


Post-Fire Resilience of **Bee Flat Canyon**

Masters in Conservation and Restoration

Capstone 2021 - 2022

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Acknowledgements

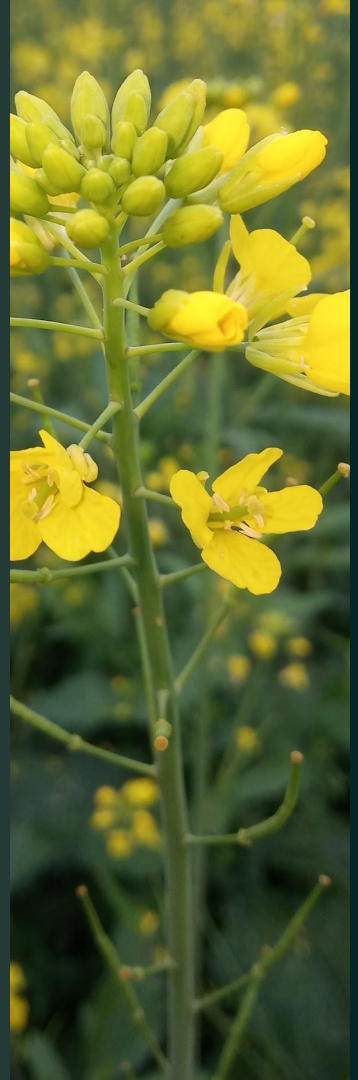
An unfortunate fire

presented a unique opportunity...

Fire Intervals

Research Objective

We studied the post-fire resilience of restored **Coastal sage scrub** and **grassland** communities in Bee Flat Canyon



Research Questions

1. How resilient are restored CSS sites post-fire?

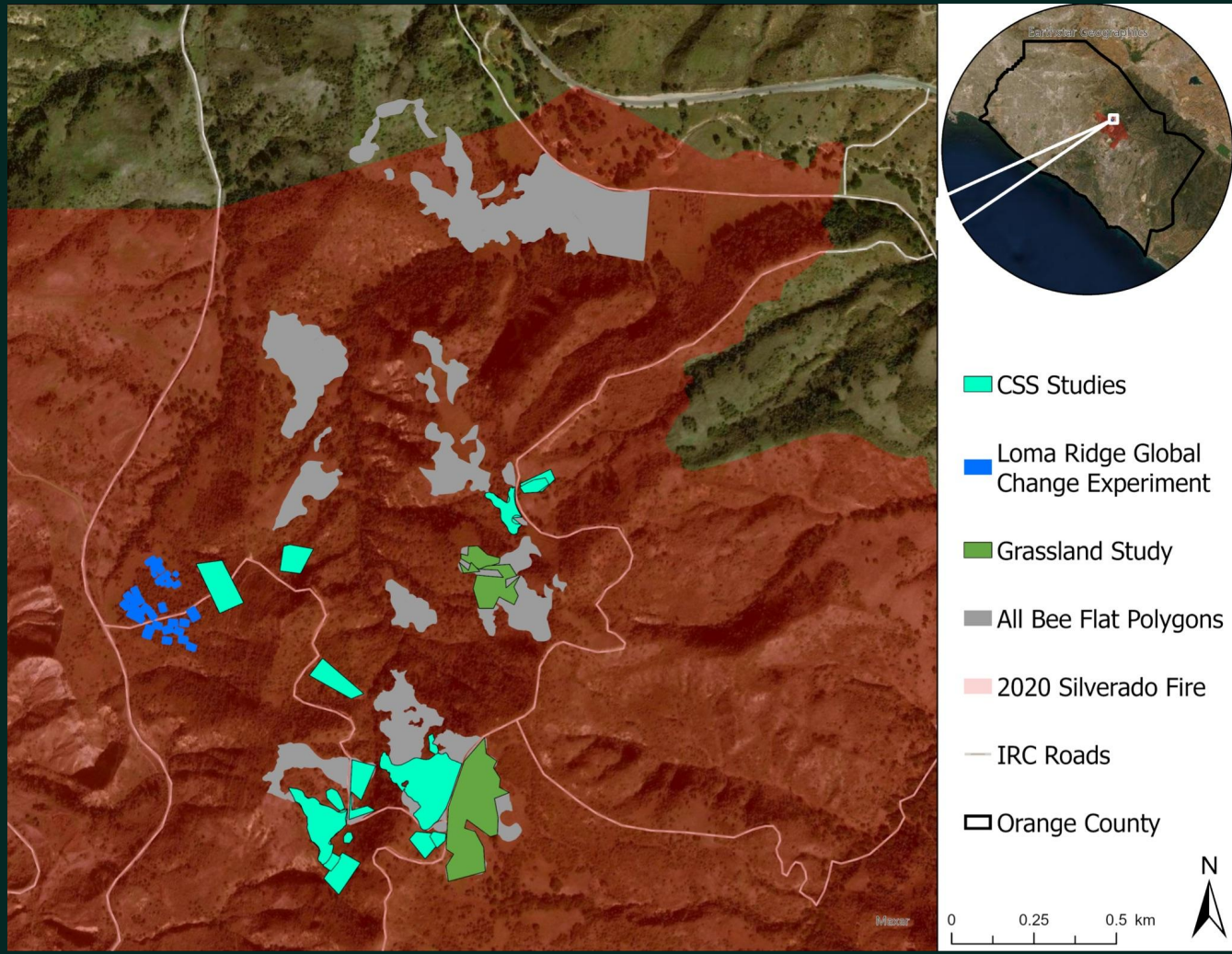
2. What functional traits allow native and nonnative/invasive CSS species to be more resilient post-fire?

3. How does grassland composition vary over time in relation to fire events, drought, and precipitation?

Study System

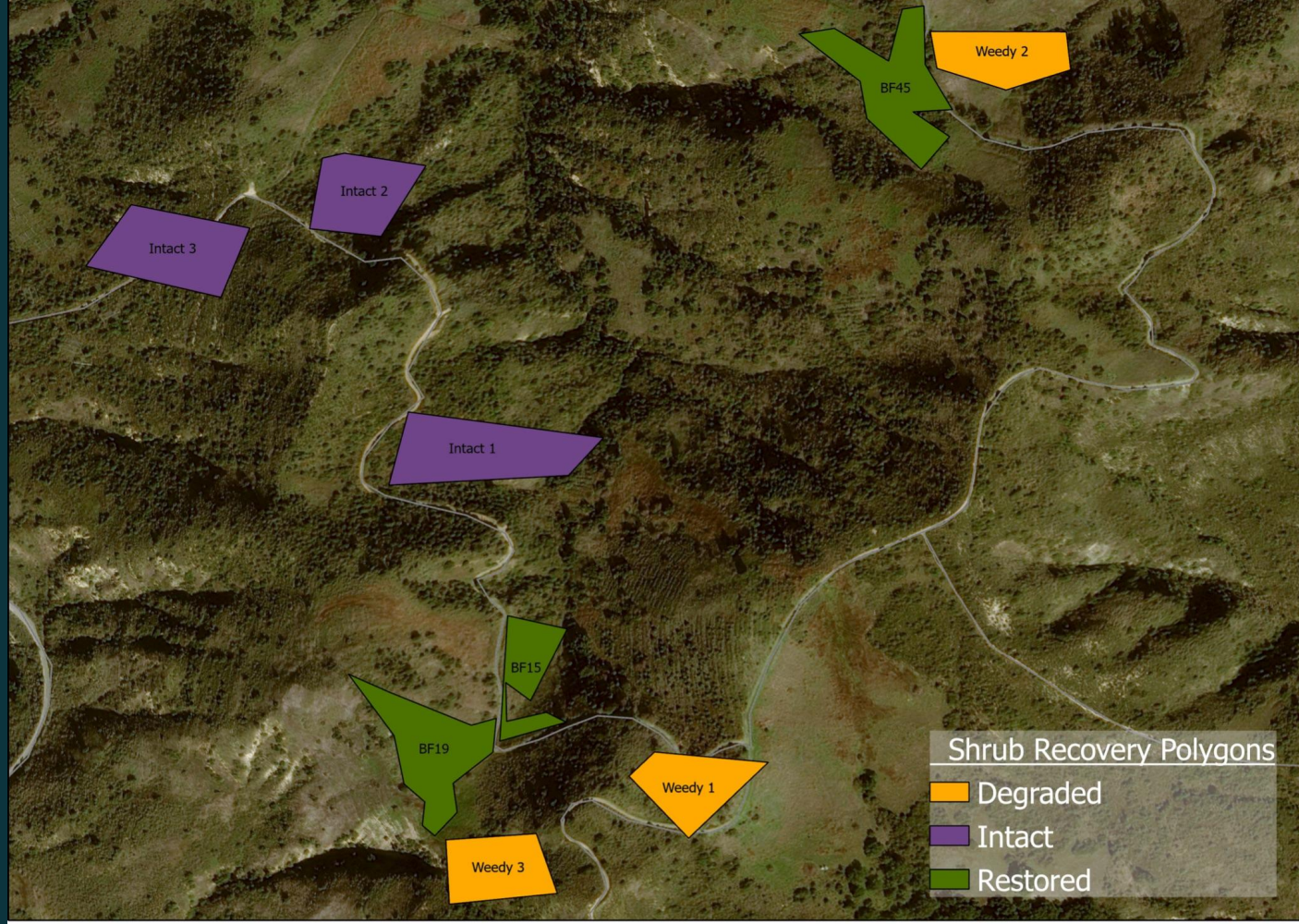
Four Studies:

1. CSS shrub recovery
2. CSS seedling recruitment
3. CSS functional traits (*Loma Ridge*)
4. Grassland long-term monitoring



Coastal Sage Scrub

Shrub Recovery Map



Shrub Recovery Methods

- Nov - Dec 2021
- 1 x 5 m quadrats
- Crown sprouts
- Seedling recruitment

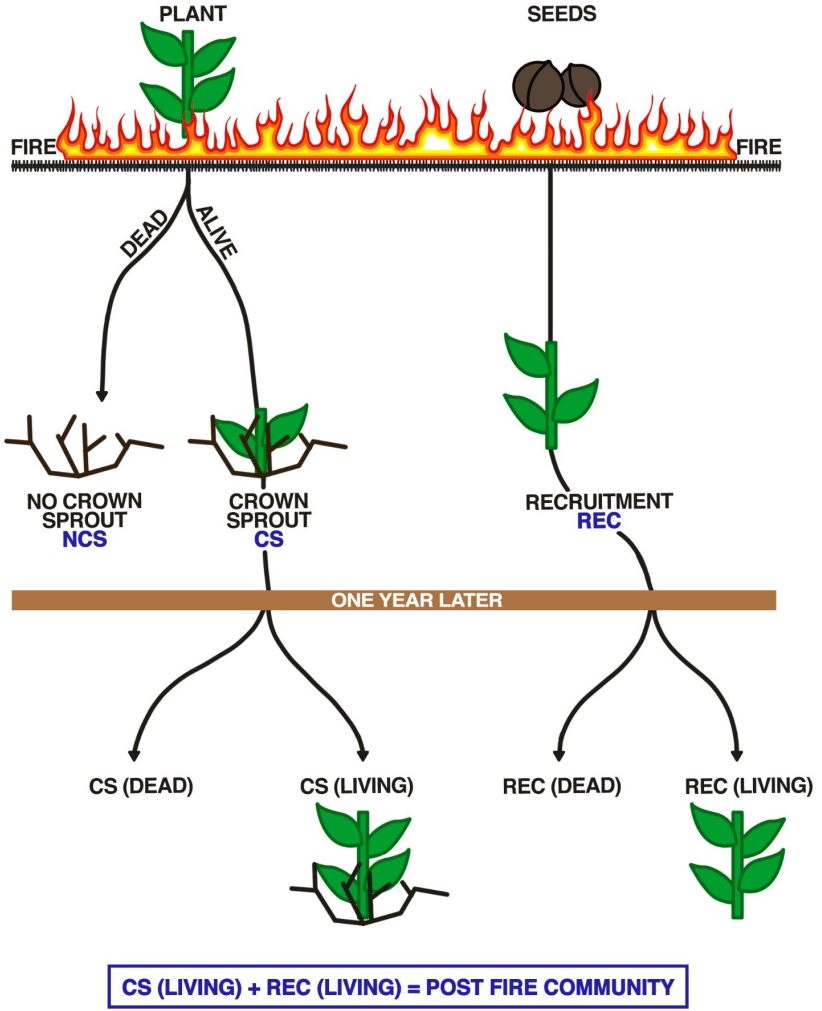
3 treatment areas:

