Functional group responses to burn severity in three ponderosa pine ecosystems a decade after fire

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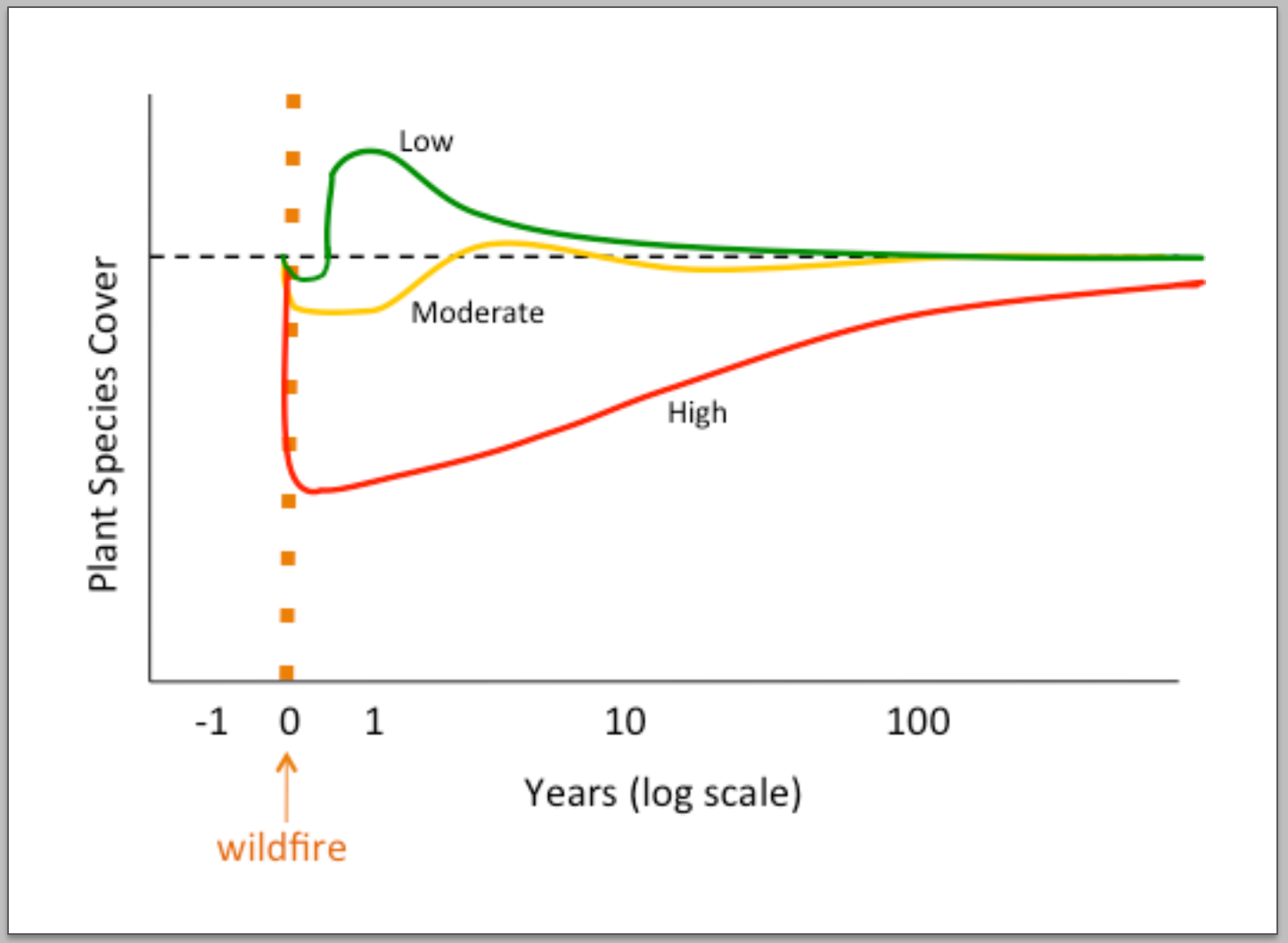
Hypothetical Responses

