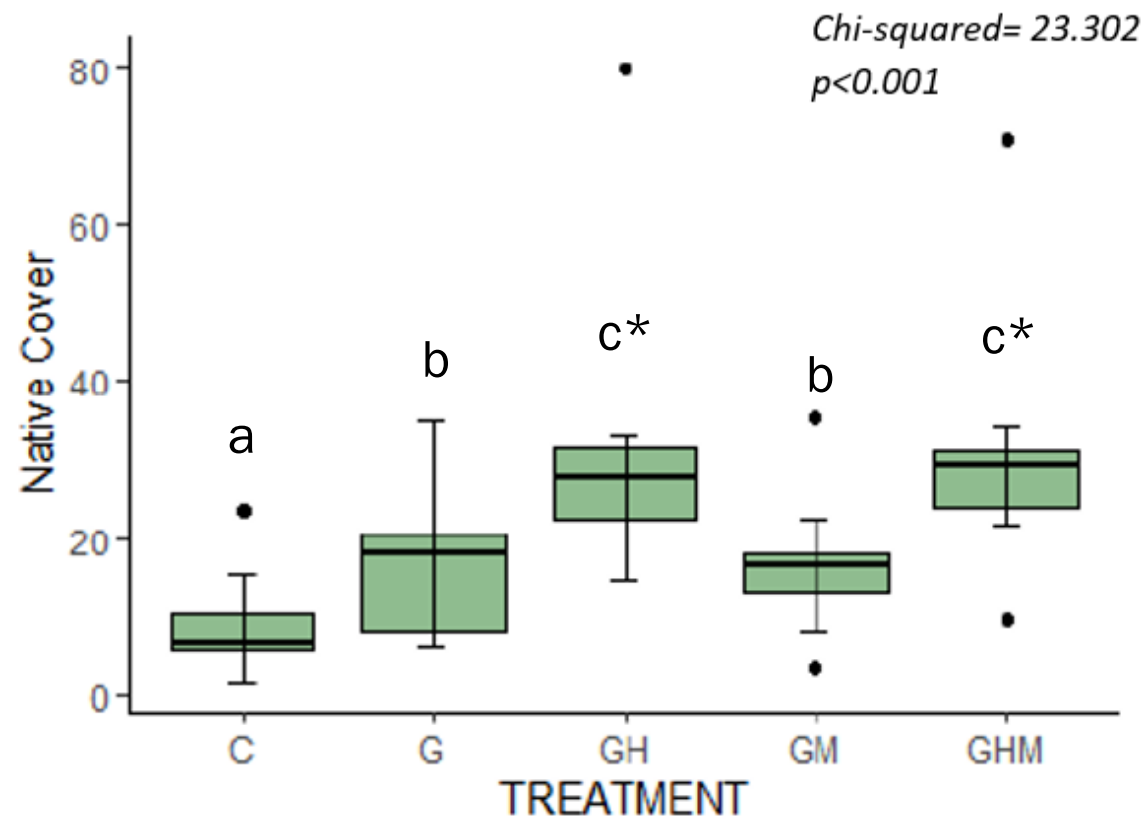


Native Species

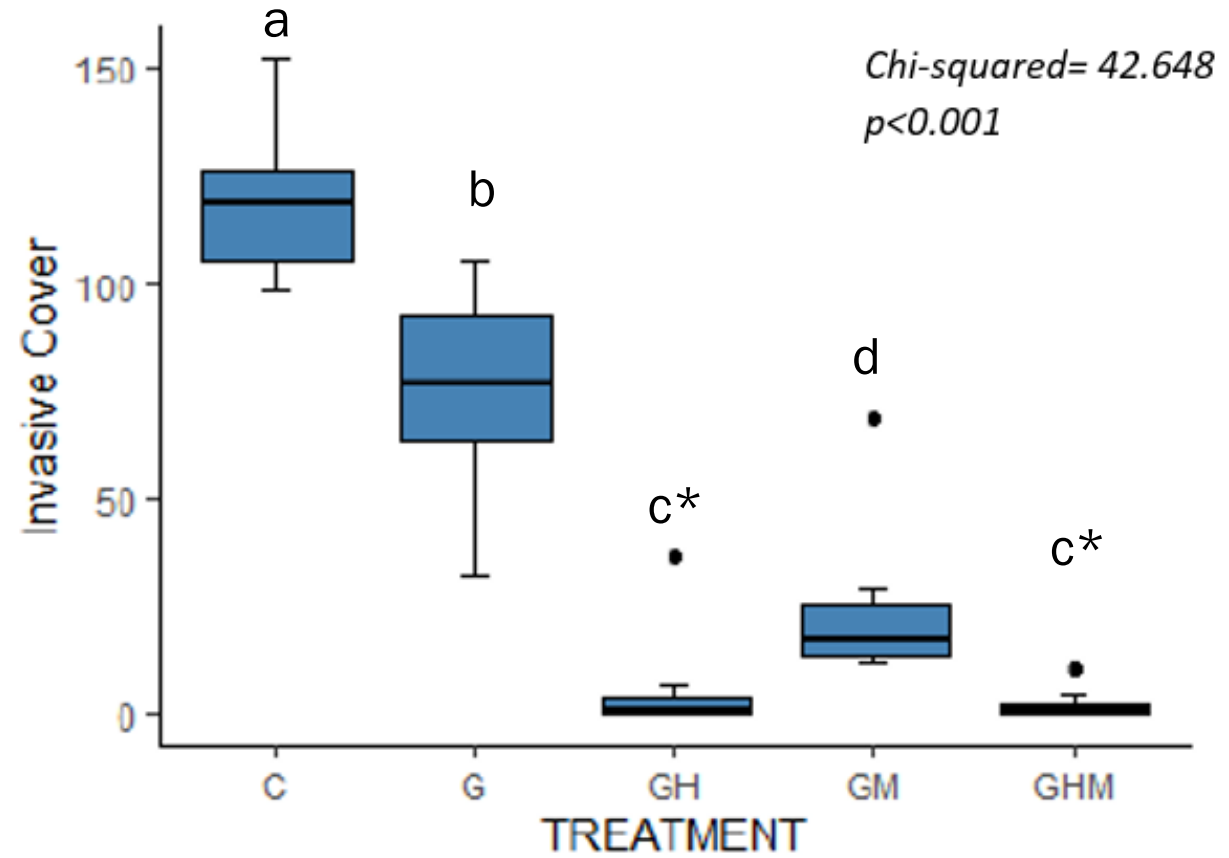


Invasive Species

Results: Species Cover

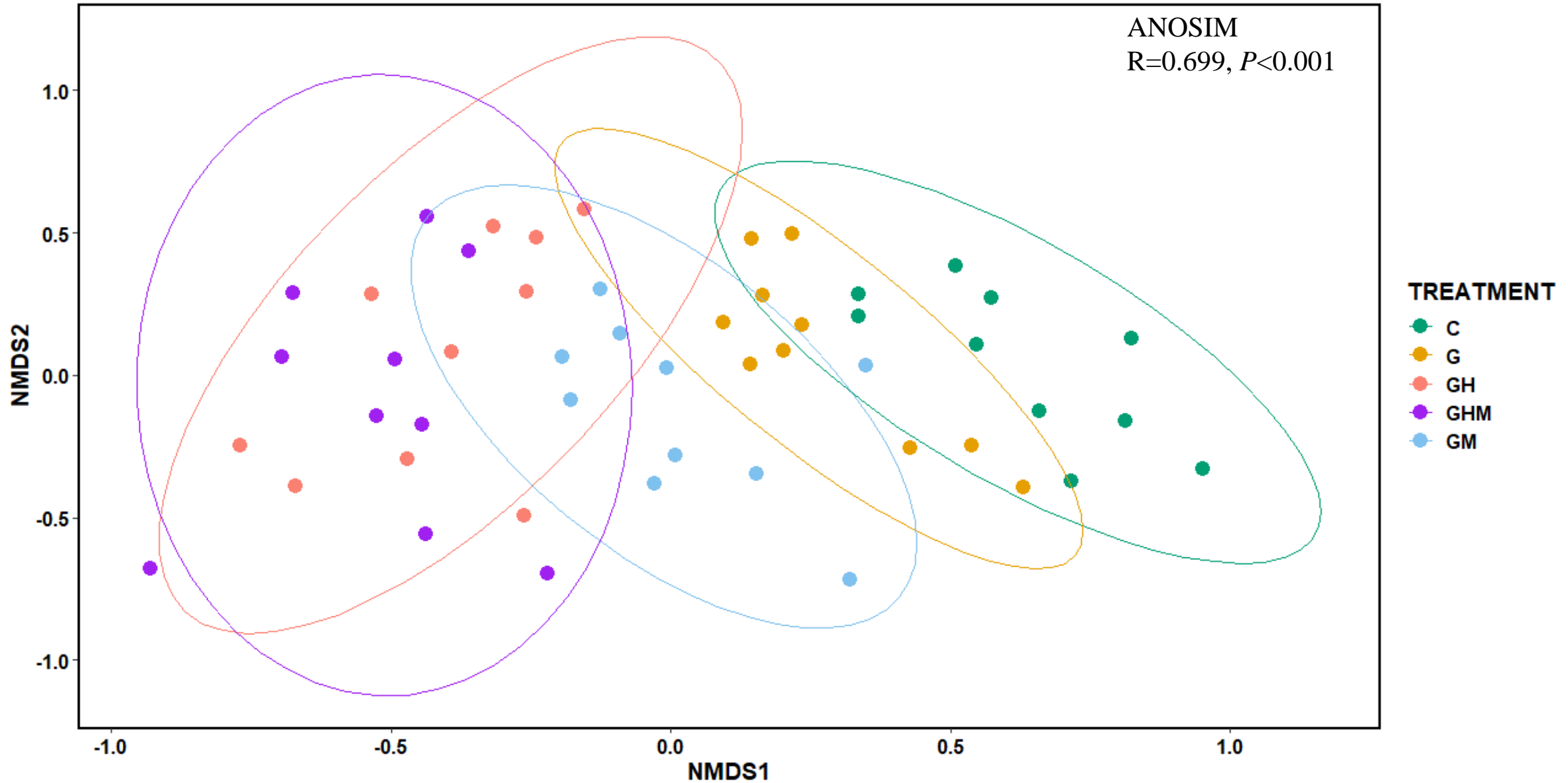