- unrestored naturally intact
- unrestored degraded
- restored

Shrub Recovery Methods

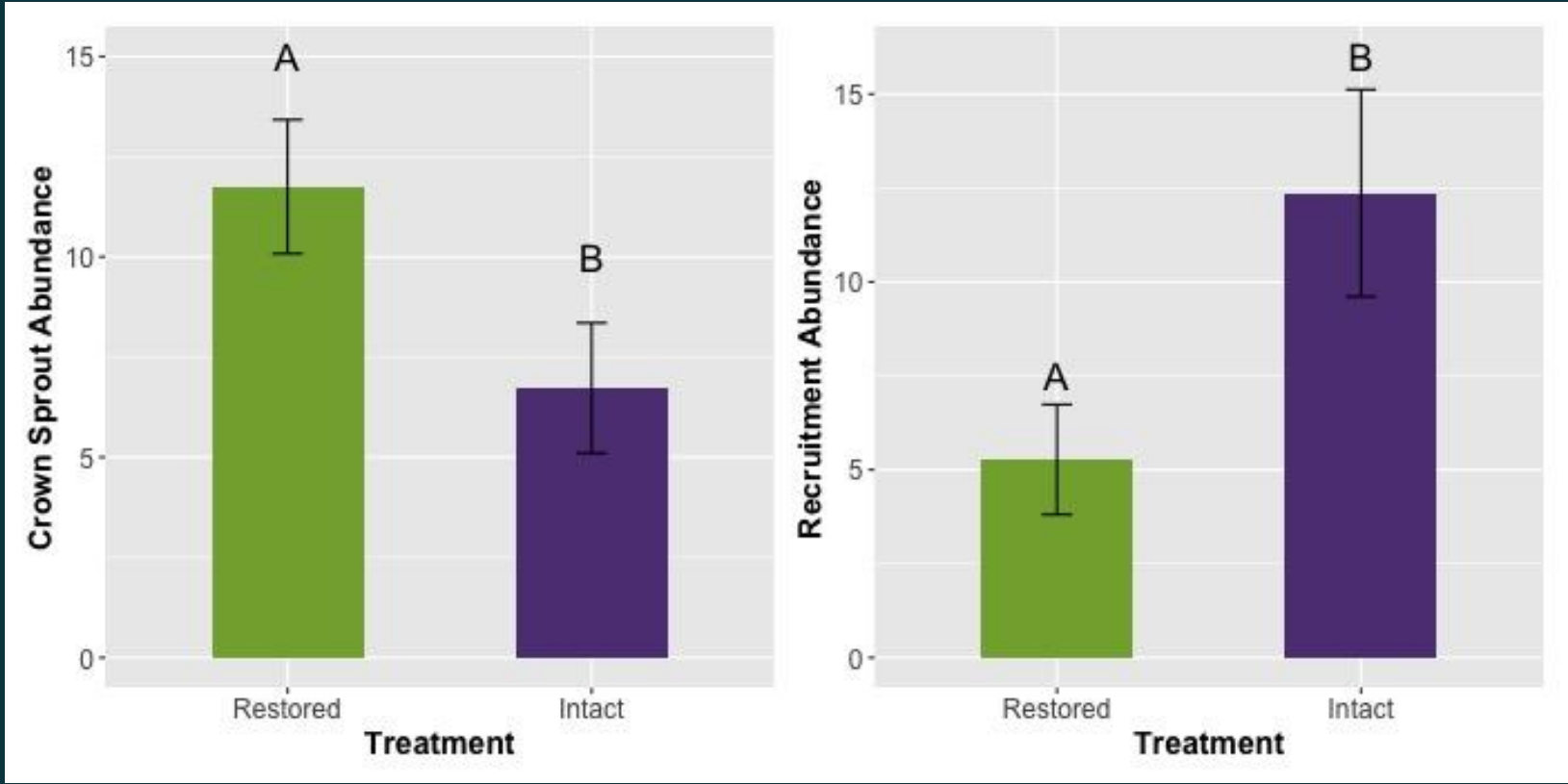
Crown Sprouting

Seedling Recruitment

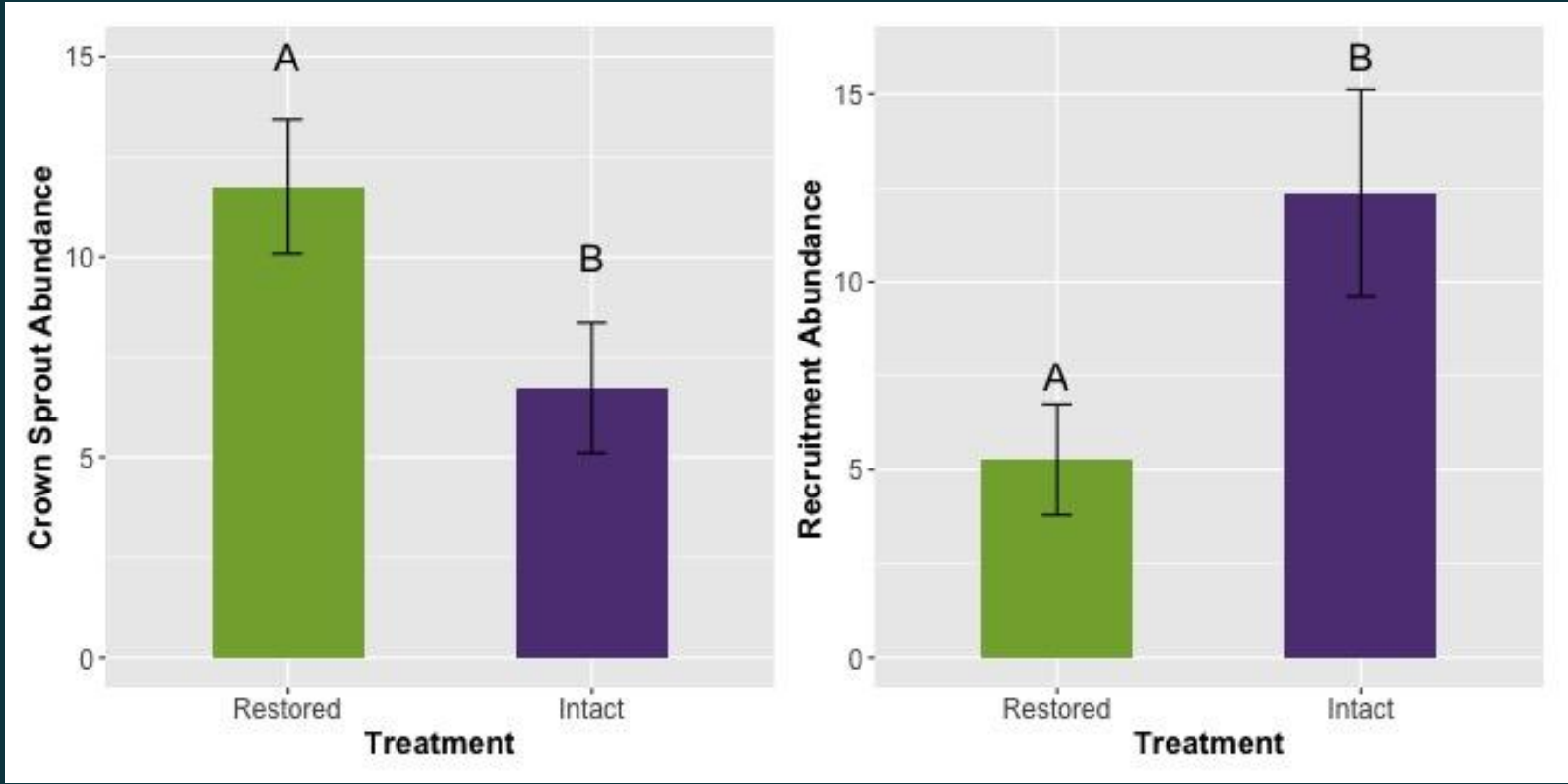


CSS fire ecology graphic credit: Meghmik Vosghanian

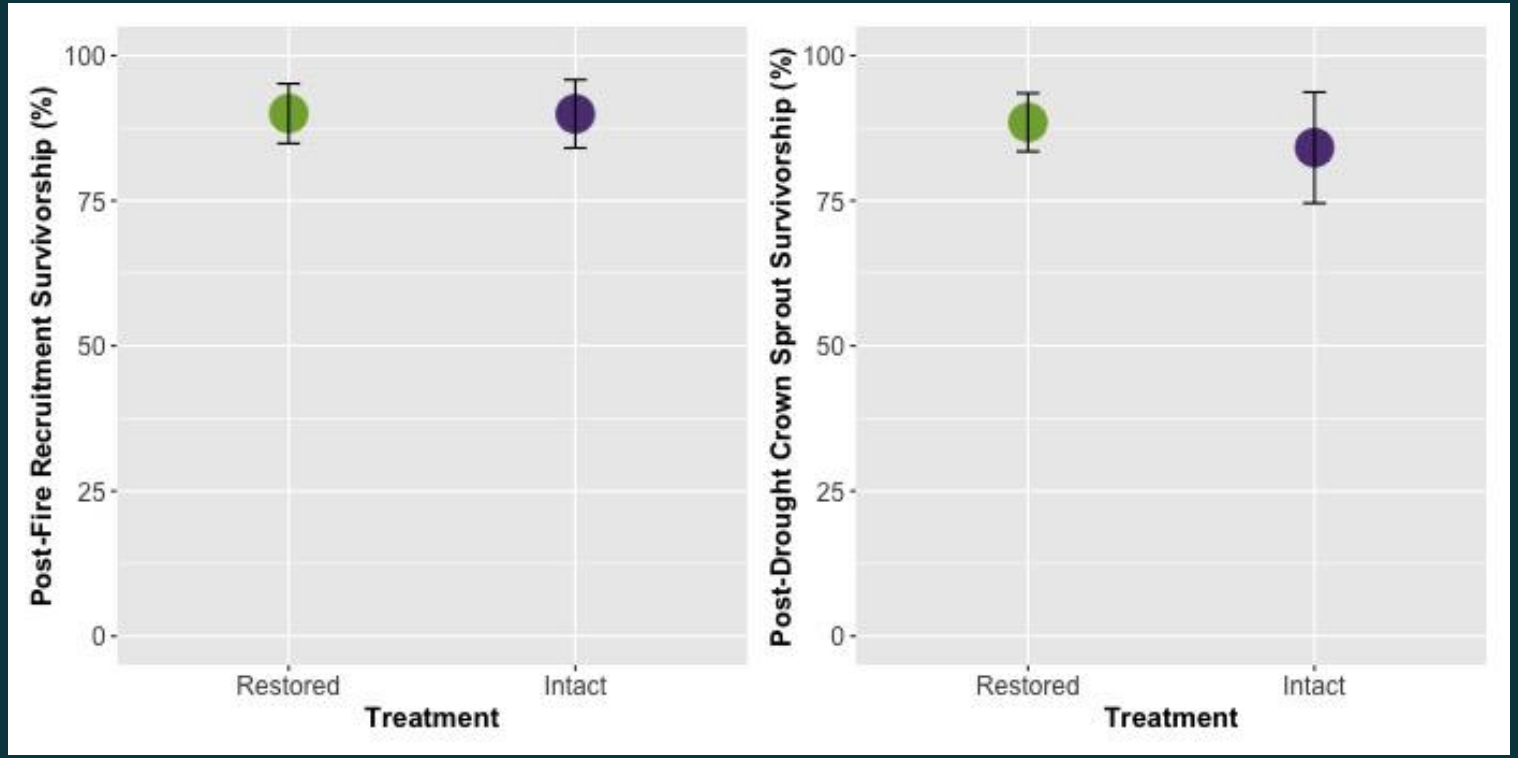
Crown Sprout Abundance higher in Restored sites



Seedling Abundance higher in Intact sites

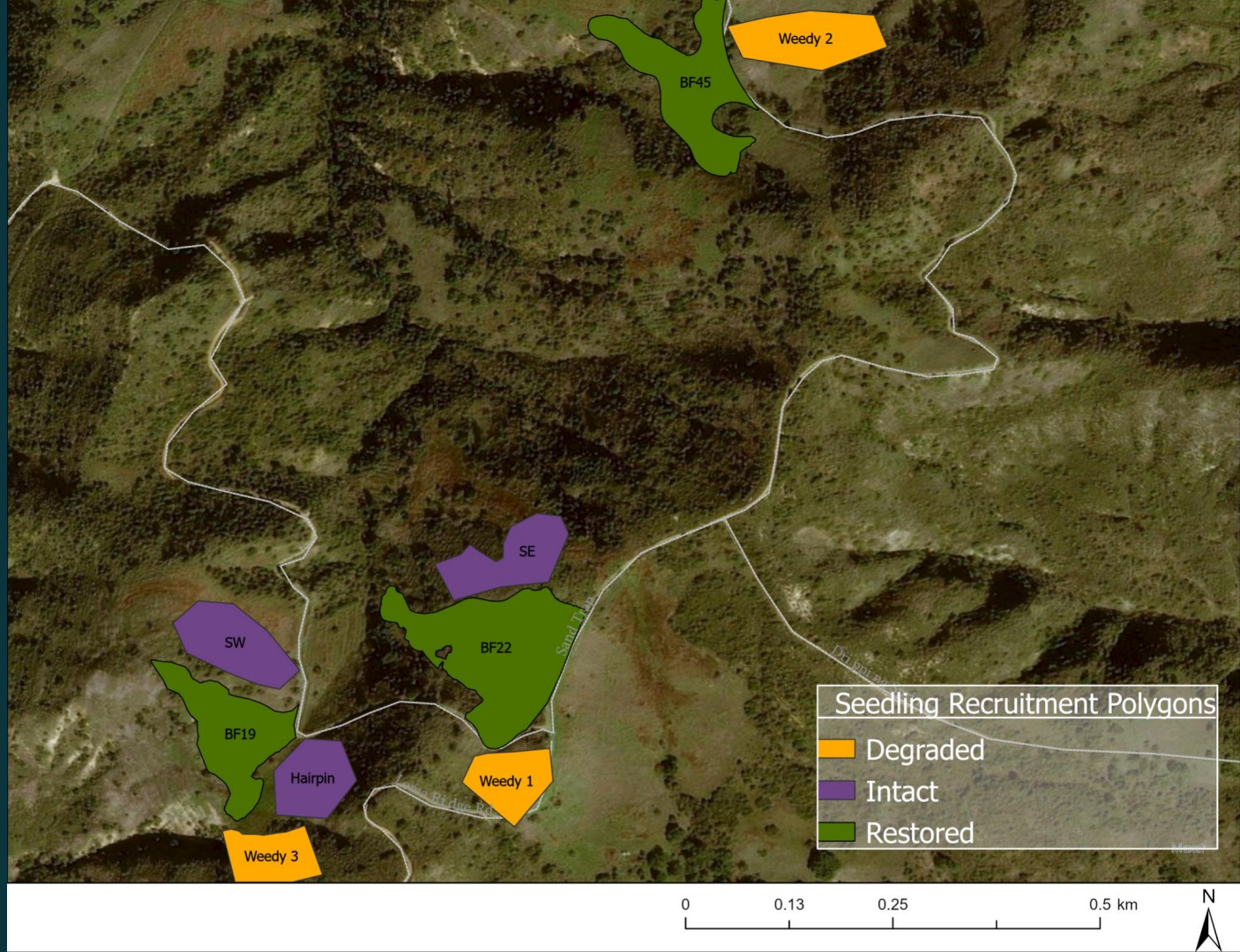


Seedling and Crown Sprout Survivorship were 90% in restored and intact sites.