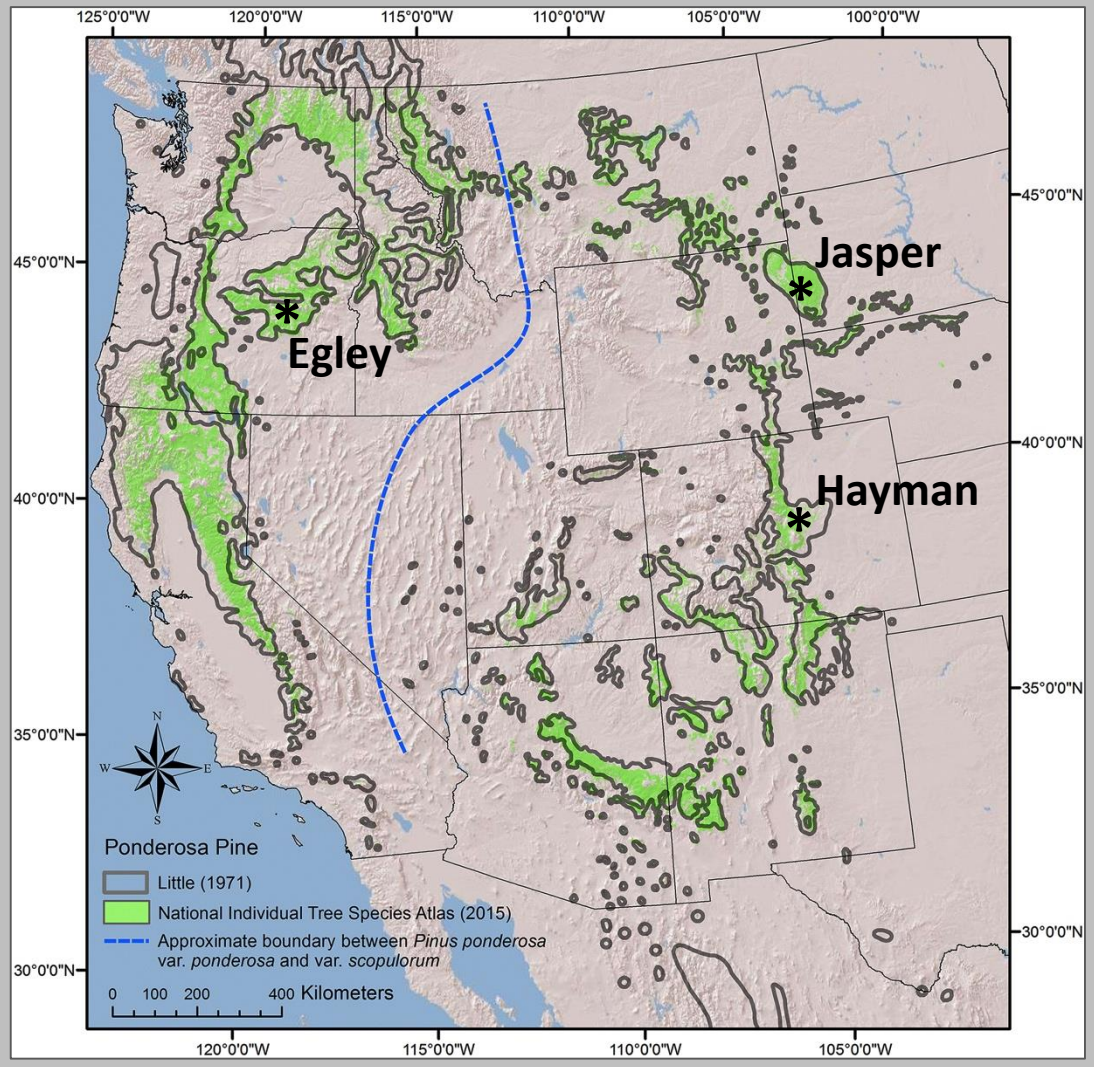


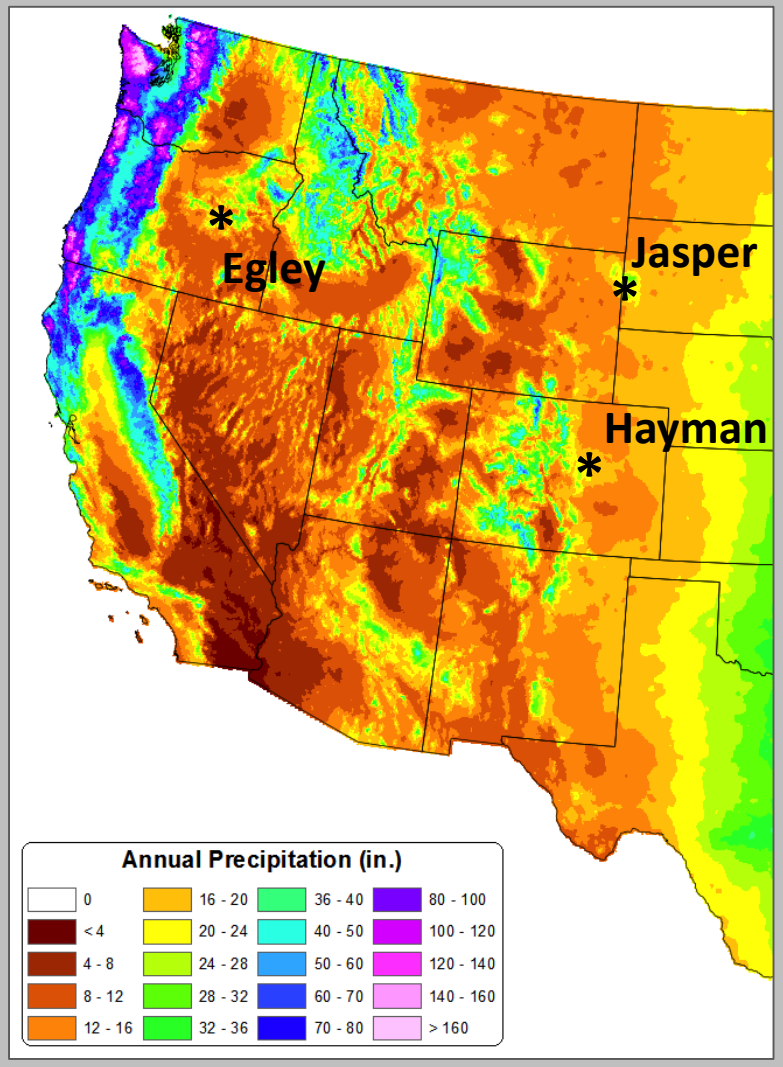
15 Fires

Vegetation Types

1. Subarctic Boreal Spruce
2. Moist Mixed Conifer
3. Dry Mixed Conifer
4. Ponderosa Pine
5. Mixed Chaparral

Ponderosa Pine Range





Shinneman et al. 2016 PLOS One

www.prism.oregonstate.edu

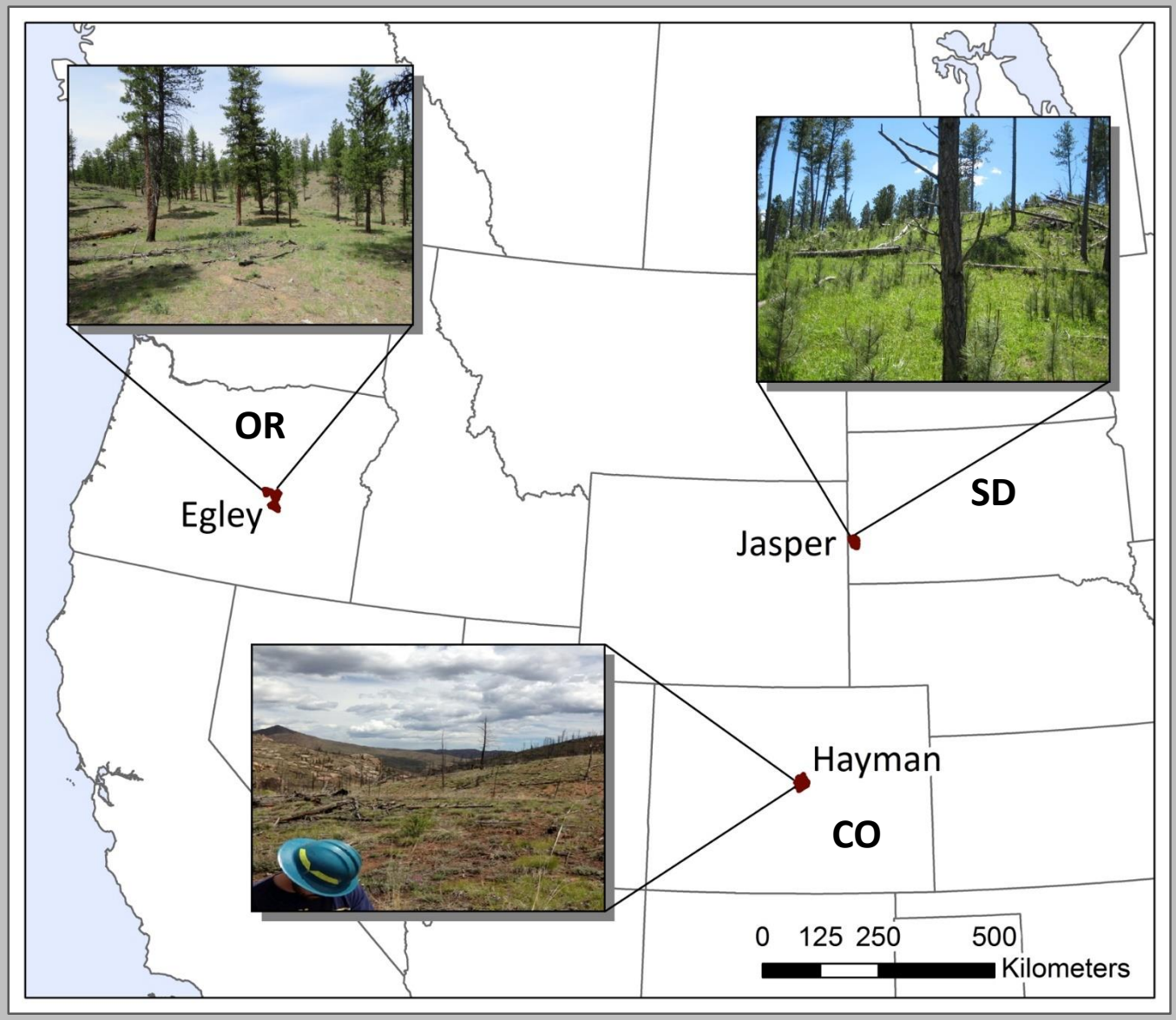
Research Questions

Understory Responses

1. Are there effects of burn severity on plant communities a decade after fire?

2. Does post-fire recovery differ among ponderosa pine communities?

Research Sites



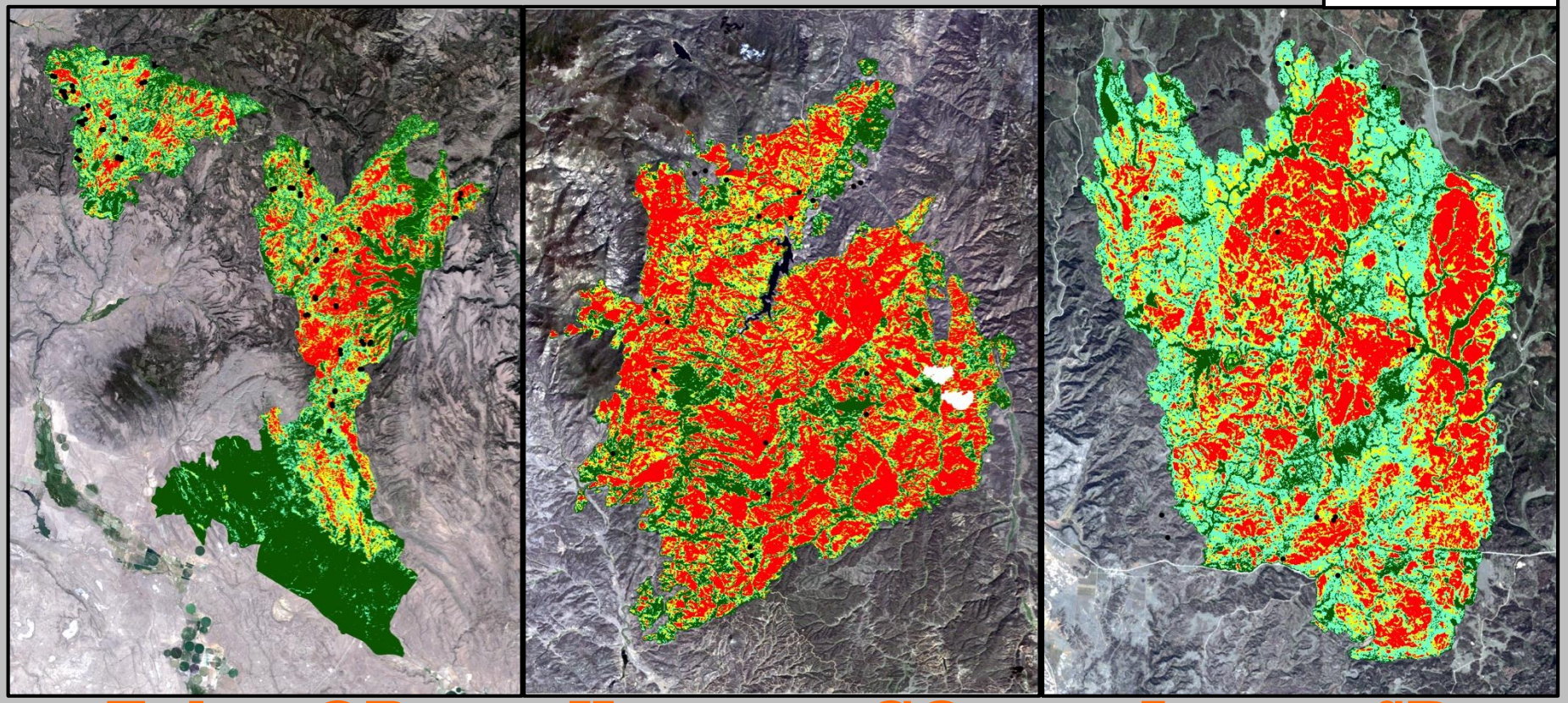
Fire Characteristics

	Egley, OR	Hayman, CO	Jasper, SD
Year Burned	2007	2002	2000
Year Resampled	2016	2015	2015
Years Post-fire	9	13	15
Mean Elevation (m)	1587	1825	1739
Mean Annual Temp (°C)	5.7	5.3	5.4
Mean Annual Precip (mm)	320	421	563