Native Species

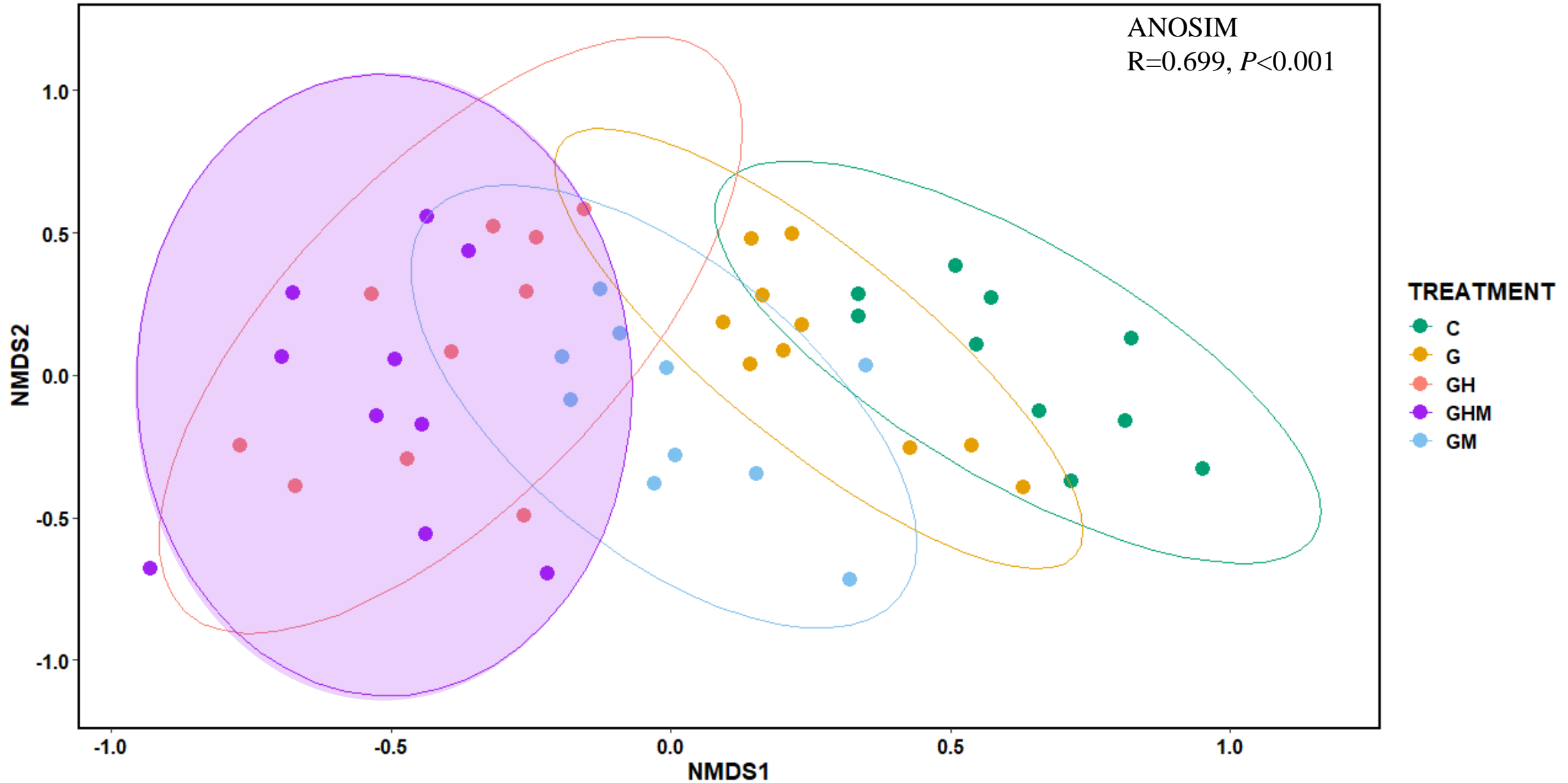


Invasive Species

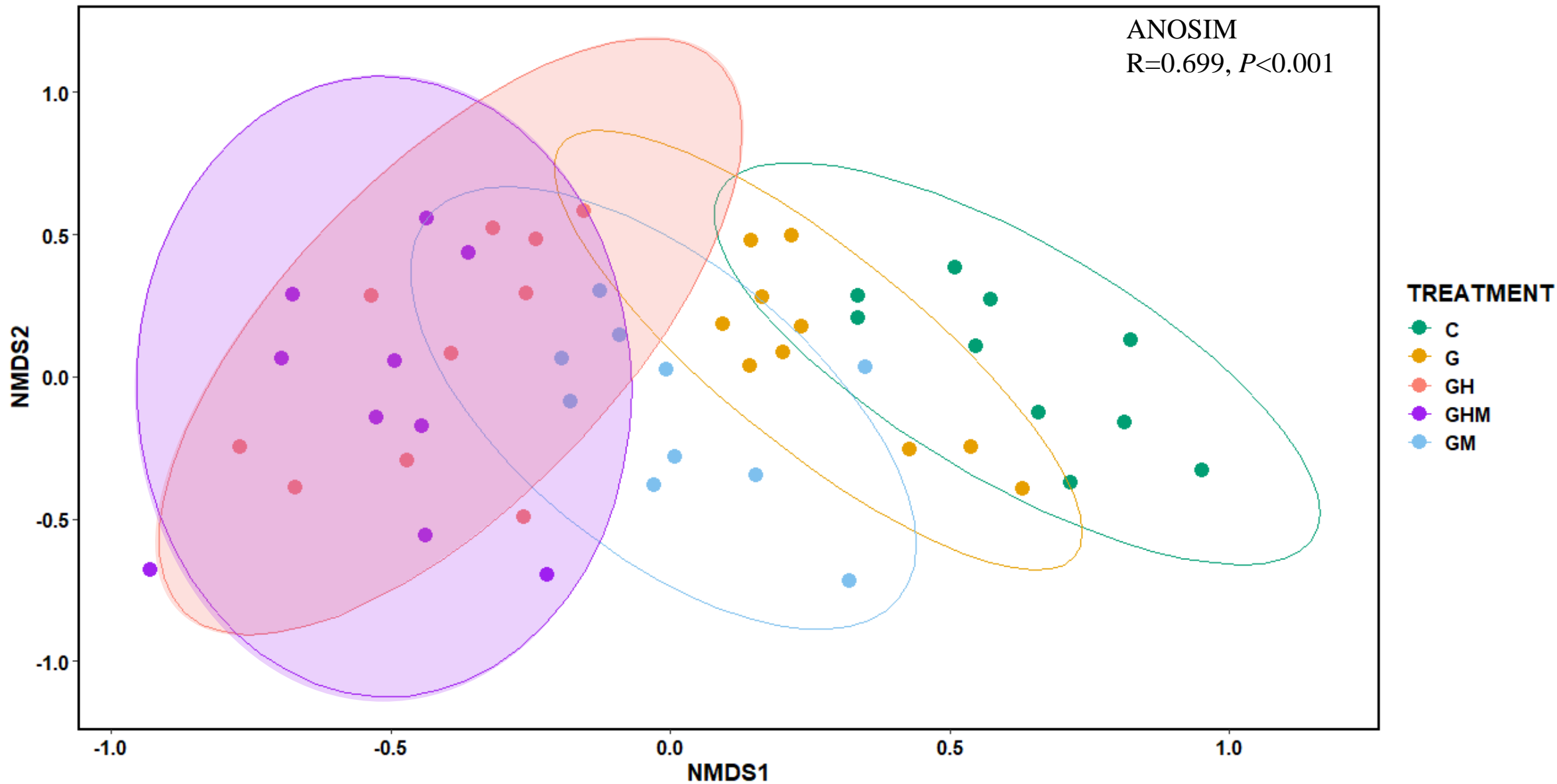
Plant Community Composition