Seedling Recruitment

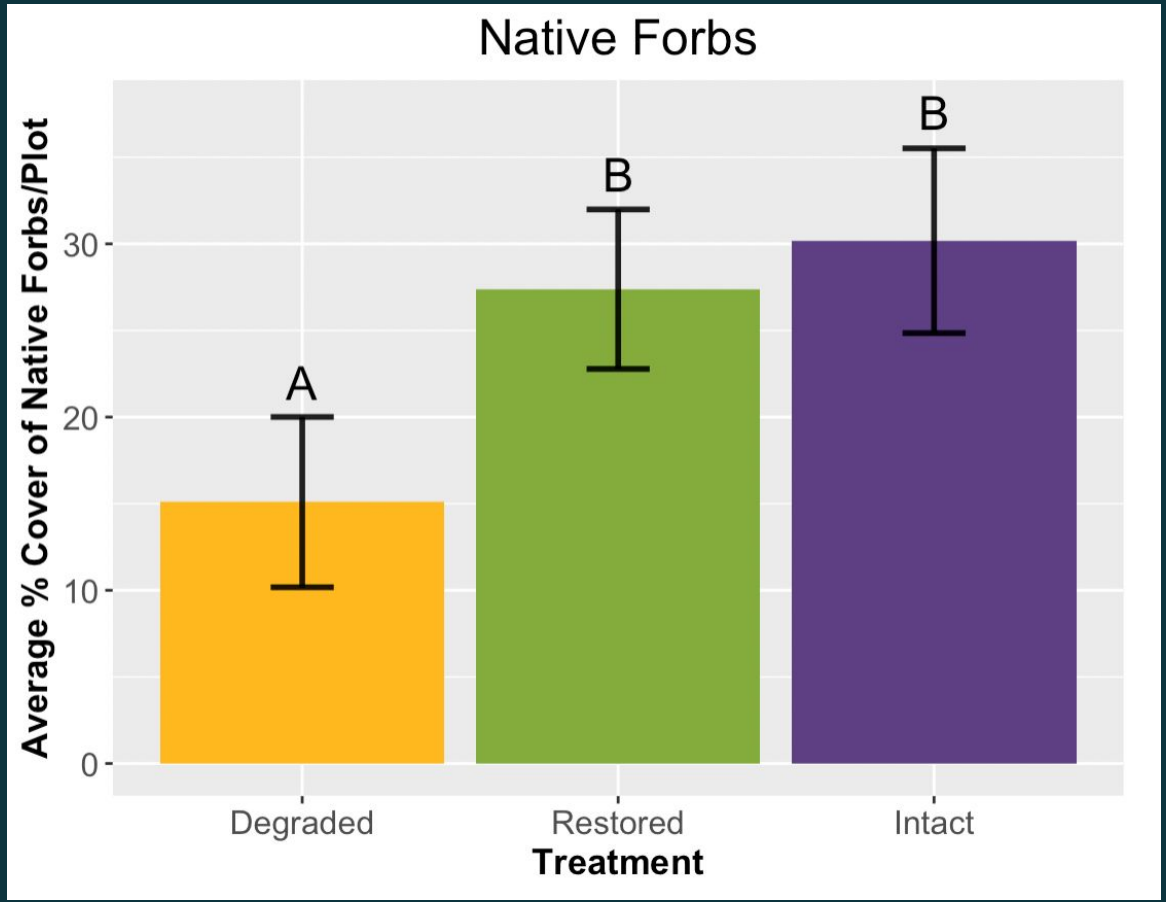
Seedling Recruitment Map



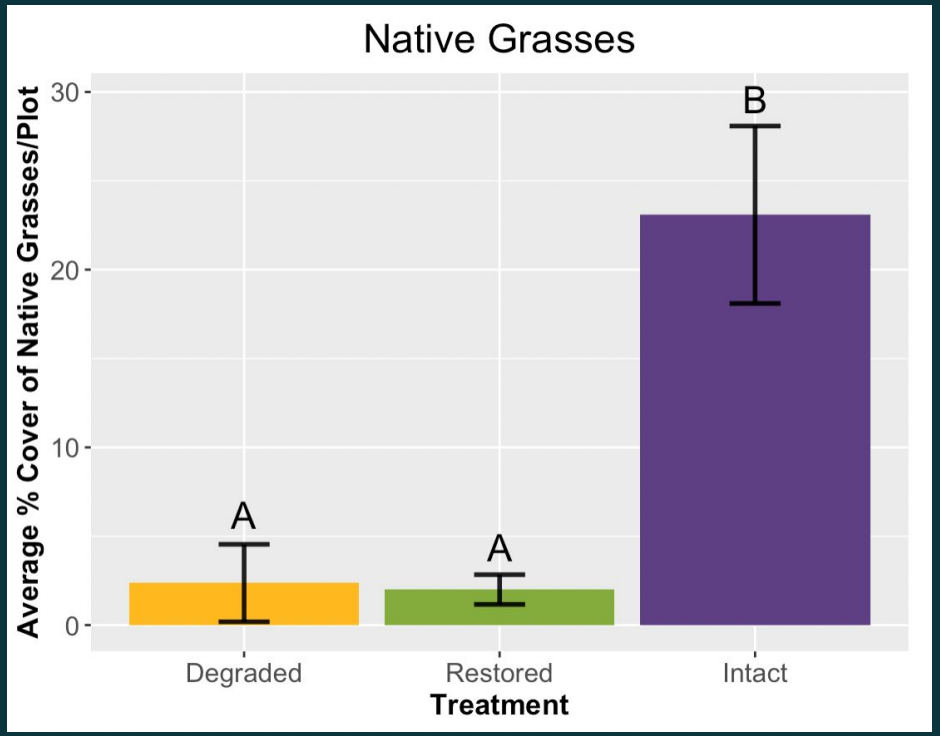
Seedling Recruitment Methods

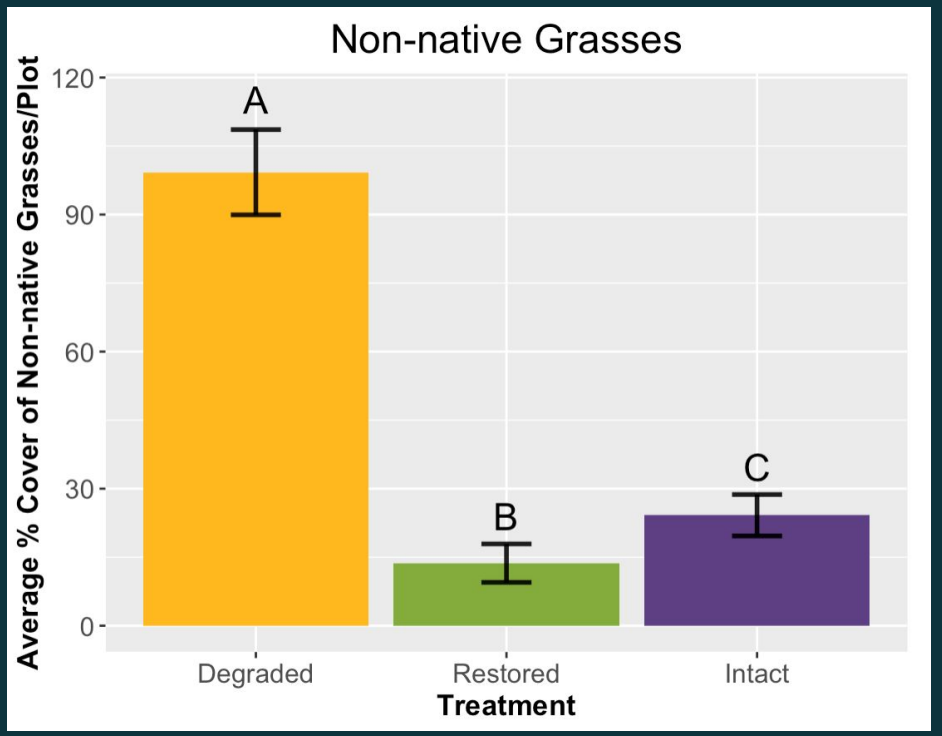
- 2021 - 2022
- 1 x 1 m gridded quadrats
- Point-intercept cover