Burn Severity

MTBS = Monitoring Trends in Burn Severity

dNBR = differenced Normalized Burn Ratio



Egley, OR

Hayman, CO

Jasper, SD

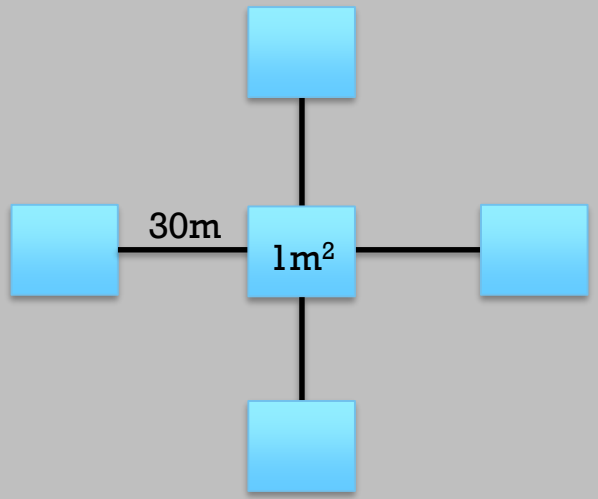
Experimental Design

Site Stratification

1. Burn severity (dNBR)
   - Ranged 6 to 925
2. Elevation
   - Ranged 1507-2859m
3. Aspect
   - TRASP (Transformed Aspect)

Sampling

Five plots per site



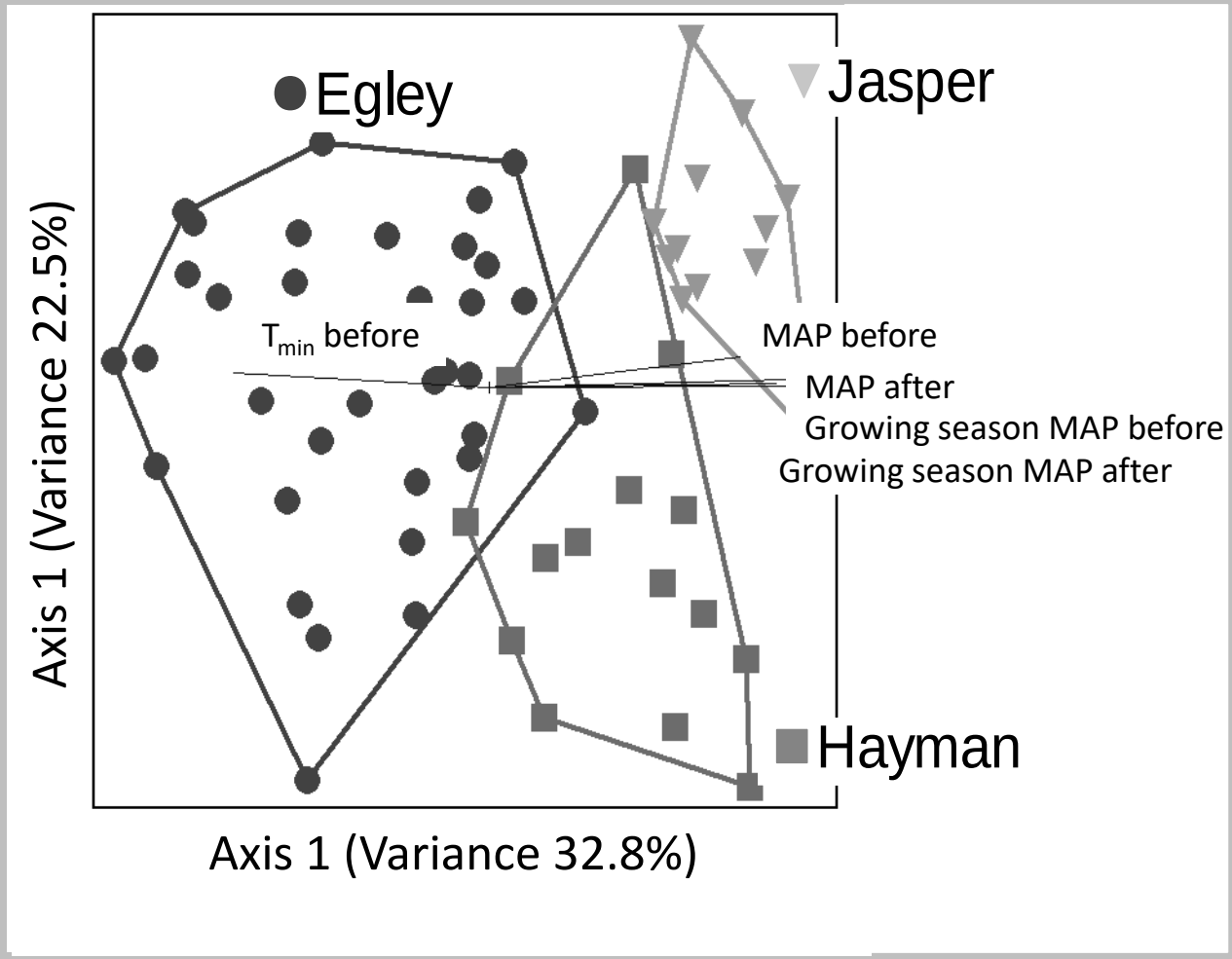
Visually estimated cover

Analysis

Multivariate

Non-metric multidimensional scaling (NMS) ordination

- dNBR
- Plant cover
- Climate



Analysis

Univariate

Multiple linear regression

Explanatory variables:

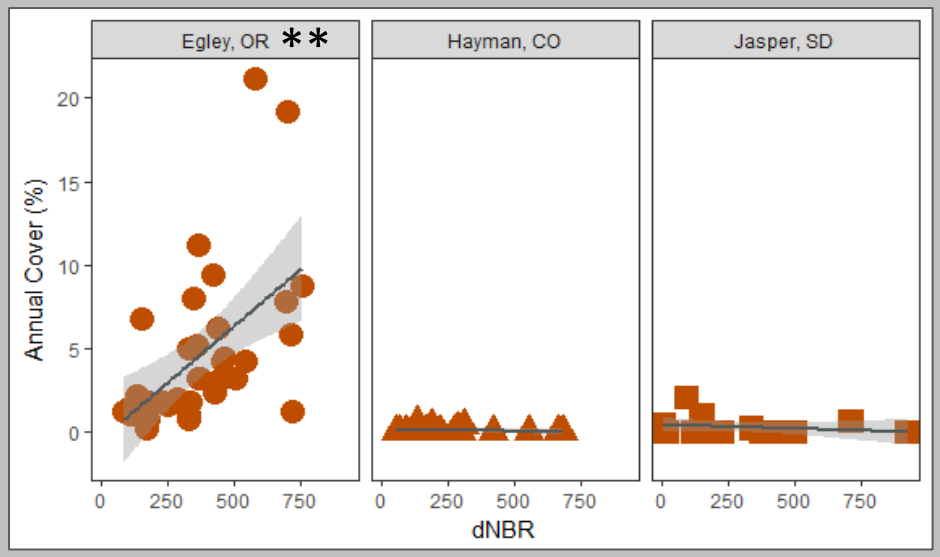
- dNBR
- Mean annual precipitation after fire