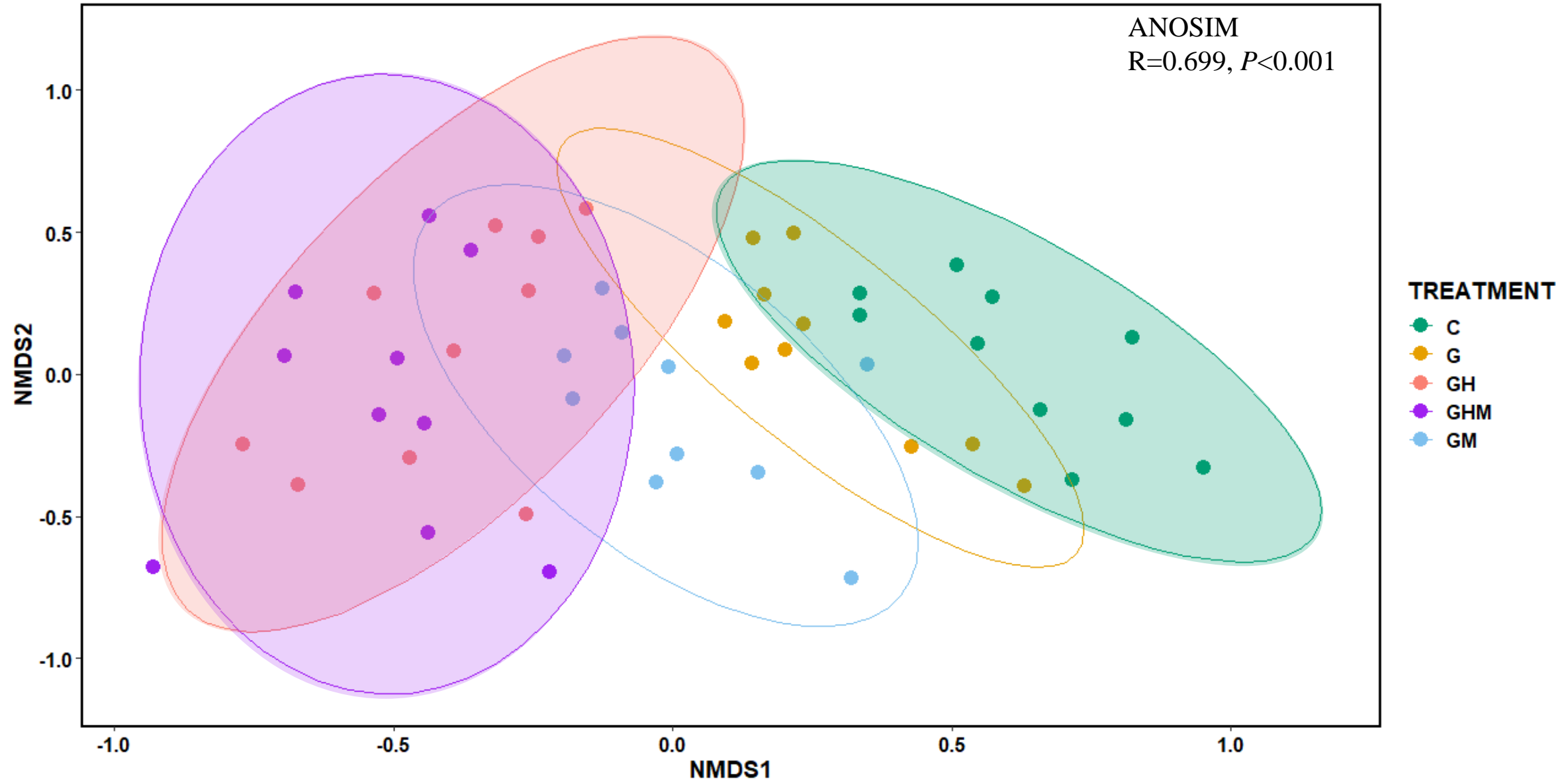
Plant Community Composition



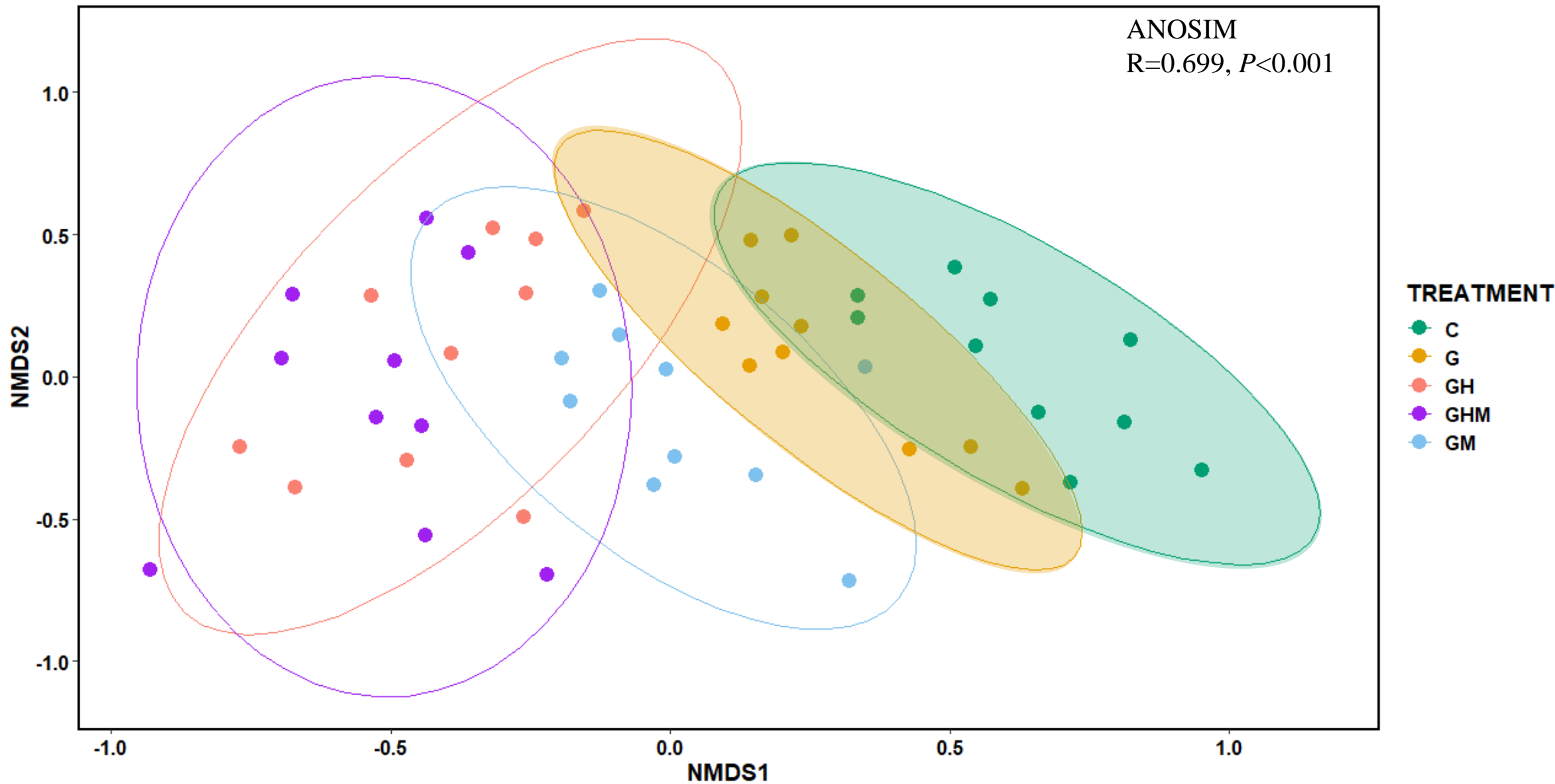
Plant Community Composition



Plant Community Composition