Forb Seedling Recruitment

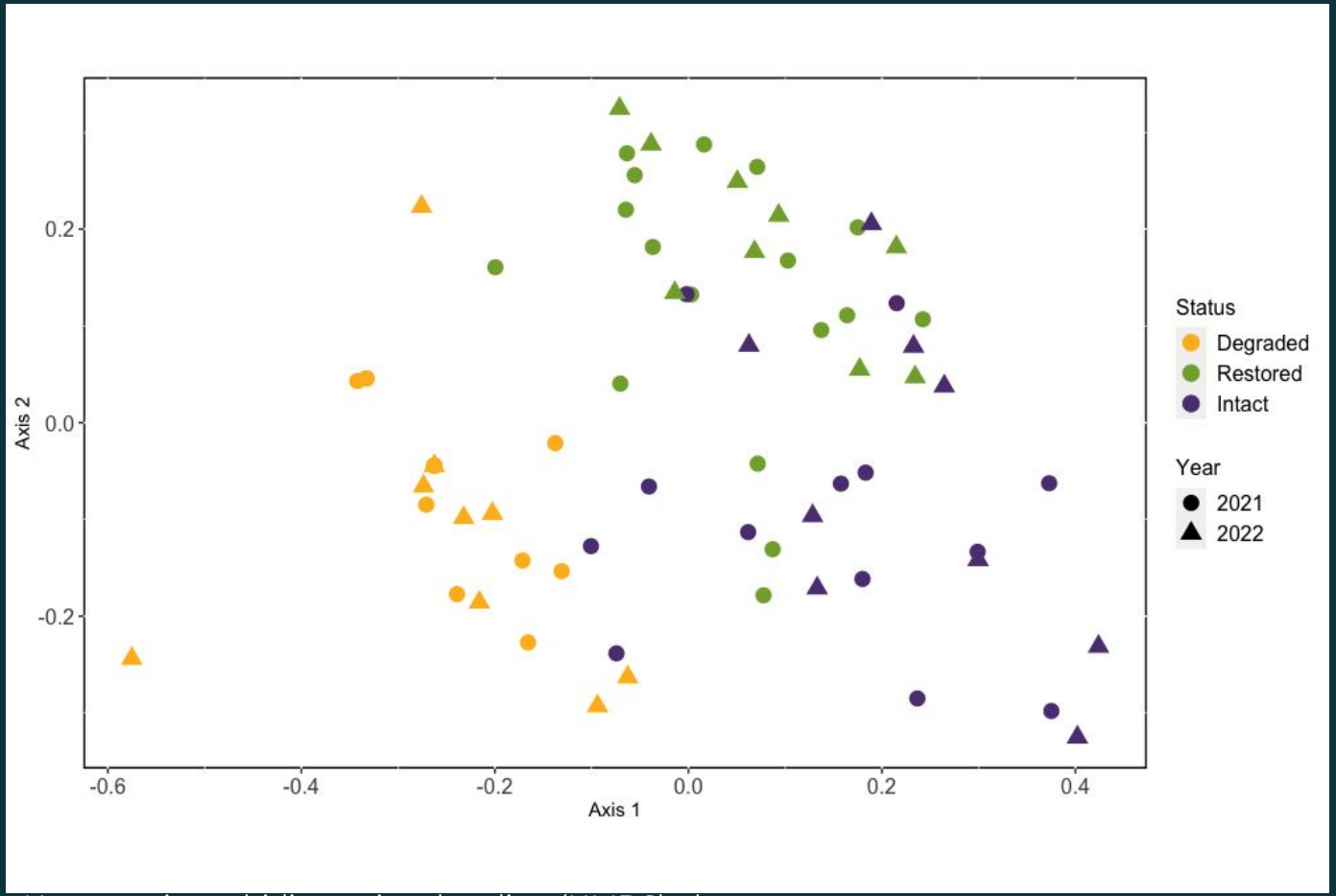


Grass Seedling Recruitment





Seedling Recruitment Species Composition



Non-metric multidimensional scaling (NMDS) plot

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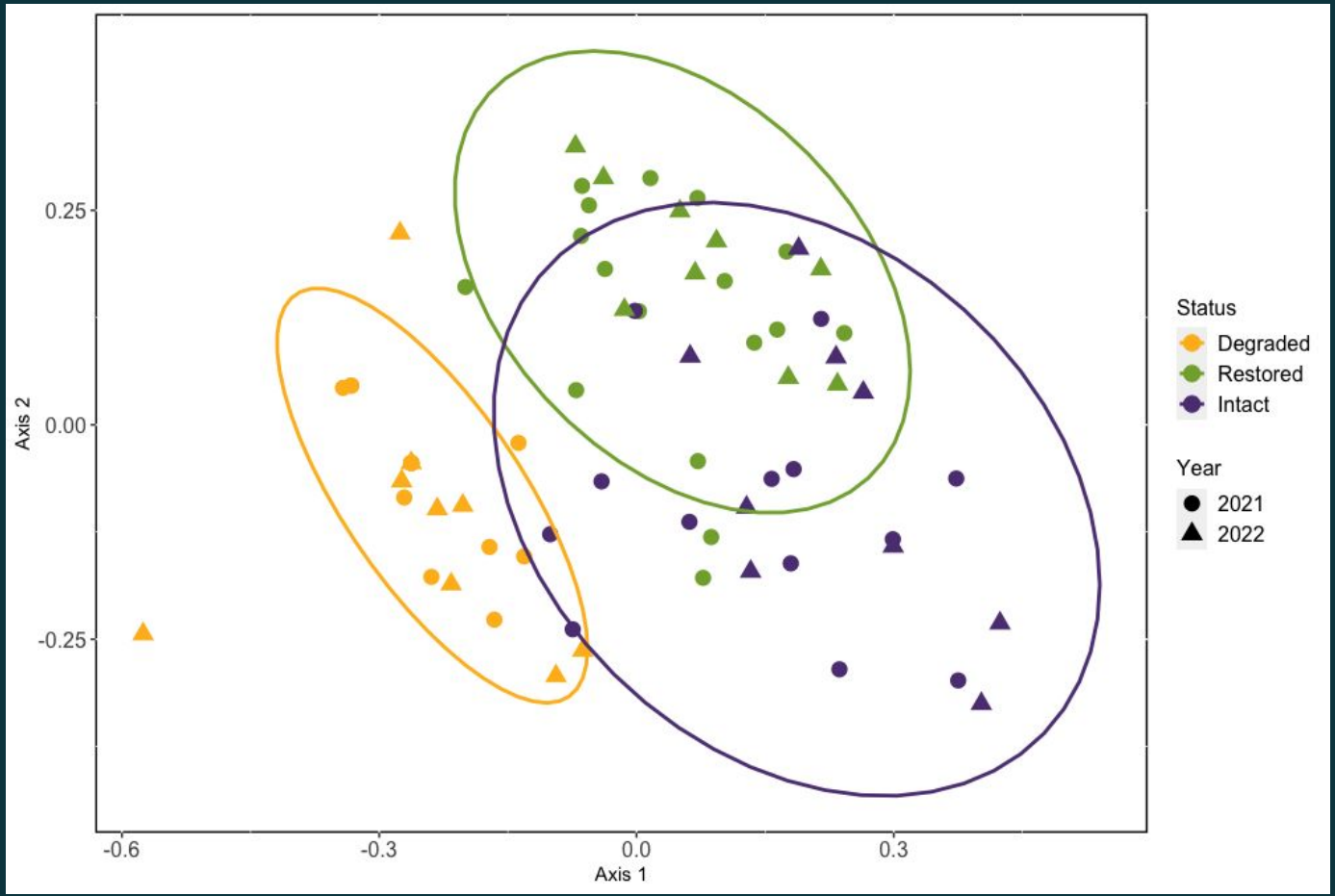

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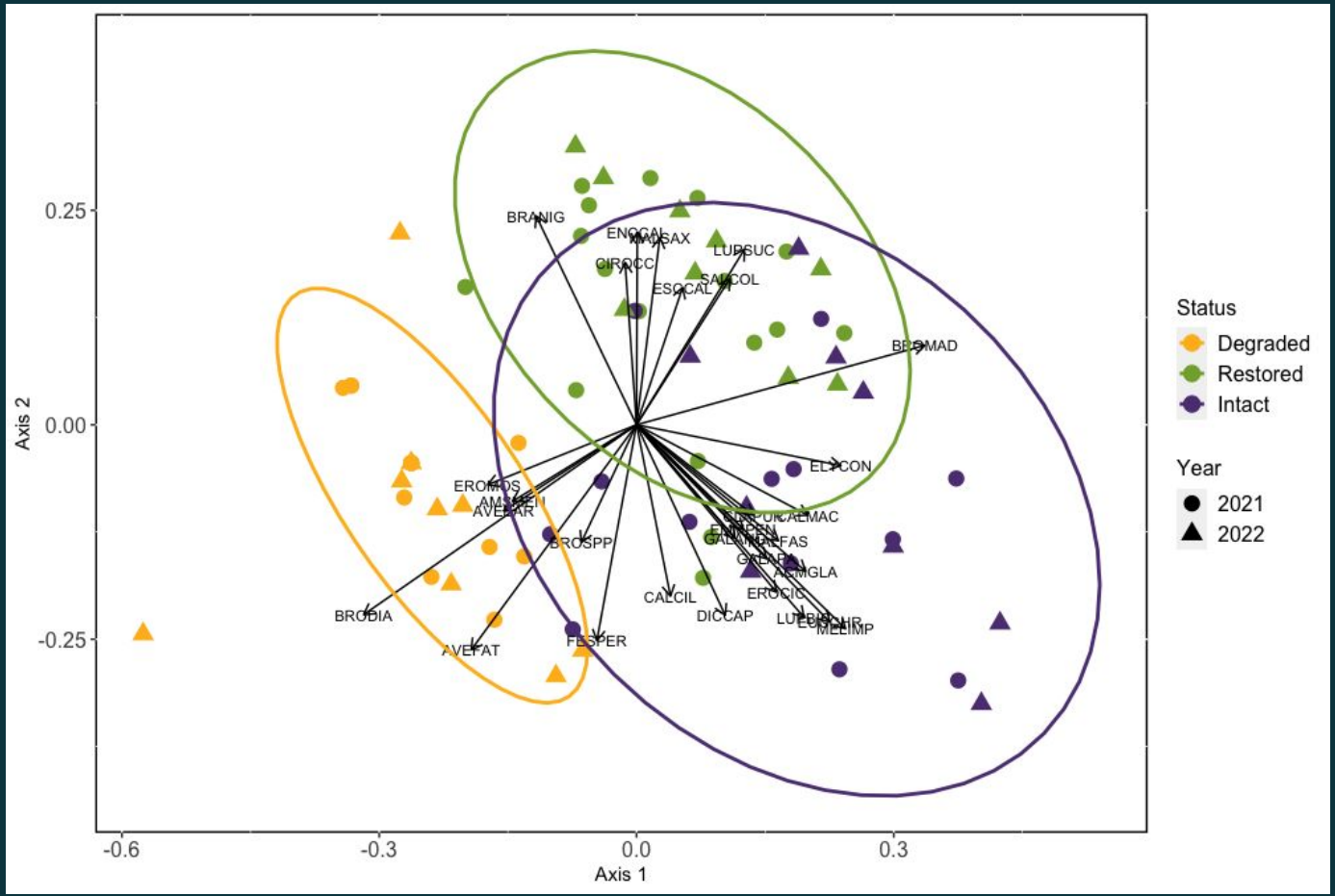
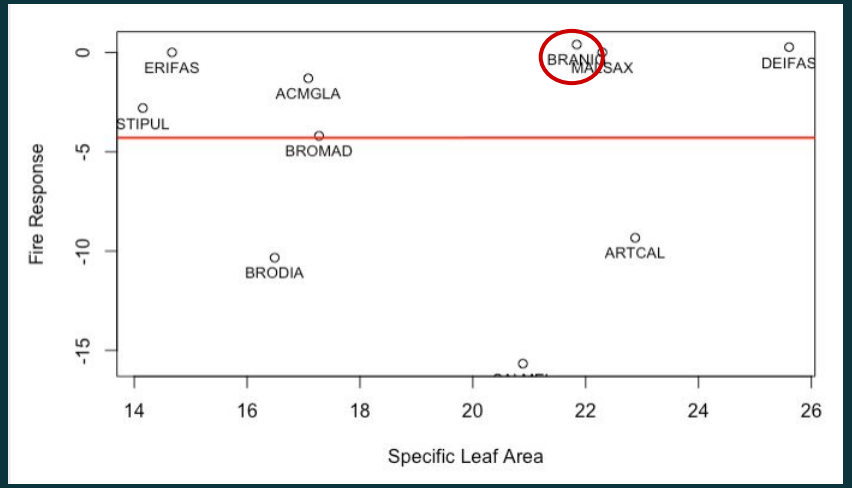


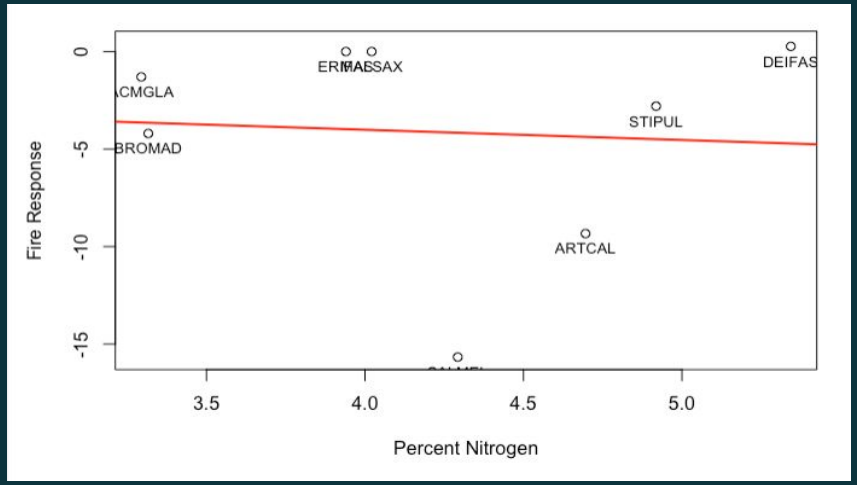
Non-metric multidimensional scaling (NMDS) plot

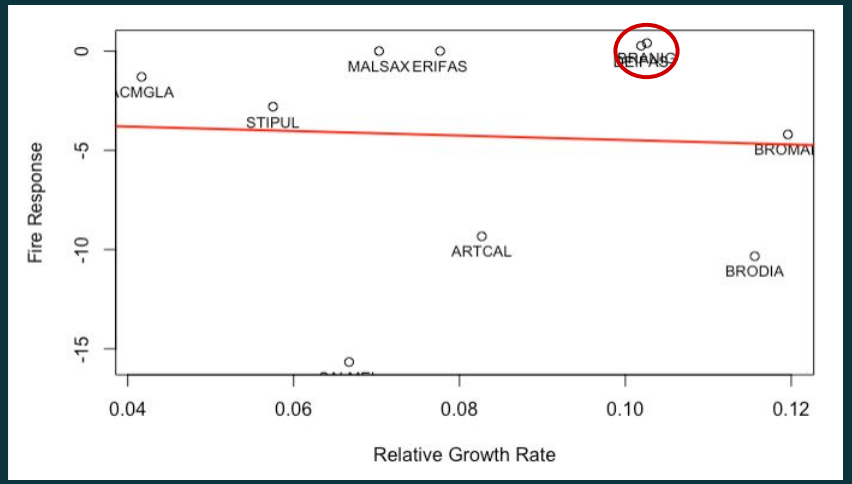
Plant Traits

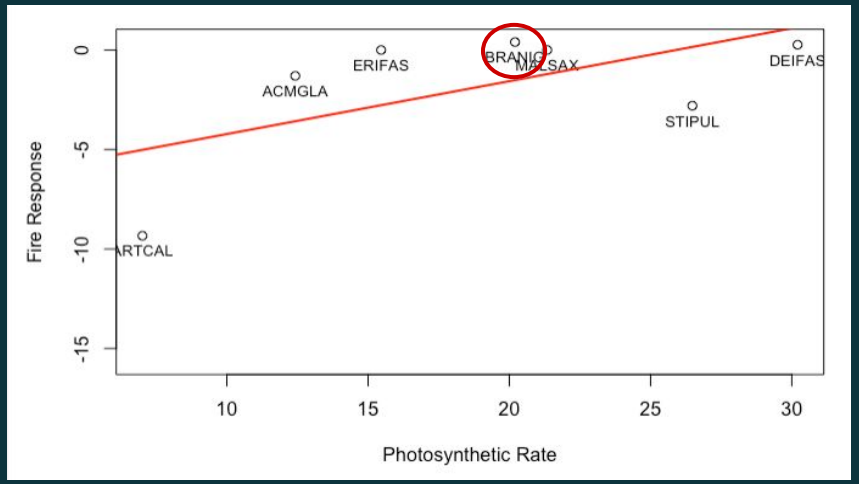
Plant Traits

- Loma Ridge Global Change Experiment
- Data was collected before and after the Silverado Fire
- Fire Response Variable