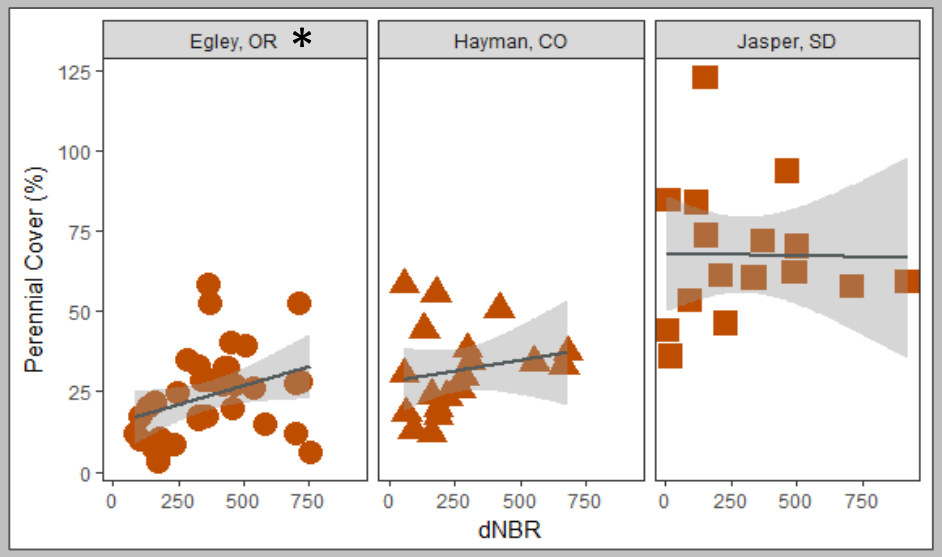
Response variables:

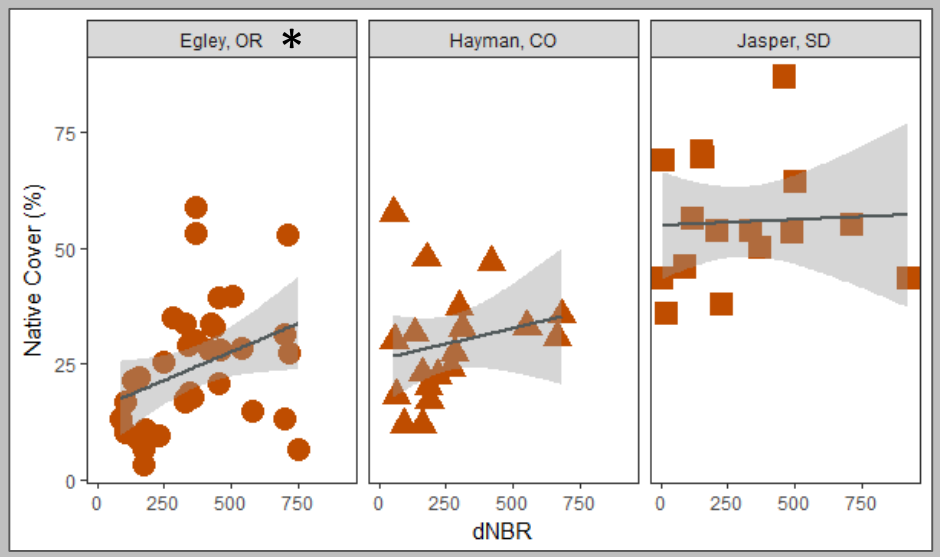
- Cover (%)
  - Annual & perennial
  - Native & introduced
  - Graminoid, forb, shrub
  - Total
  - Species
- Shannon's Diversity (H')