Plant Community Composition





What species are driving this change in community composition?

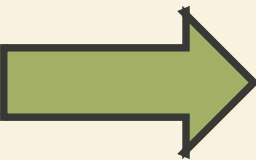
Invasive Species Drivers



Lolium spp.



Hordeum spp.



Bromus hordeaceus

Native Species Drivers



Pogogyne douglasii



Lasthenia californica

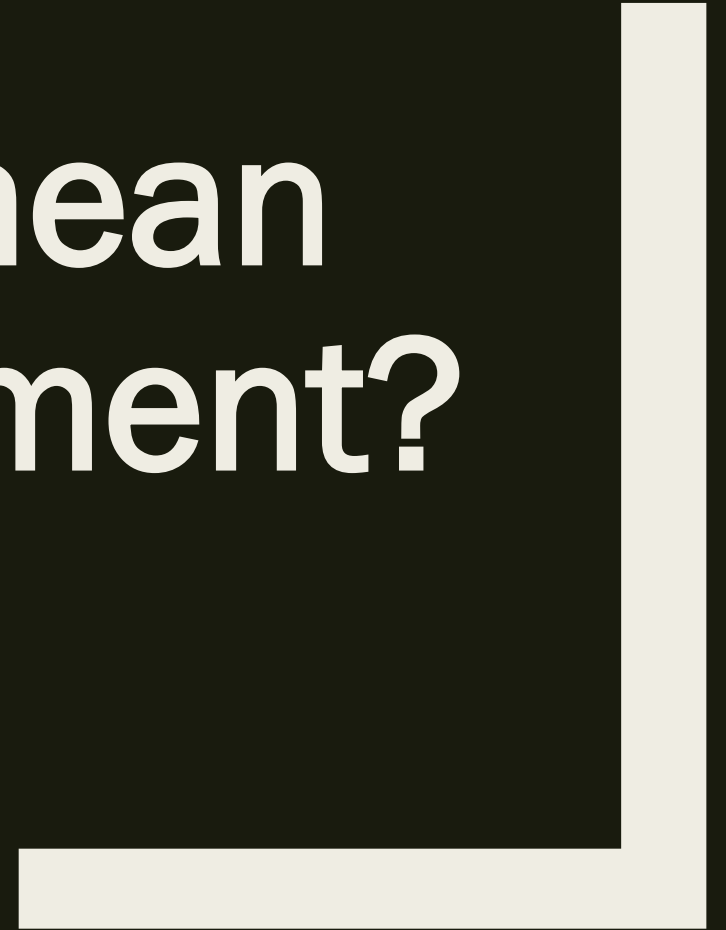


Hemizonia congesta



Eryngium jepsonii

**What does this mean
for future management?**



Using Environmental Variation to inform Management

March 2022

- Dry
- Invasive grass growth
- Little to no natives

March 2023

- Wet
 - Closer to normal cycles
- Little grass growth
- What does this mean for native plants?