ERIFAS
ACMGLA
STIPUL
BROMAD
BRODIA
ARTCAL
DEIFAS
Fire Response
Specific Leaf Area
0
-5
-10
-15
14
16
18
20
22
24
26


ACMGLA
BROMAD
STIPUL
ARTCAL
DEIFAS
Fire Response
Percent Nitrogen
0
-5
-10
-15
3.5
4.0
4.5
5.0

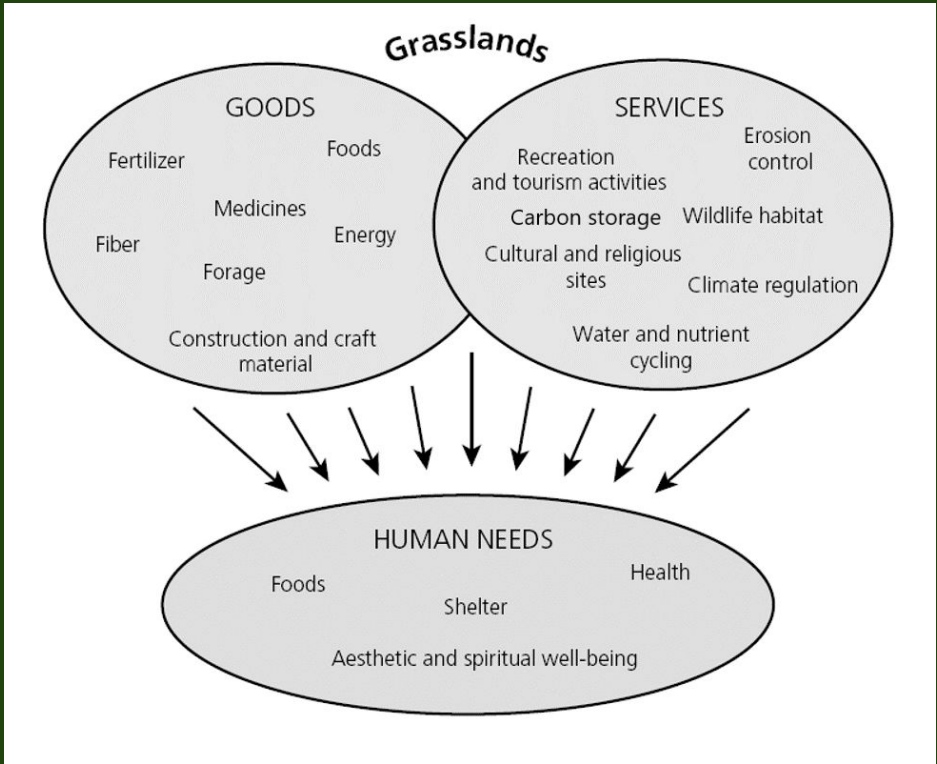

MALSAX
ERIFAS
STIPUL
ARTCAL
BRODIA
Fire Response
Relative Growth Rate
0
-5
-10
-15
0.04
0.06
0.08
0.10
0.12


ERIFAS
ACMGLA
STIPUL
DEIFAS
Fire Response
Photosynthetic Rate
0
-5
-10
-15
10
15
20
25
30

Grassland Monitoring

Grassland Monitoring

How does grassland **composition** and **cover** vary over time in relation to fire, temperature, and precipitation?

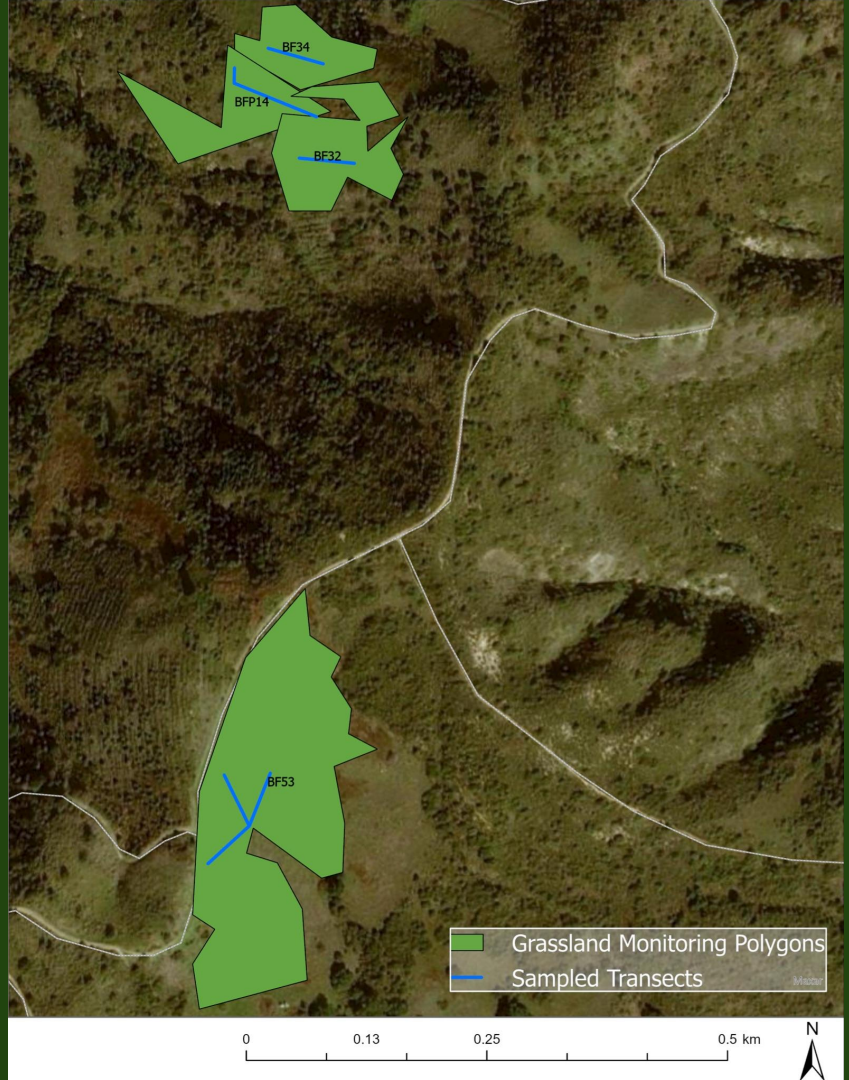


California Native Grasslands Association

Grassland Monitoring Methods

- 2015 - 2022
- 50m transects
- Vegetation cover
- Point-intercept method

- Native and non-native
- Forbs and grasses
- Native grass = *Stipa pulchra*



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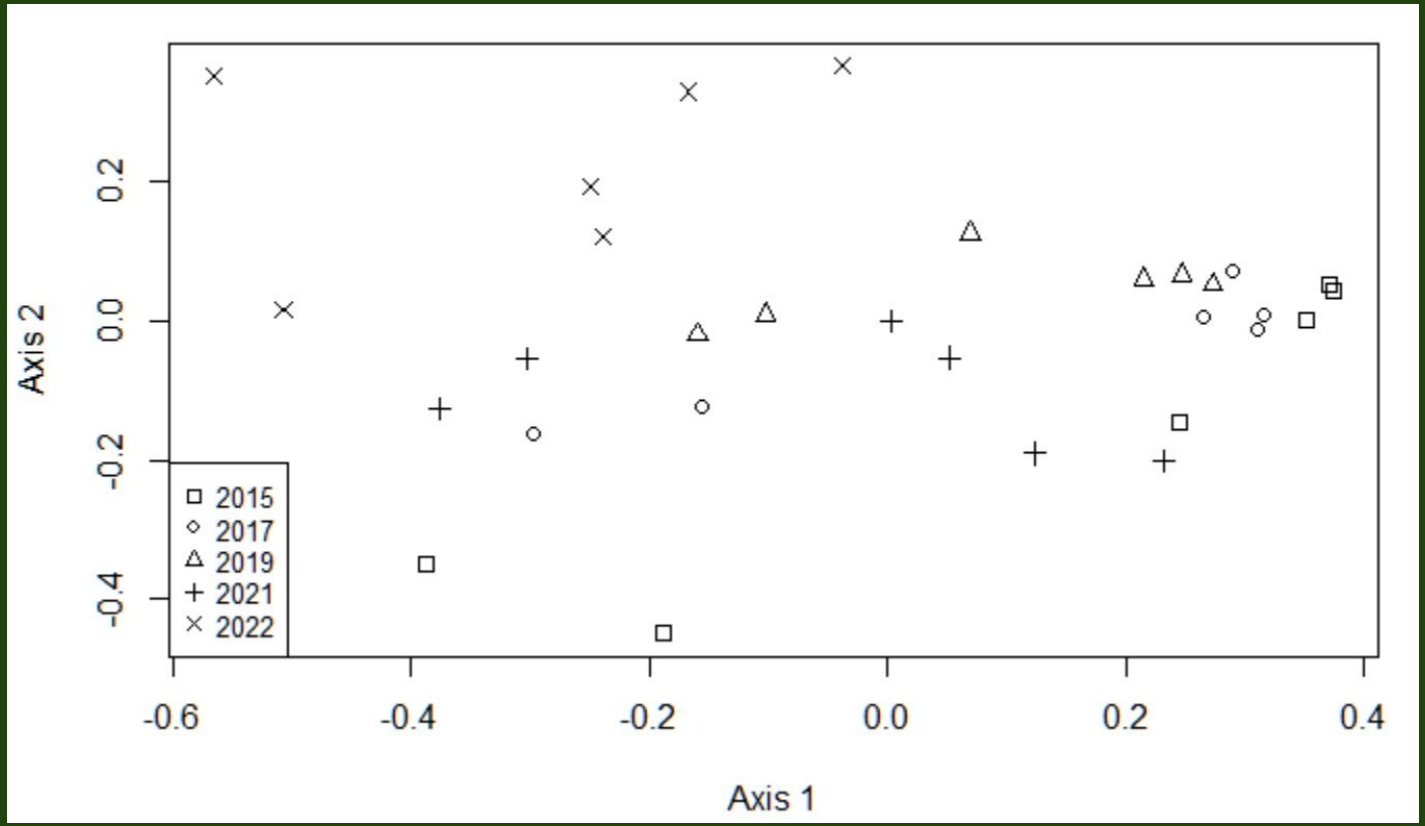
Grassland species composition is shifting over time



Non-metric multidimensional scaling (NMDS) plot

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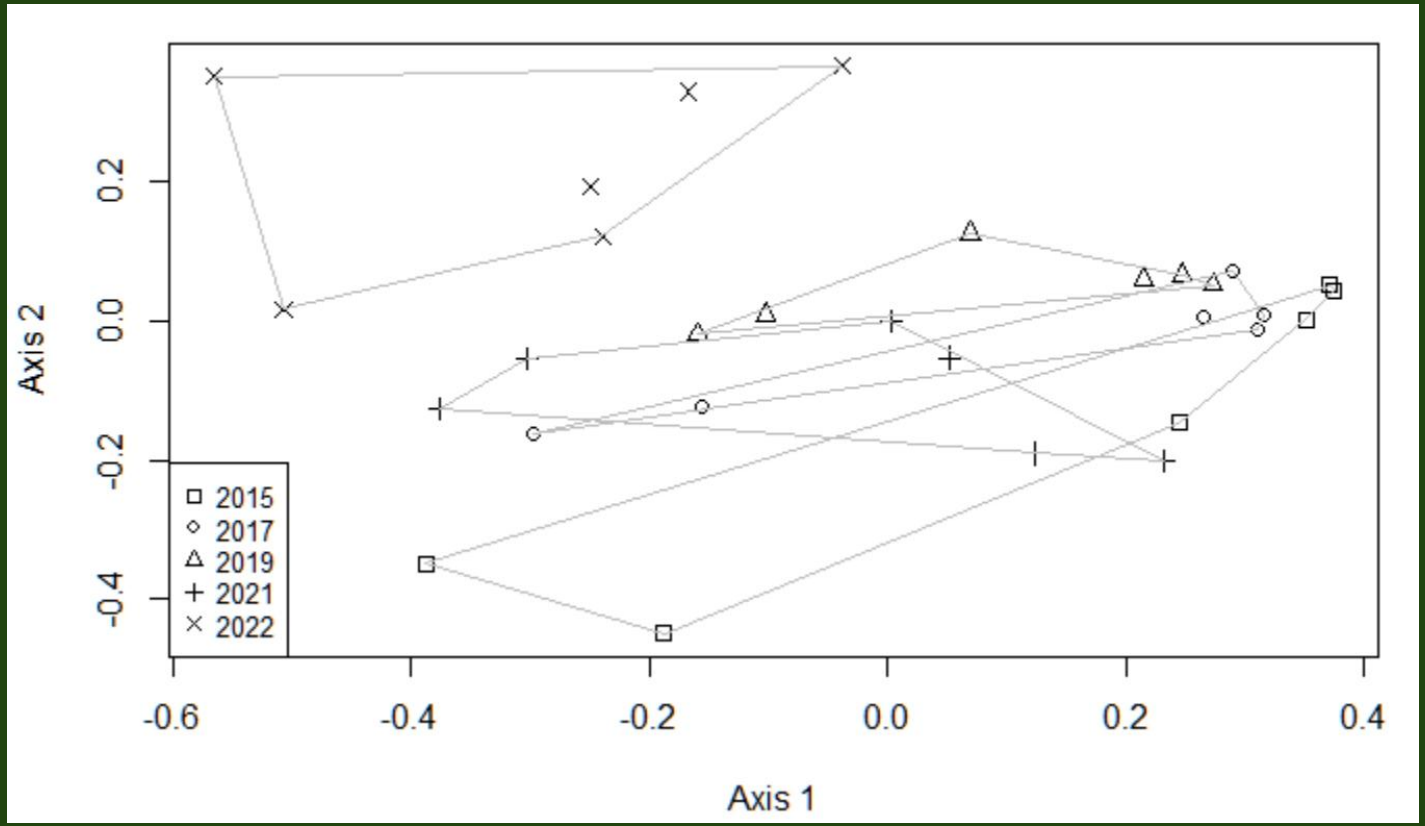