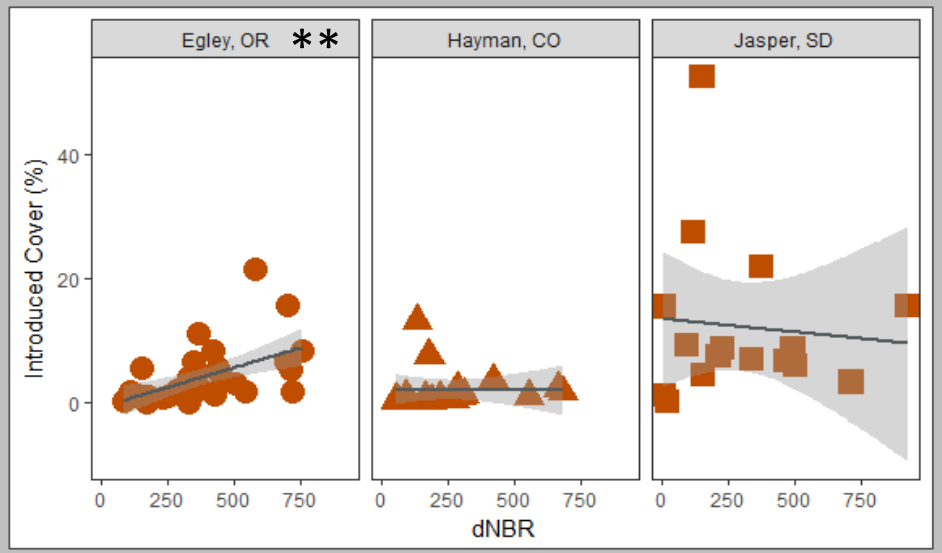
Functional Group Results

Burn Severity Effects



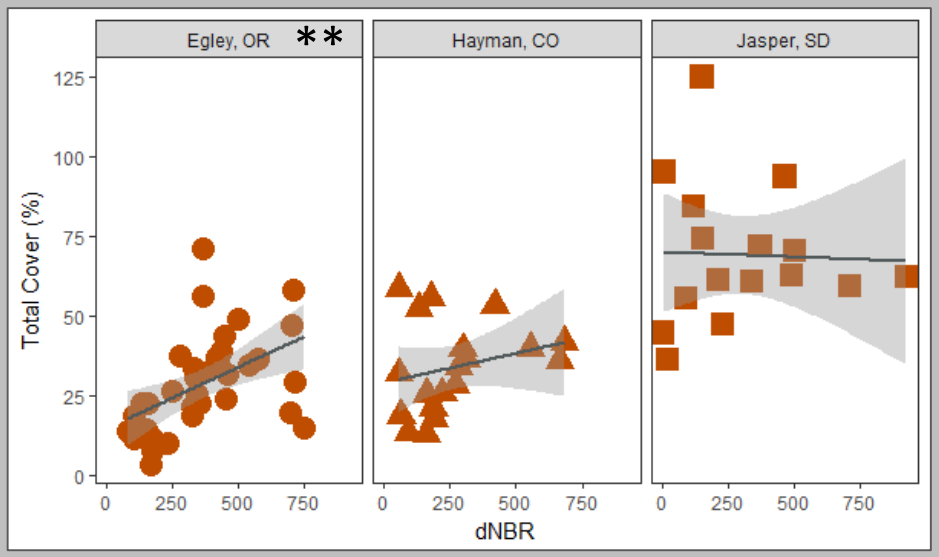


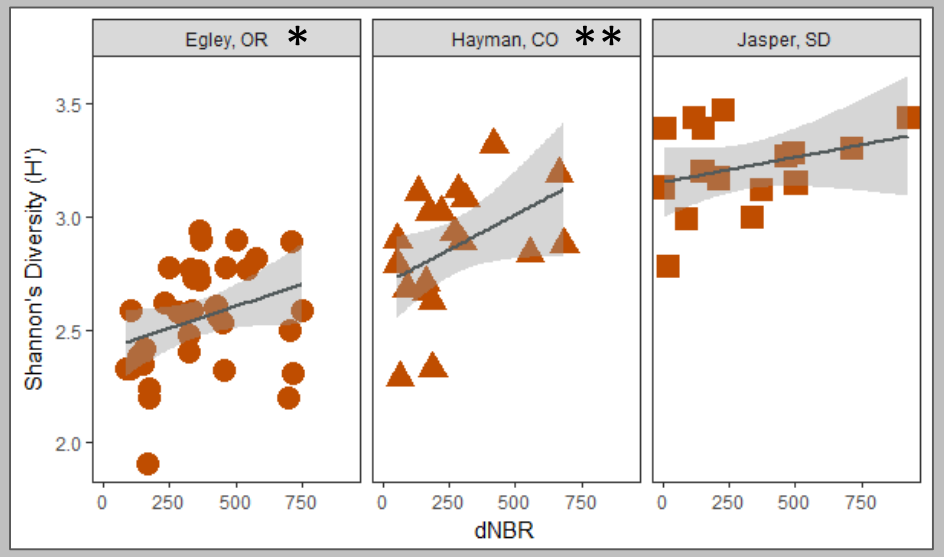




** P< 0.05; *P< 0.10

Burn Severity Effects





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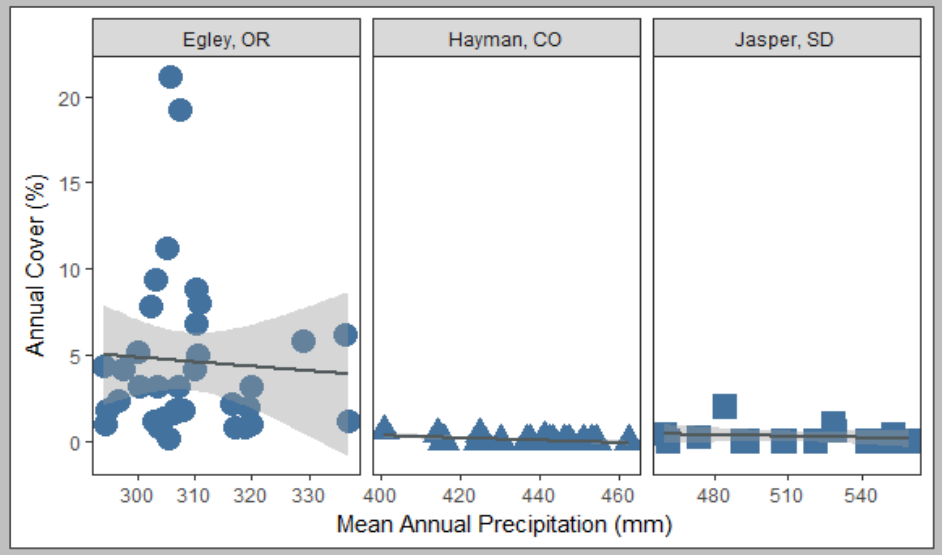
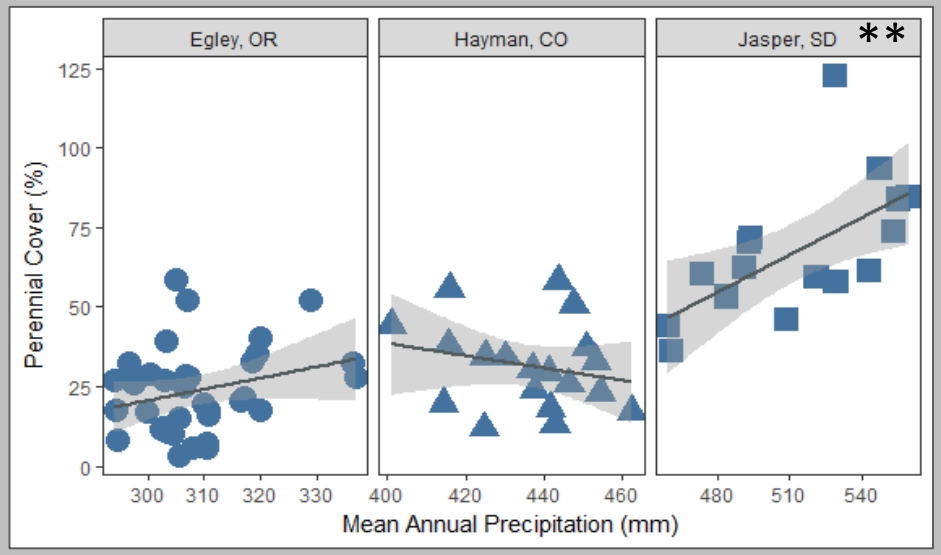
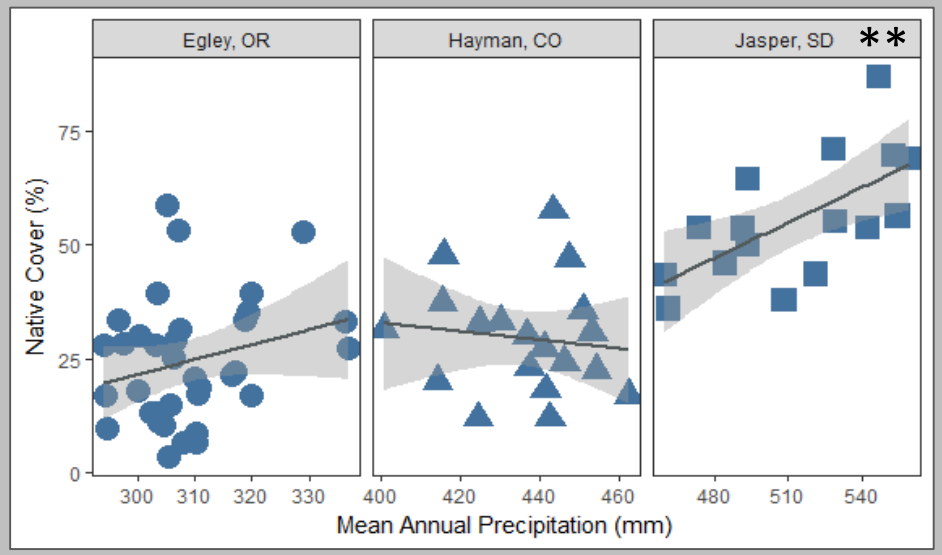
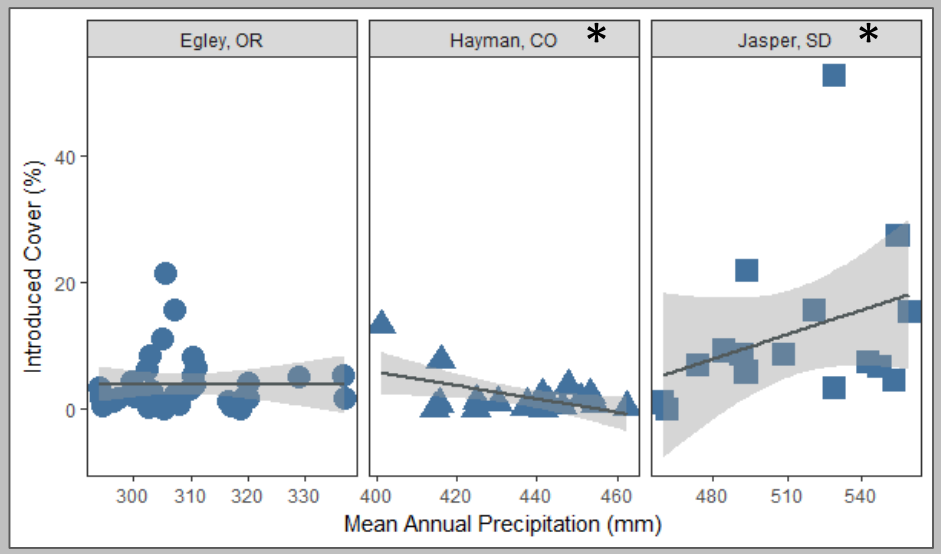
Precipitation Effects









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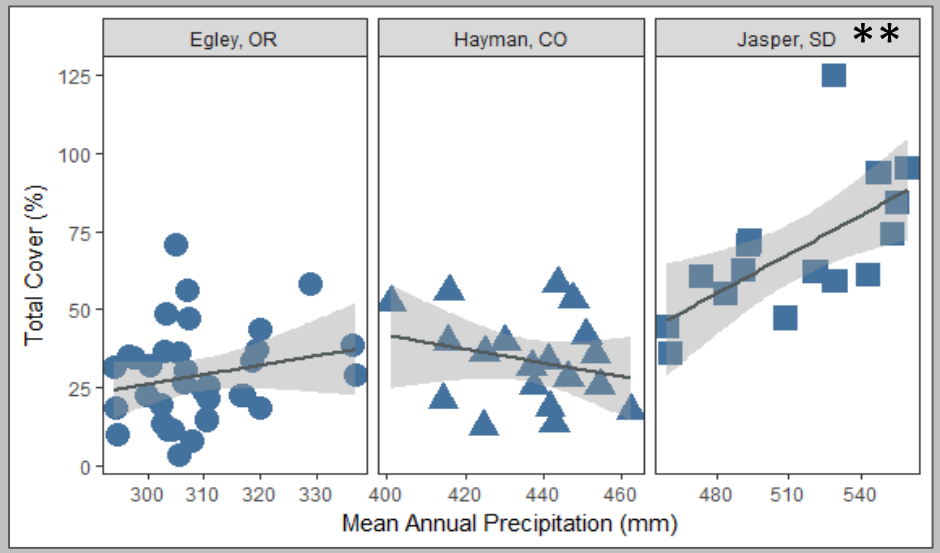