APRIL 2022



APRIL 2023*



APRIL 2022



APRIL 2023*



Diplacus tricolor



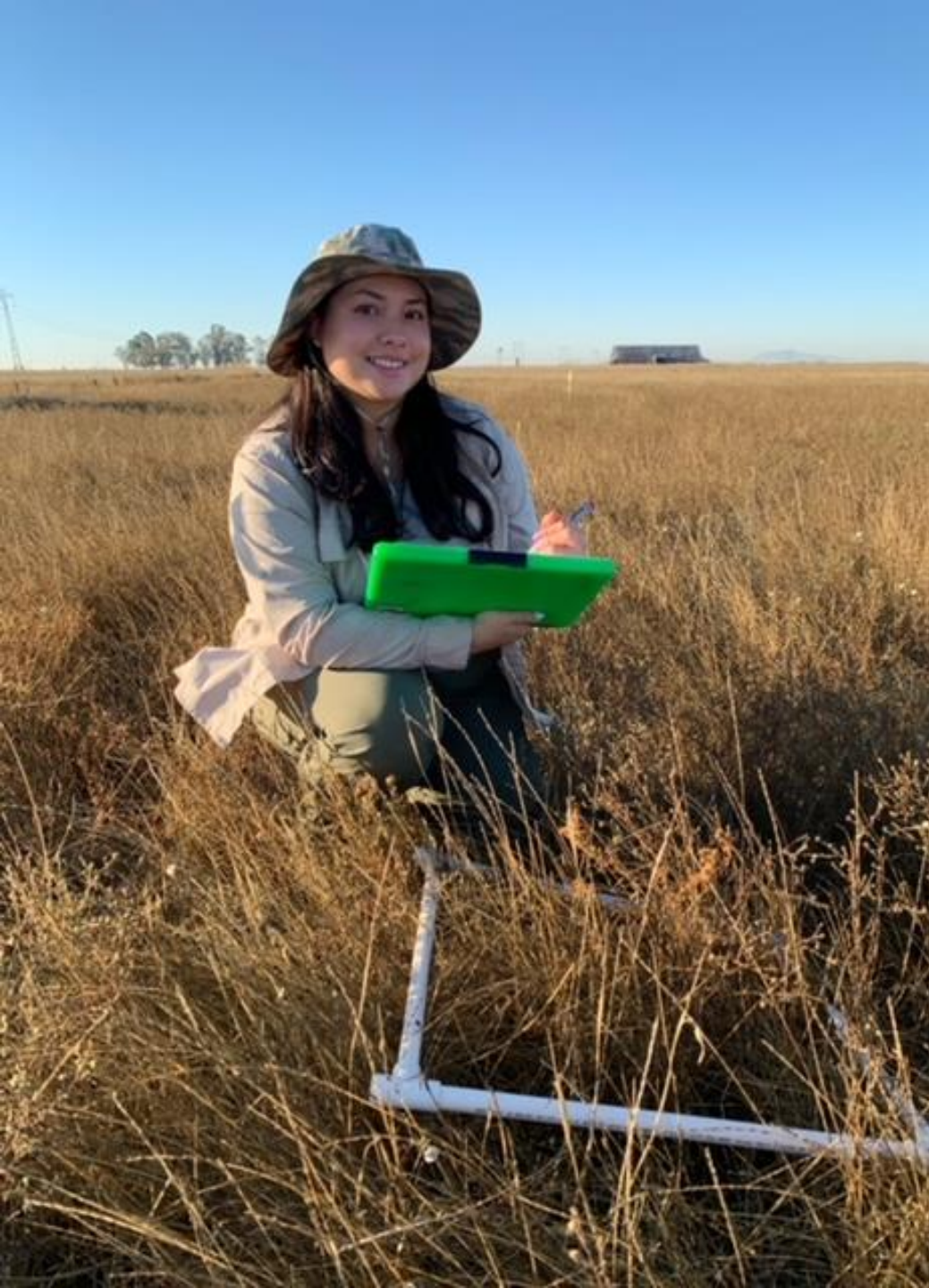
Downingia spp.

APRIL 2023



MAY 2023





THANK YOU!

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