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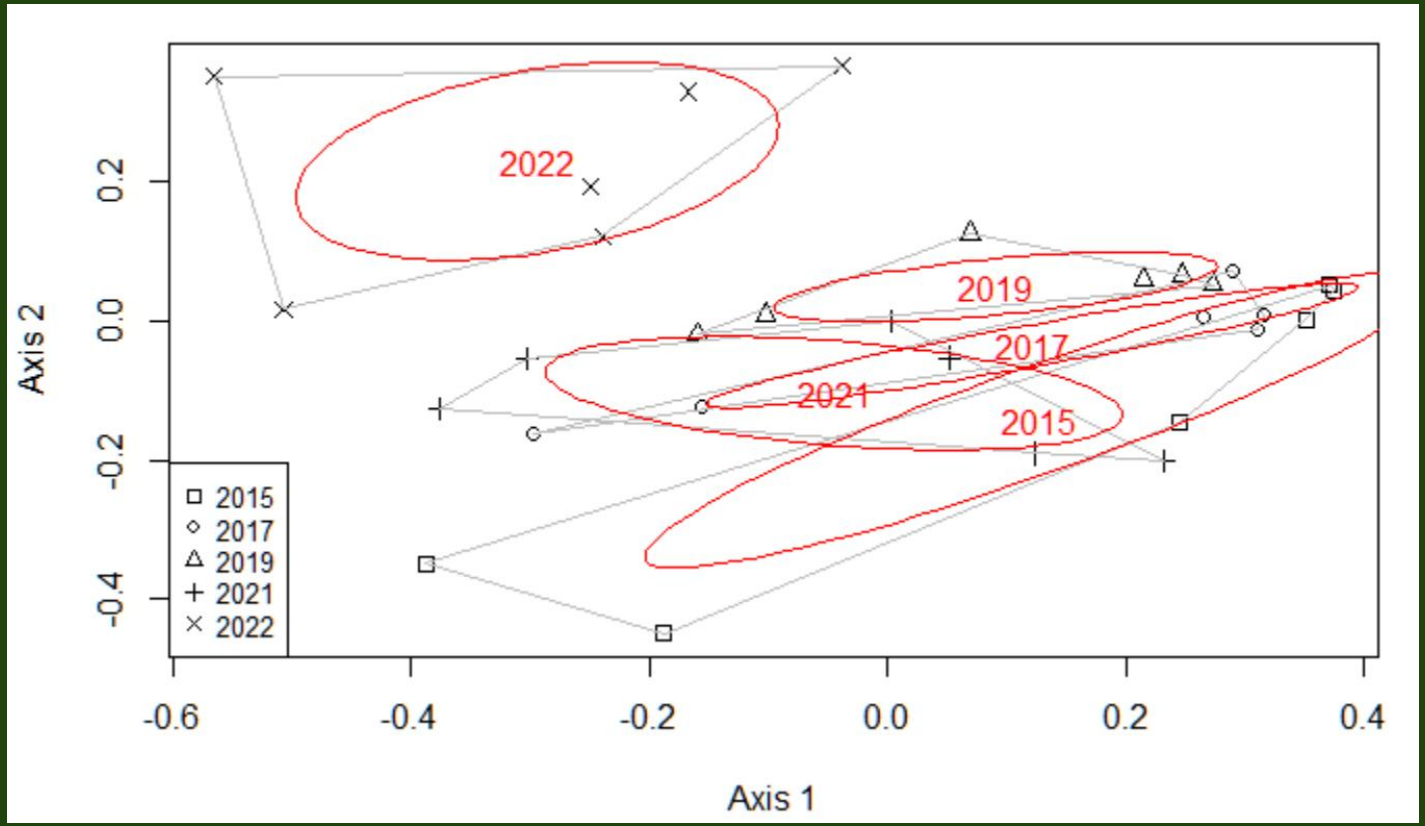

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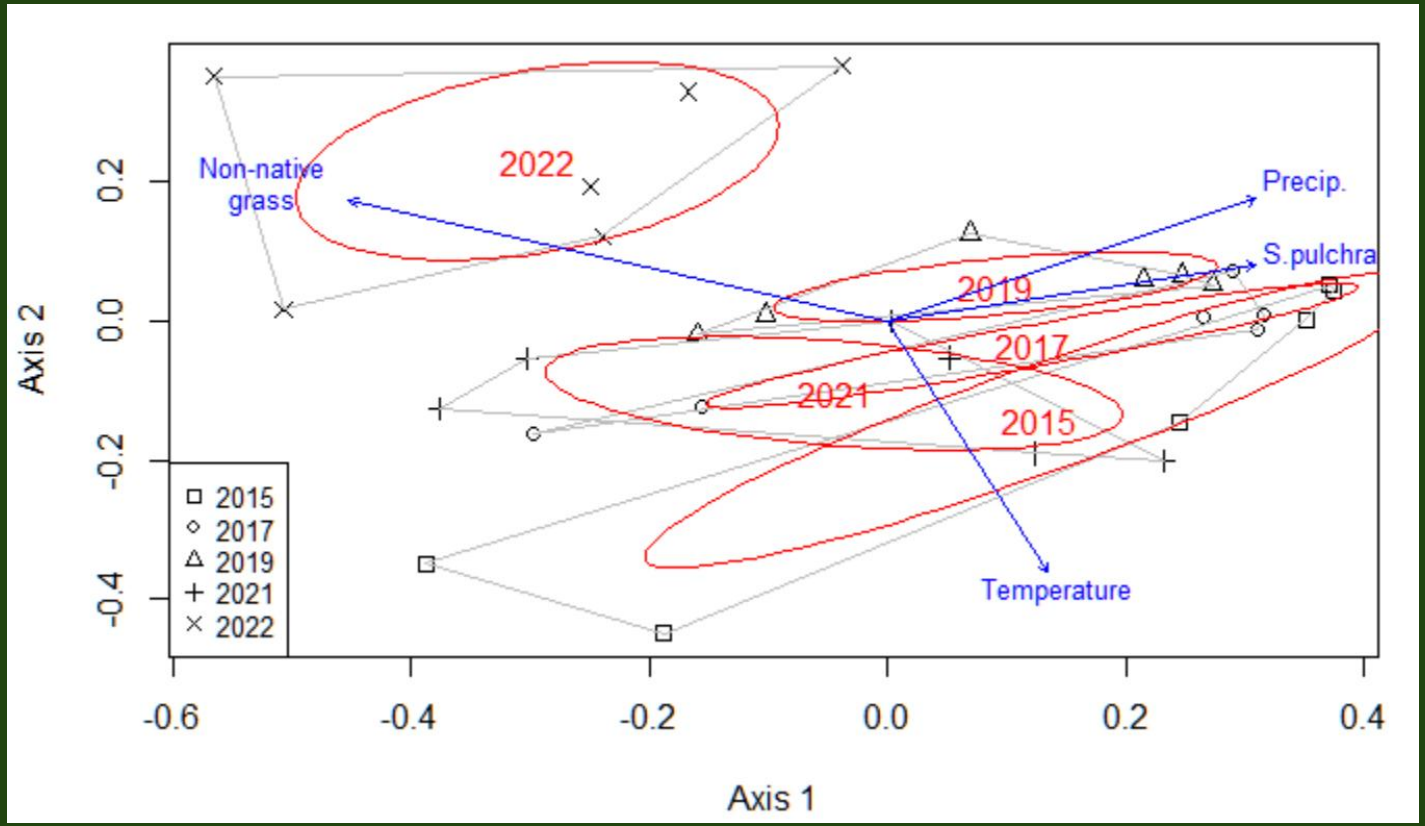

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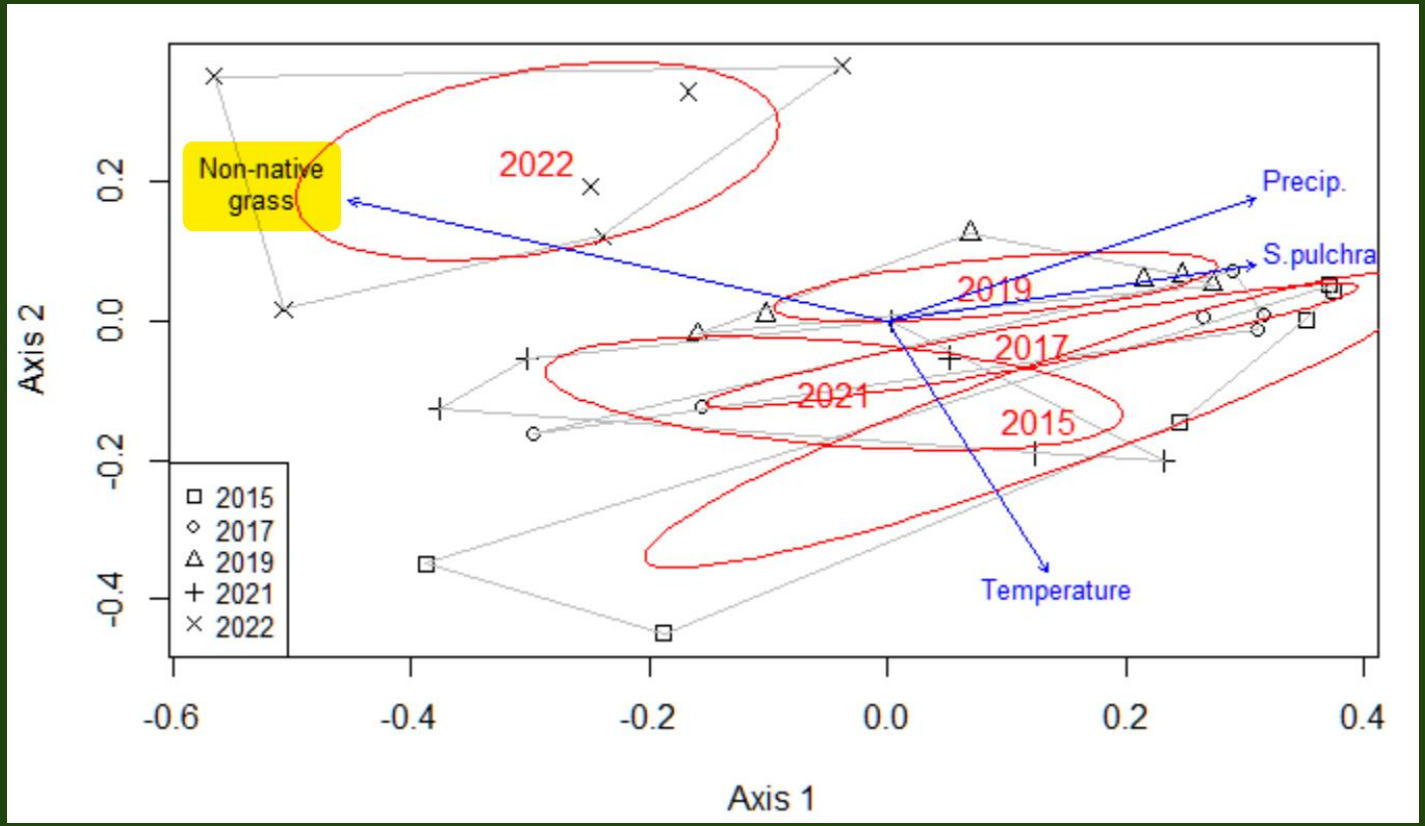