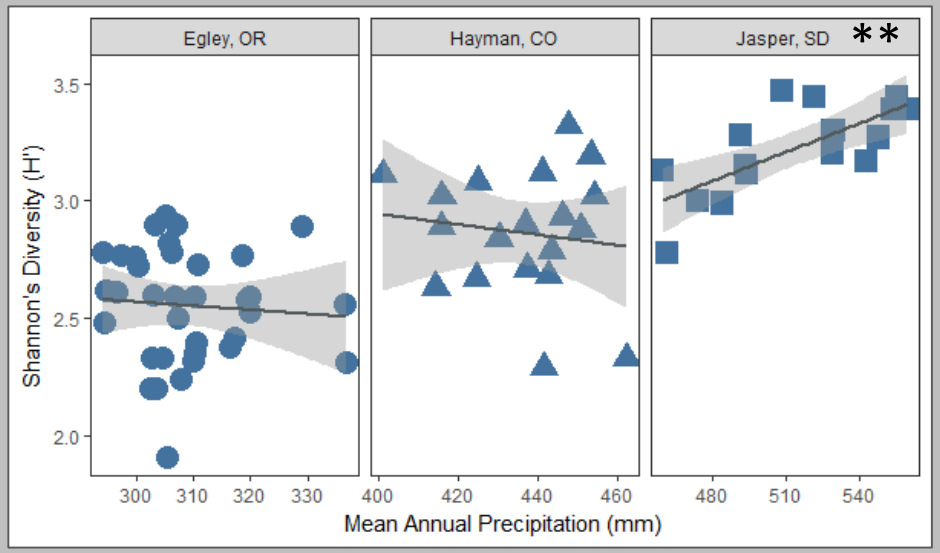

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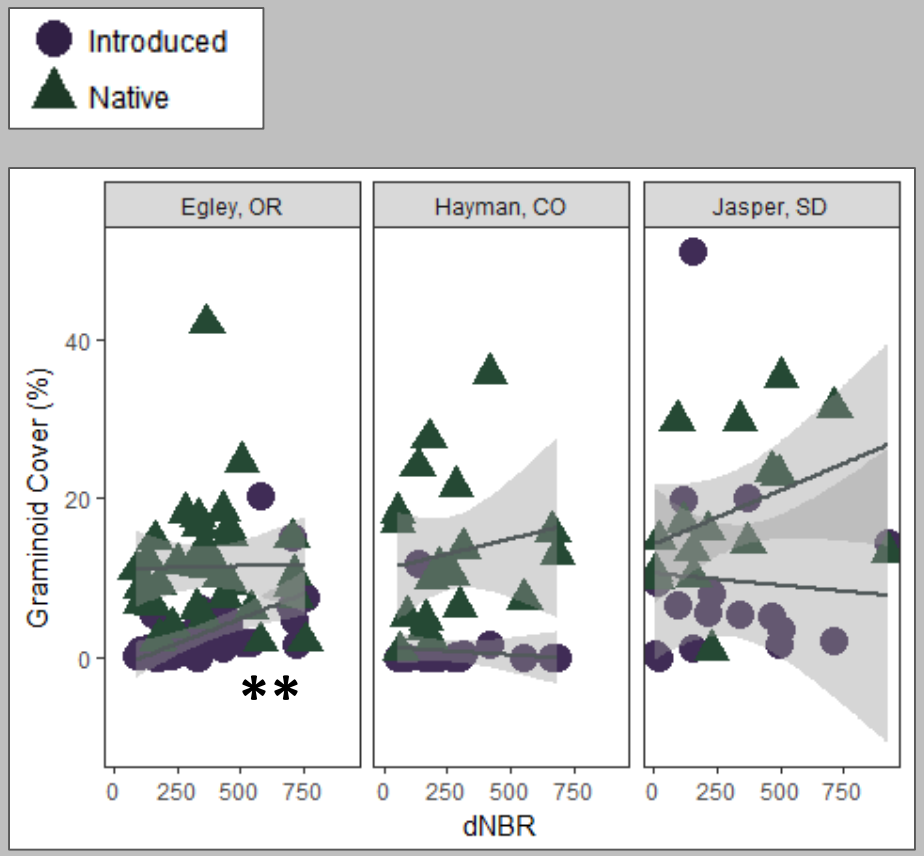
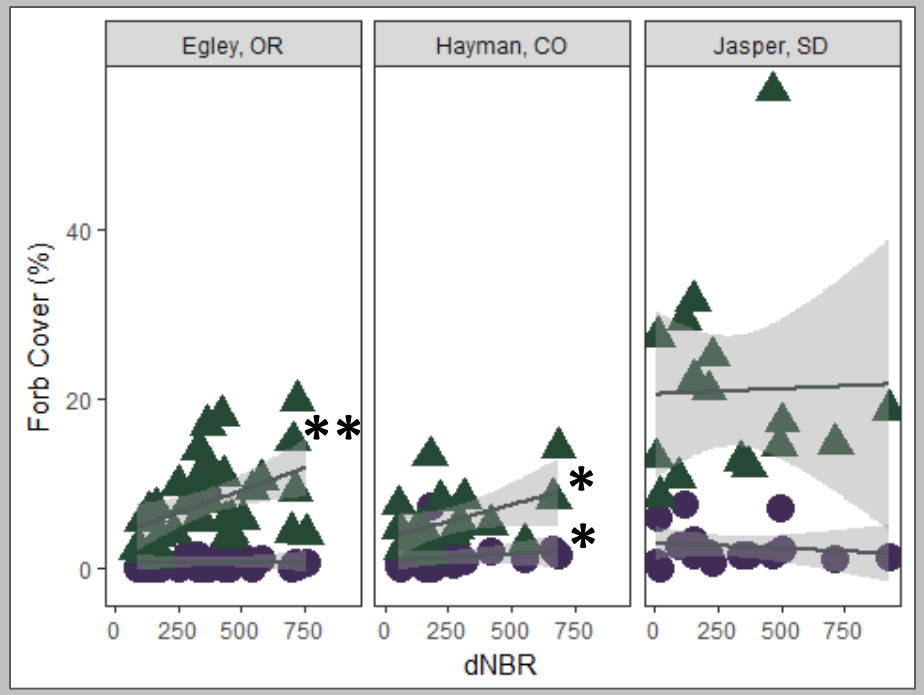
Growth Form and Species Results

Native vs. Introduced Cover

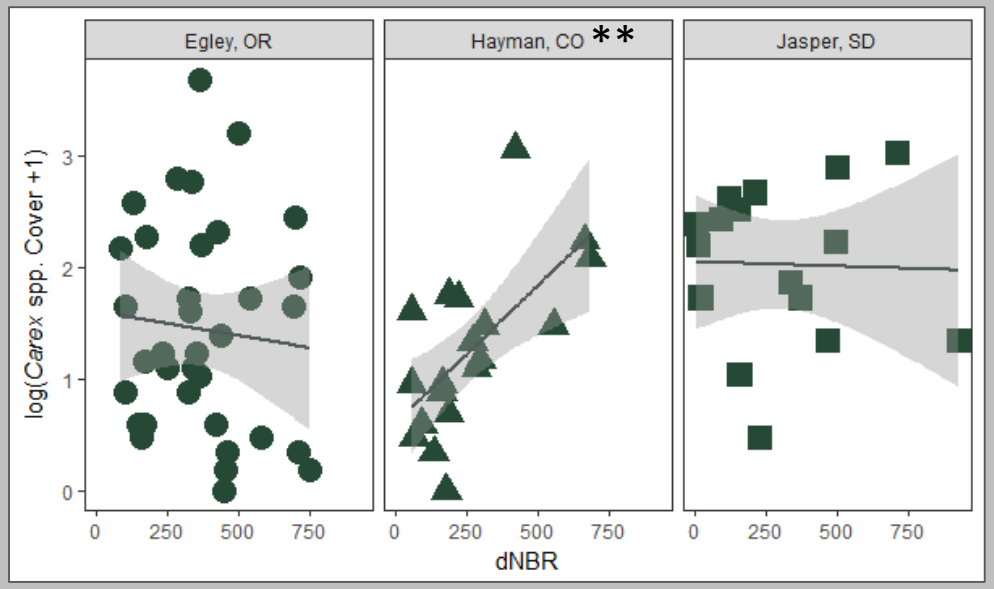


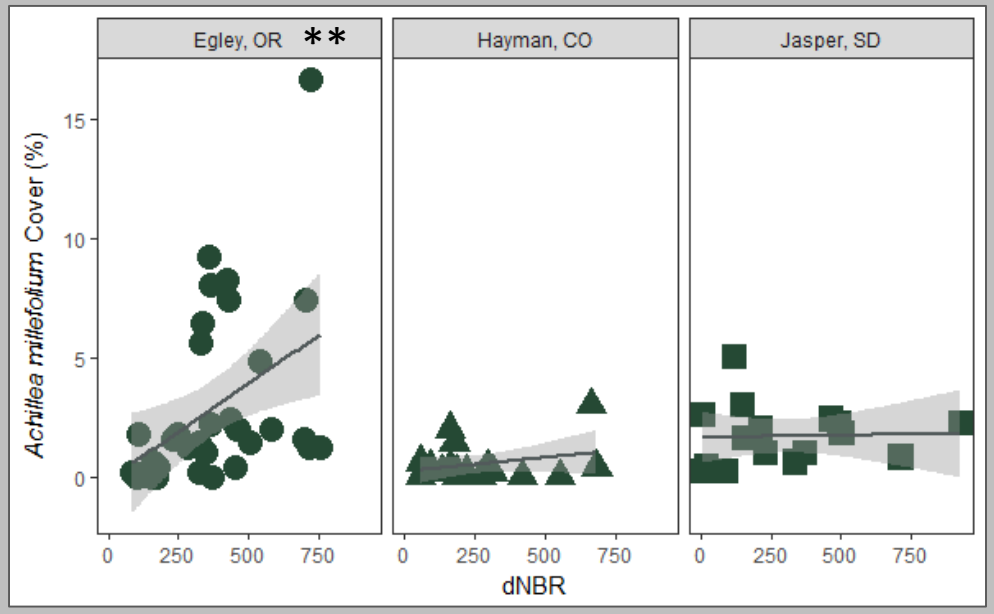


Burn severity did not affect shrub cover

** P< 0.05; *P< 0.10

Native Species Cover





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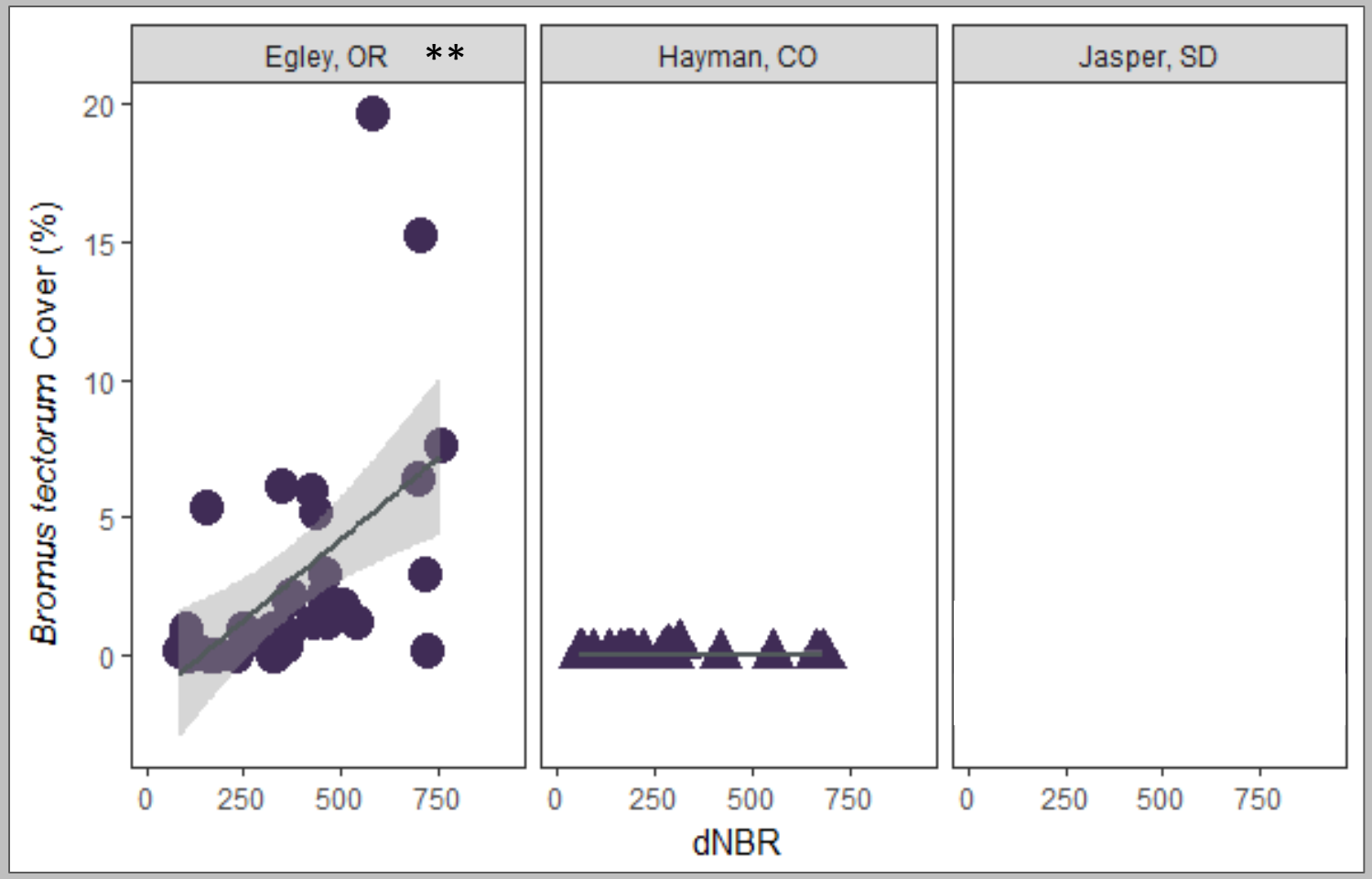
Introduced Species Cover



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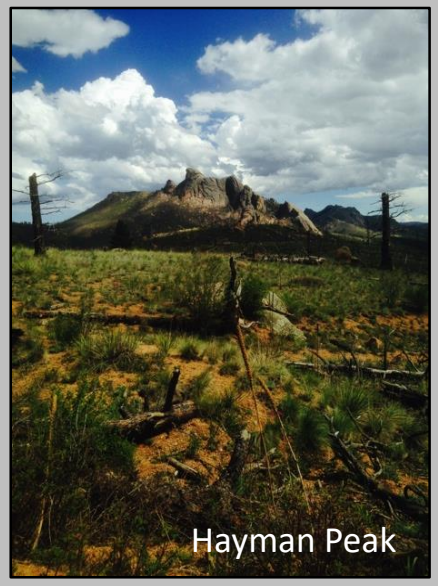
Summary

A decade after fire…


Hayman Peak

		Egley, OR	Hayman, CO	Jasper, SD
Cover	Annual	dNBR +	.	.
	Perennial	dNBR +	.	Precip +
	Native	dNBR +	.	Precip +
	Introduced	dNBR +	Precip	Precip +
	TOTAL	dNBR +	.	Precip +
Diversity	Shannon's	.	dNBR +	Precip +
Cover	Native Grass	.	.	.
	Introduced Grass	dNBR +	Precip	.

Conclusions

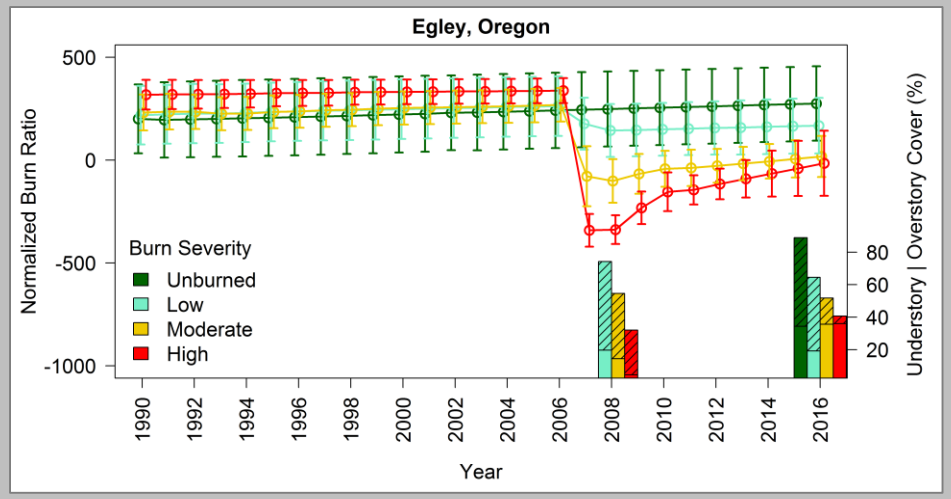
Understory Responses

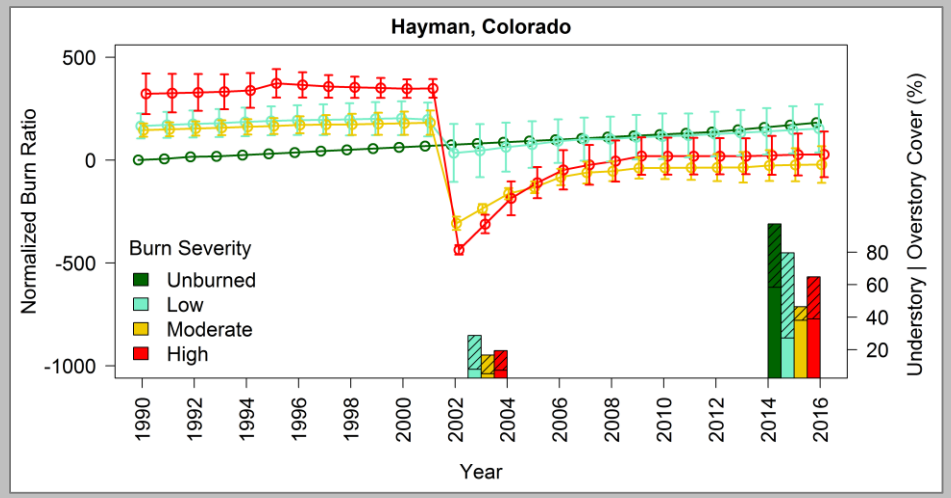
1. Are there effects of burn severity on plant communities a decade after fire?
   - Yes, burn severity increased cover and diversity.
2. Does post-fire recovery differ among ponderosa pine forests?
   - Yes, burn severity effects most prevalent at the drier ponderosa pine forests that are 9-12 years post-fire.