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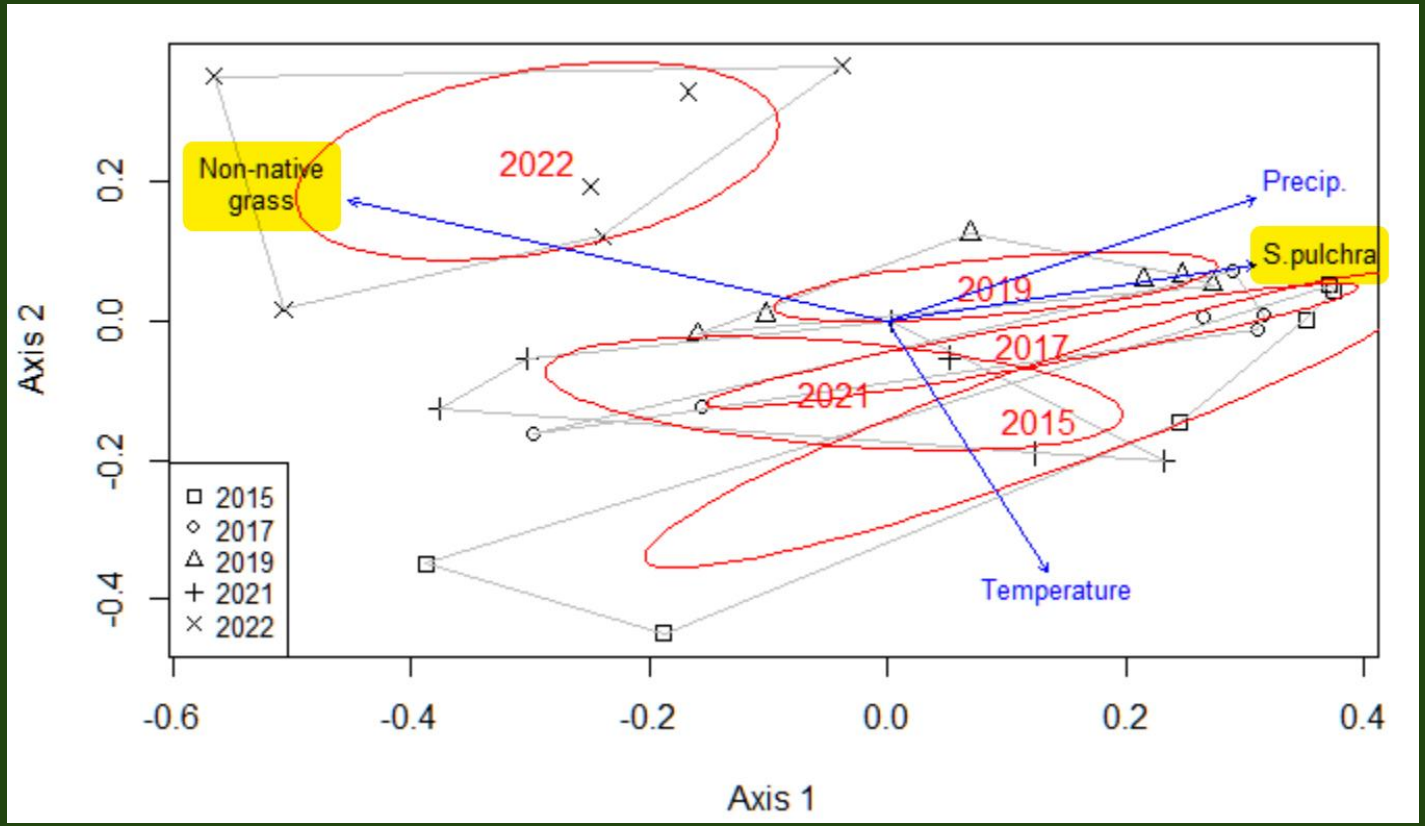

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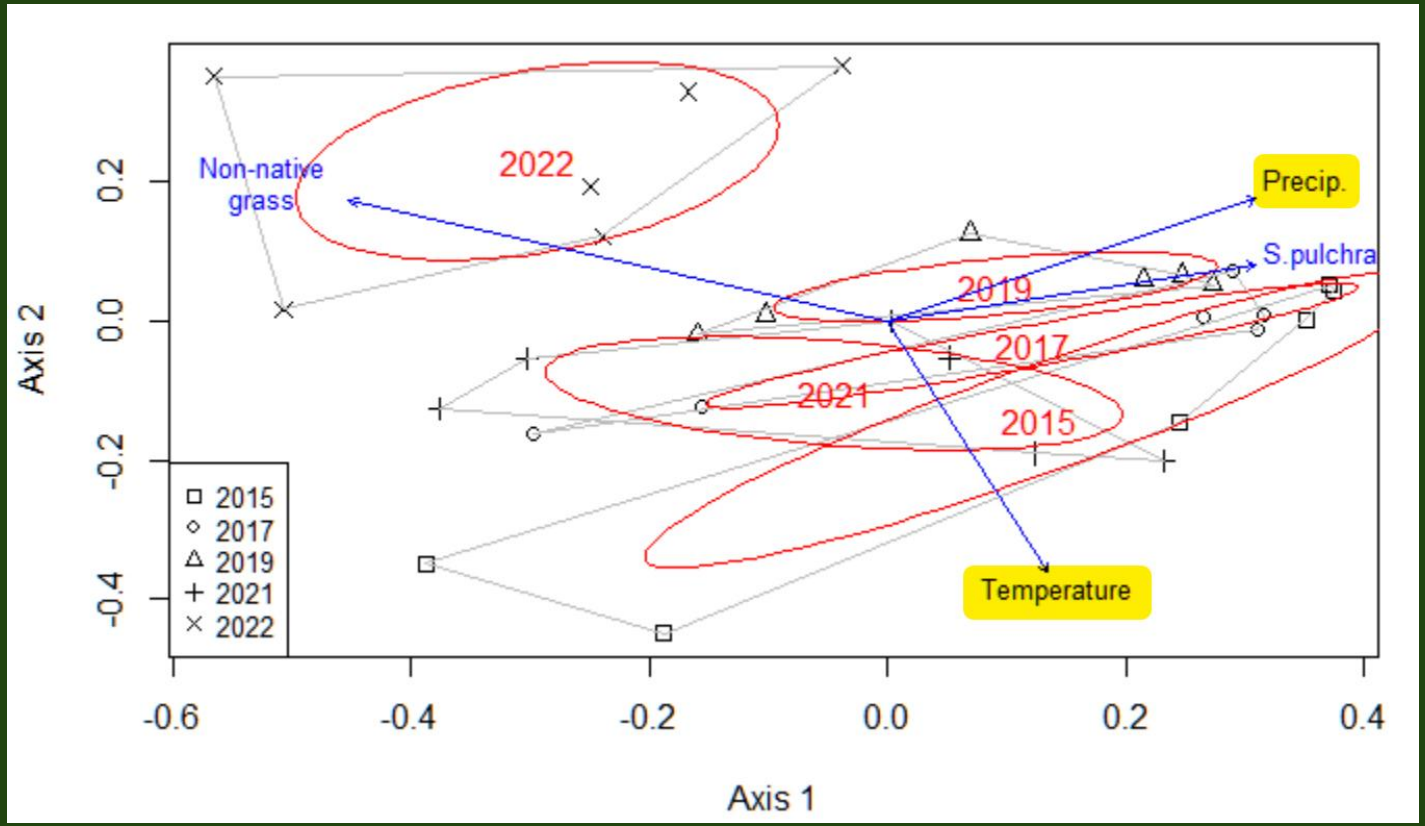
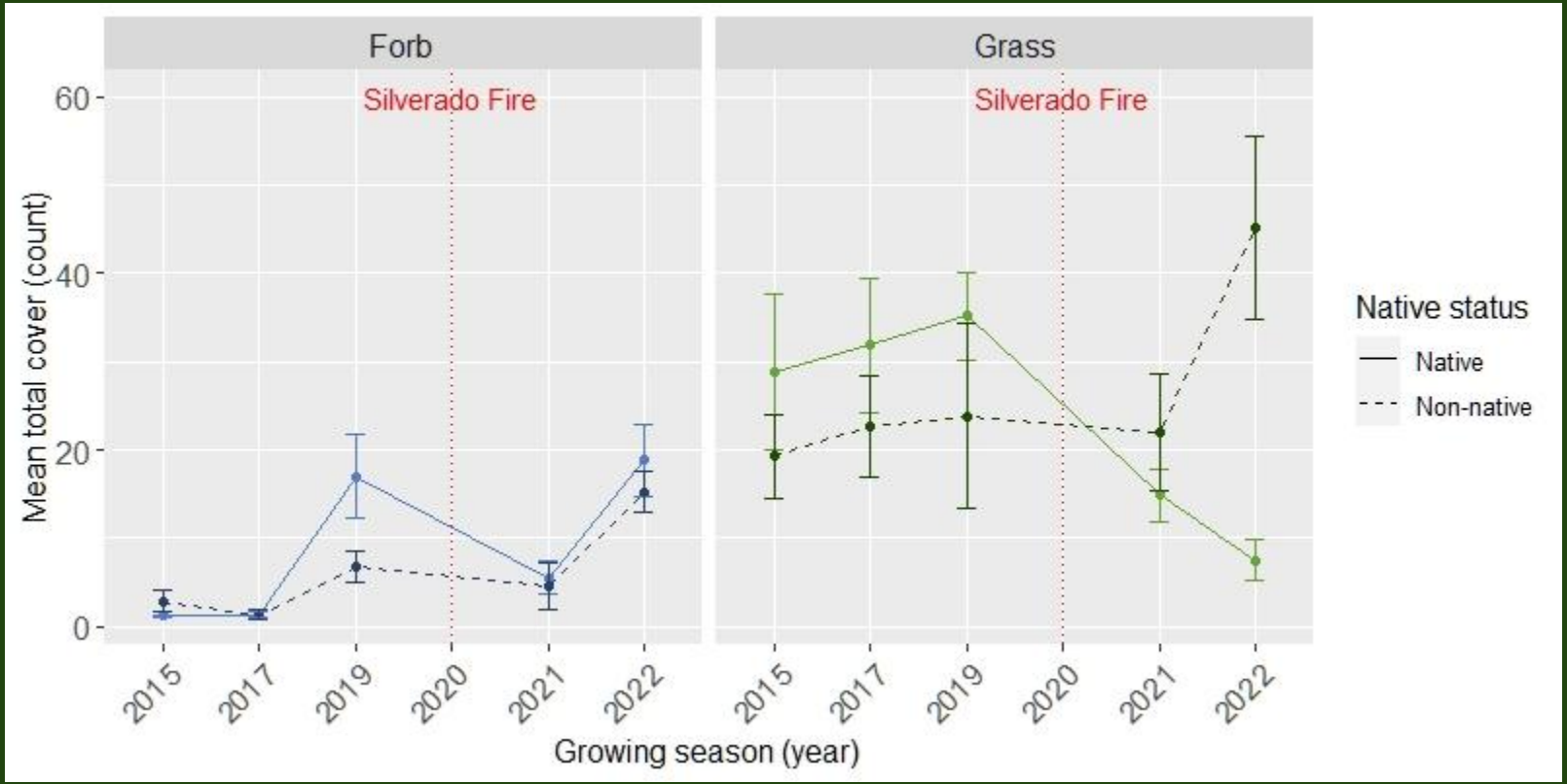
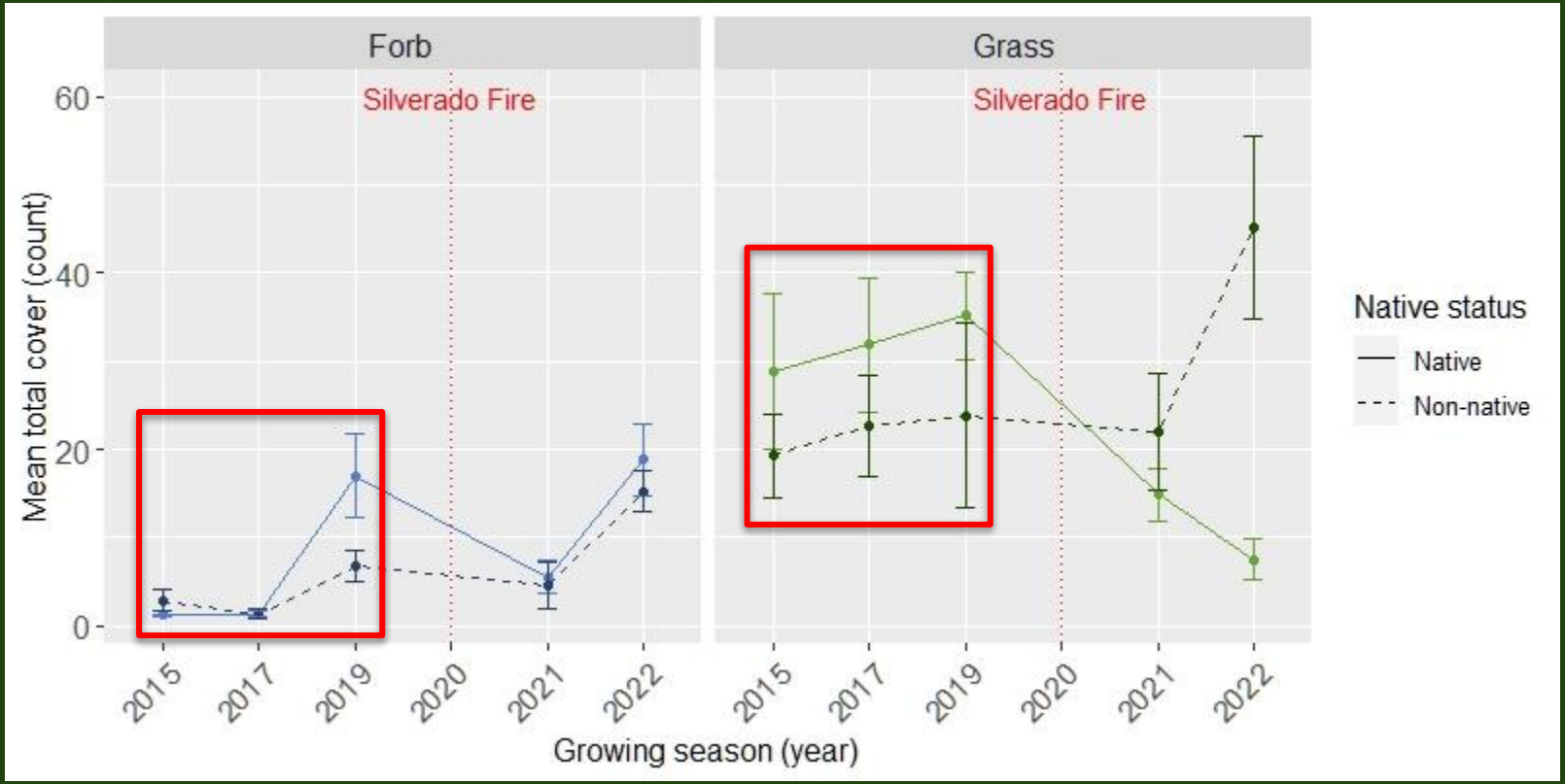