Recovery Trajectories

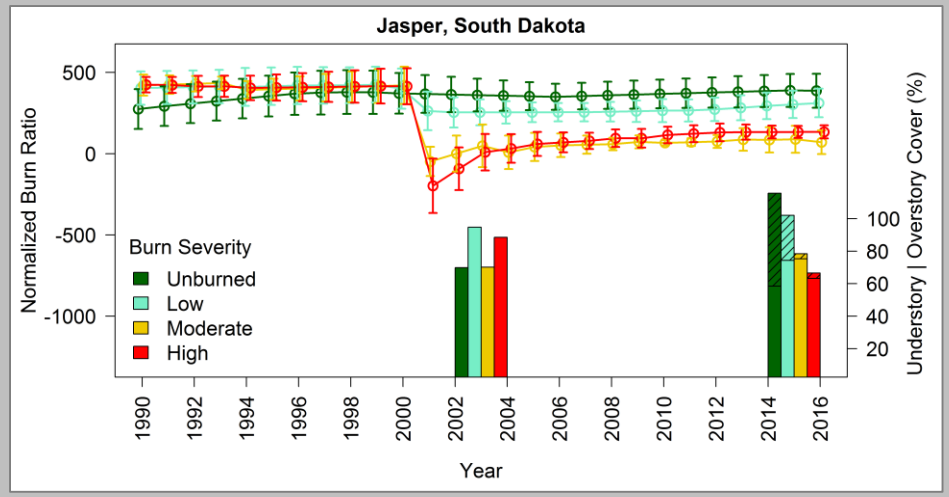
Ponderosa Pine

Driest

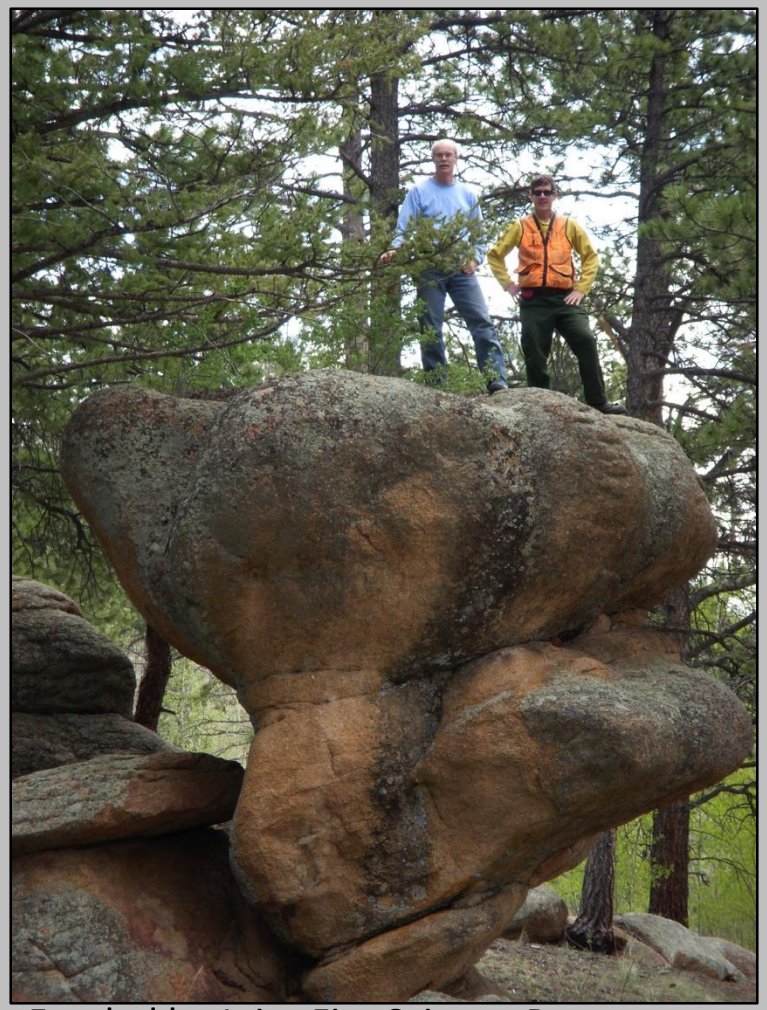




Wettest



Questions?



Funded by Joint Fire Science Program

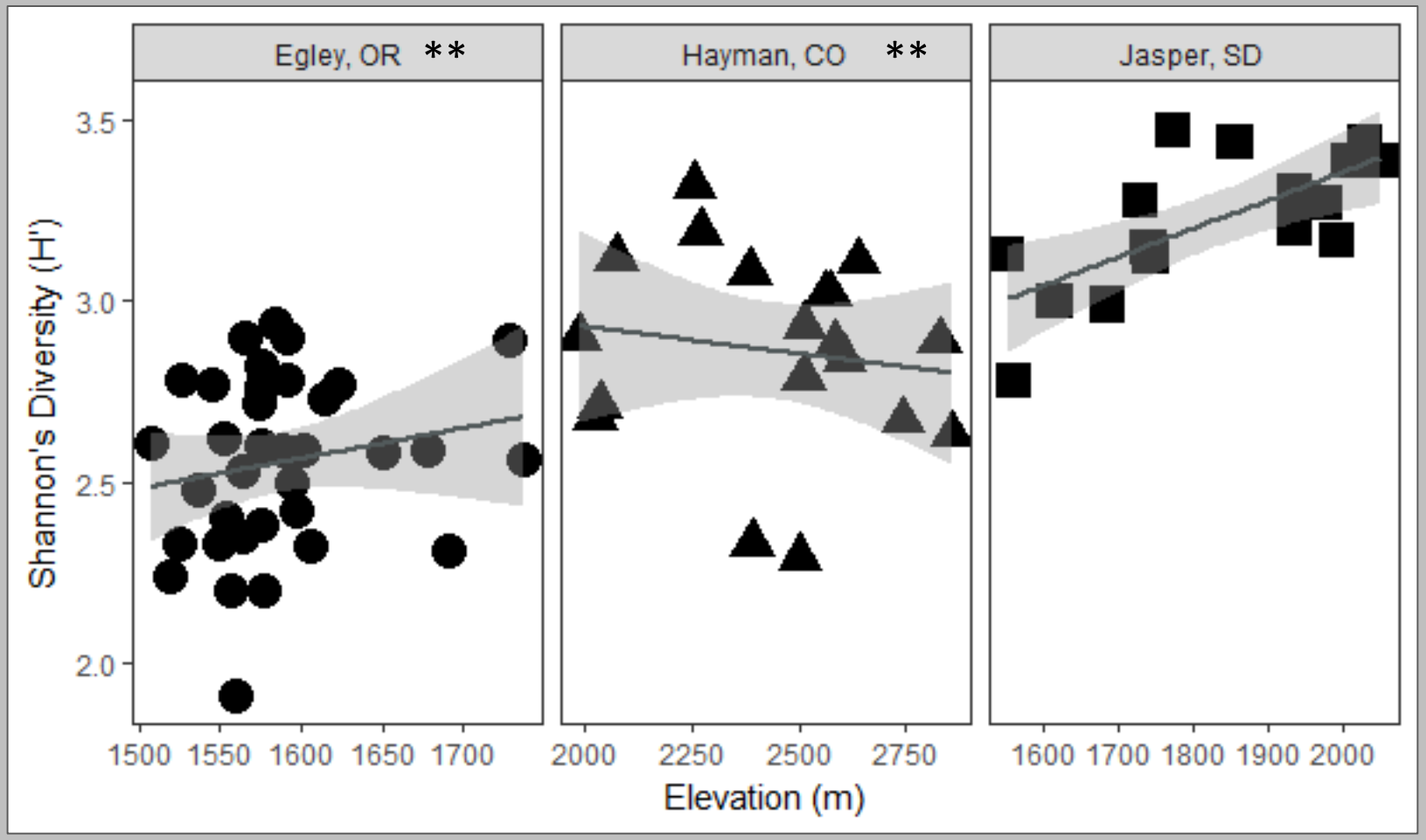
www.frames.gov/partner-sites/long-term-recovery

Hayman

Jasper

Egley

Elevation Effects



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