Non-metric multidimensional scaling (NMDS) plot

Changes in grassland cover over time



Cover increased until the fire, dropped immediately after, and differed in post-fire recovery



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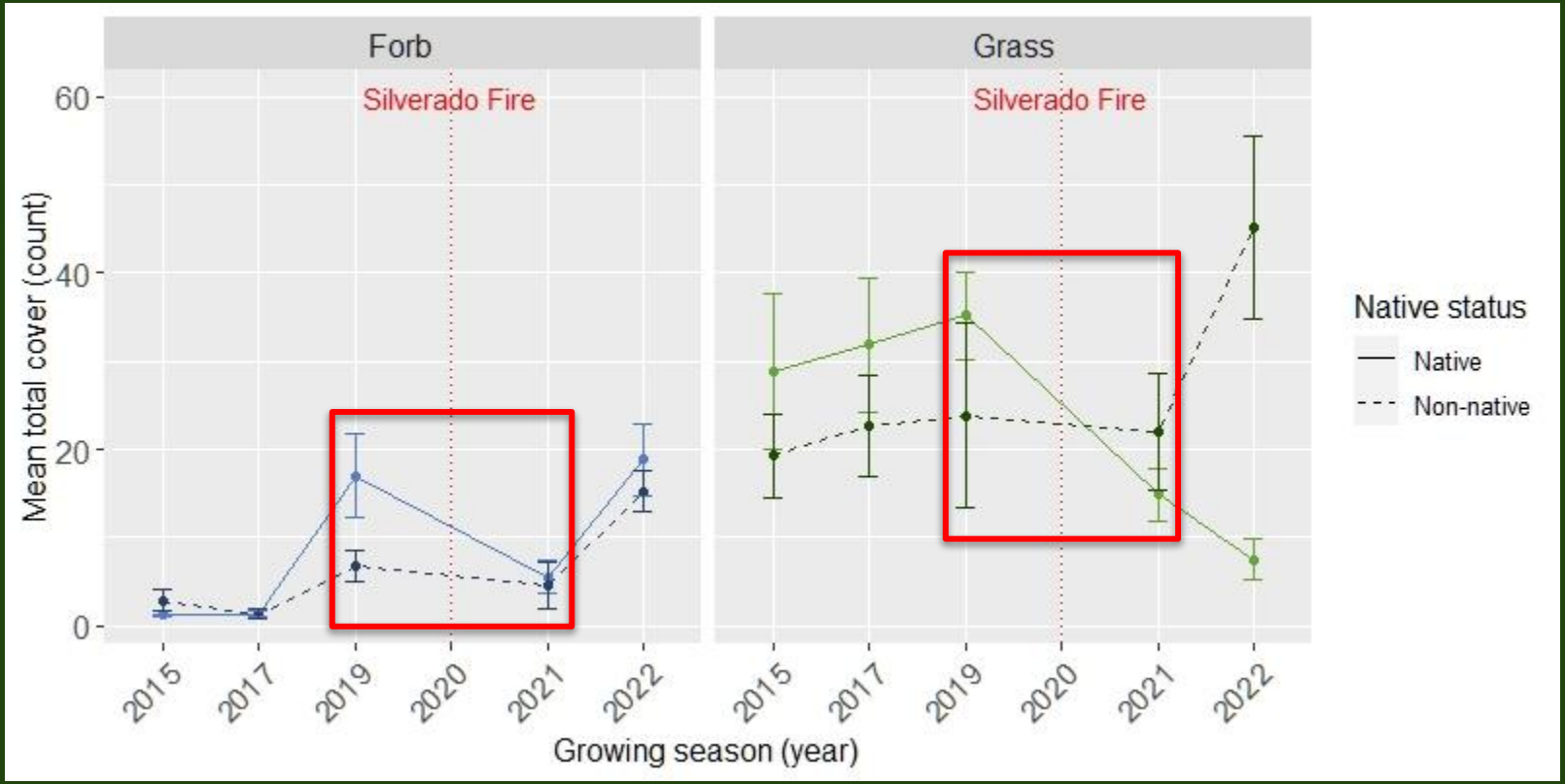

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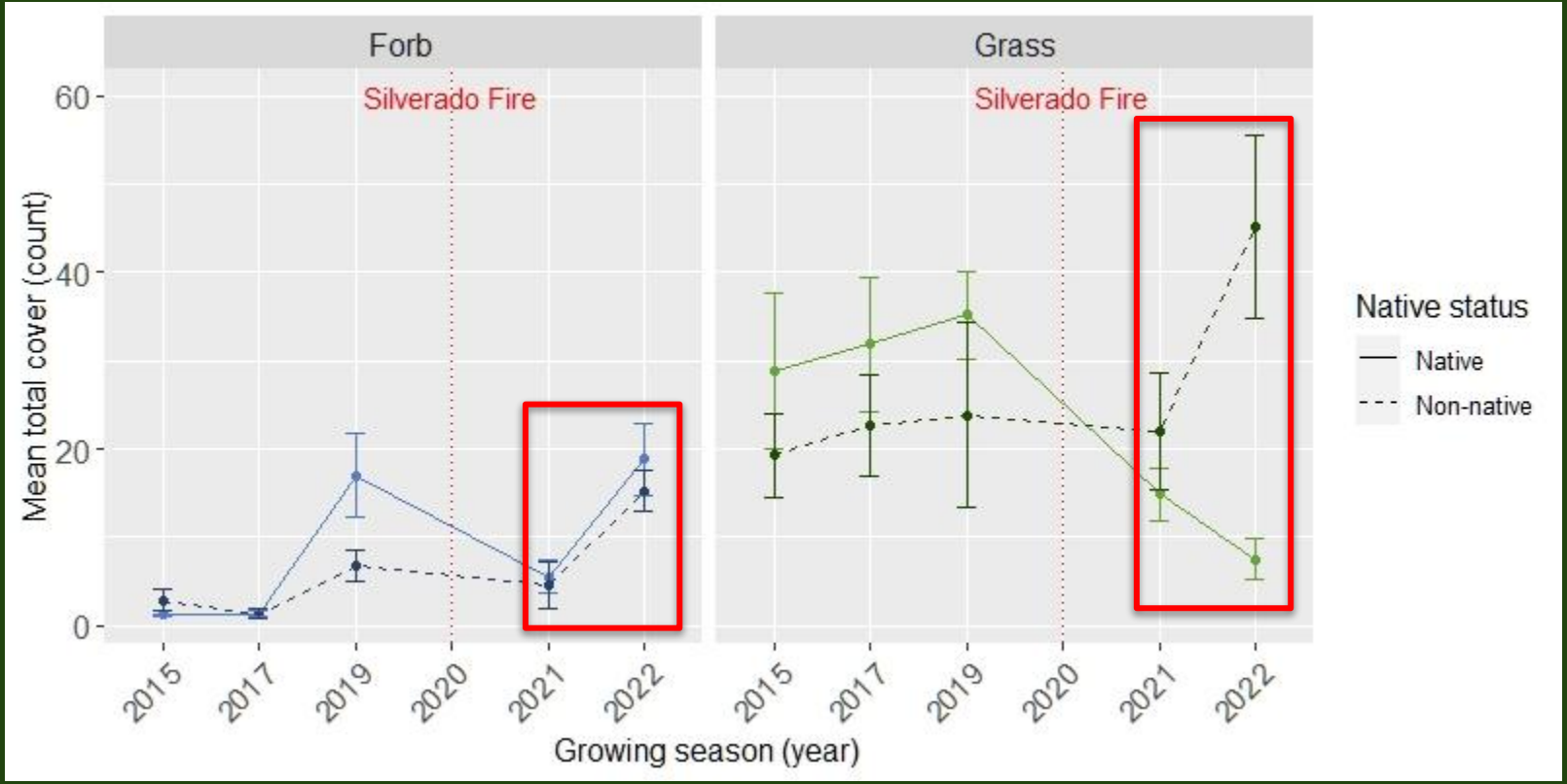
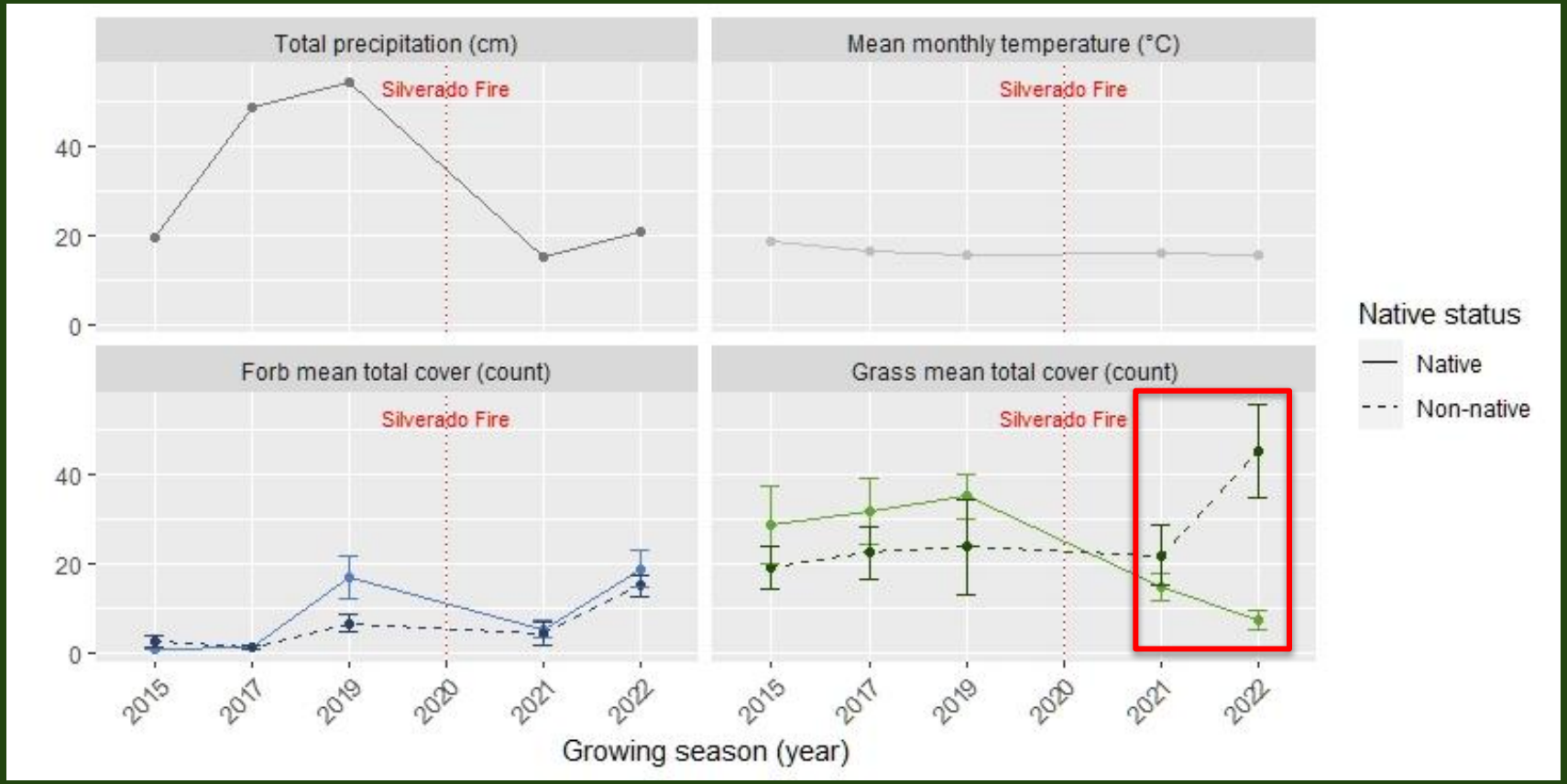


Non-native grasses are doing well after fire… *S. pulchra* is not



Education and Outreach

Recommendations

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1. **Continue post-fire monitoring**

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2. **Expand the restoration plant palette**

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3. **Create a post-fire recovery program**

Recommendations

1. Continue post-fire monitoring
2. Expand the restoration plant palette
3. Create a grassland post-fire recovery program
4. **Continue fire ecology education and outreach**

Key Conclusions

Key Conclusions

- IRC successfully assembled a resilient community
- CSS shrubs and forbs maintained resiliency post-fire and post-drought
- No correlation was found between CSS traits and fire response
- Restored native grass (*Stipa pulchra*) was not resilient post-fire


Thank you!