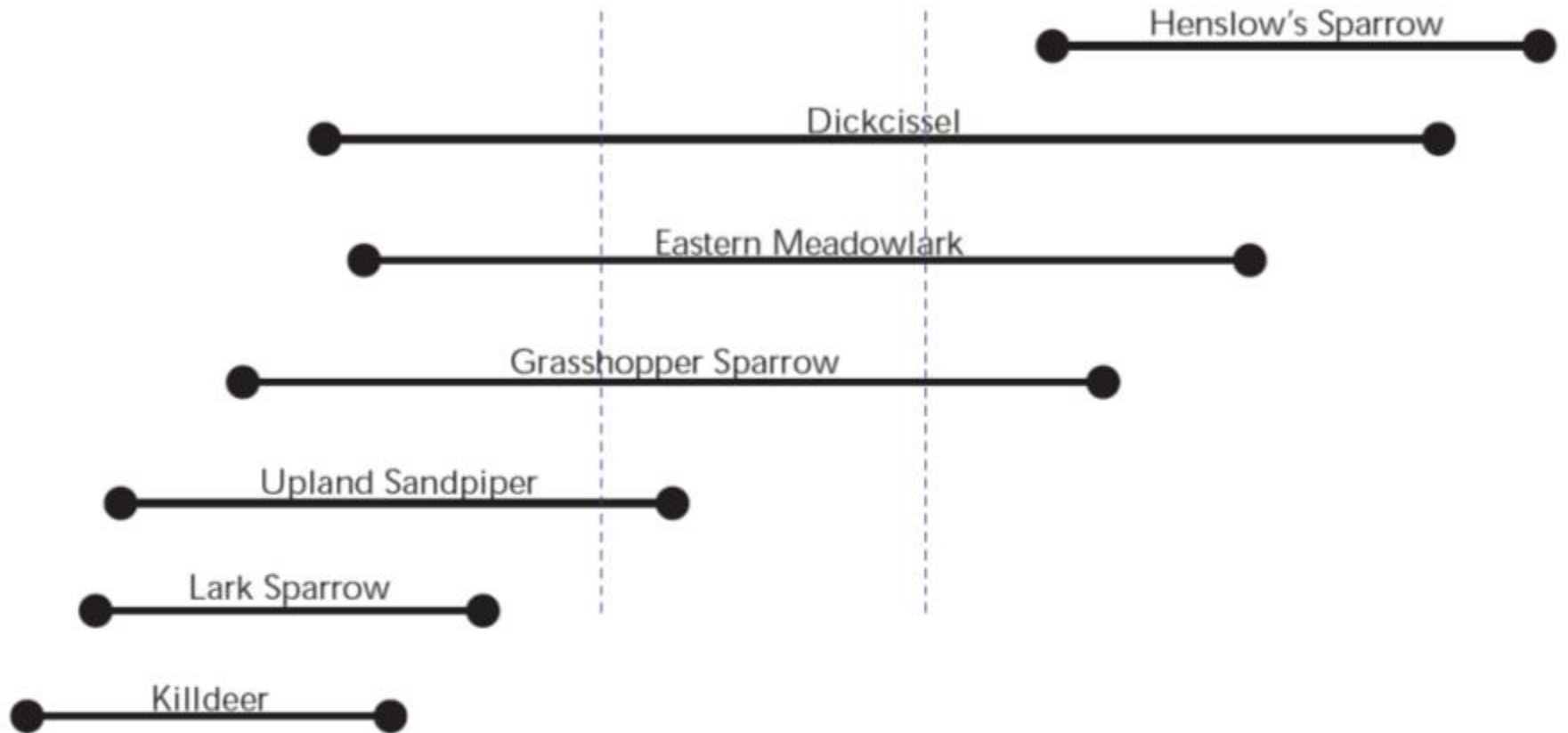


Spatially-heterogeneous fire regimes
increase habitat diversity and
reduce temporal variability in
production on working rangeland



**Devan Allen McGranahan, D. Engle, S.
Fuhlendorf, S. Winter, J. Miller, D. Debinski**

↑ heterogeneity, ↑ avian biodiversity



0



12



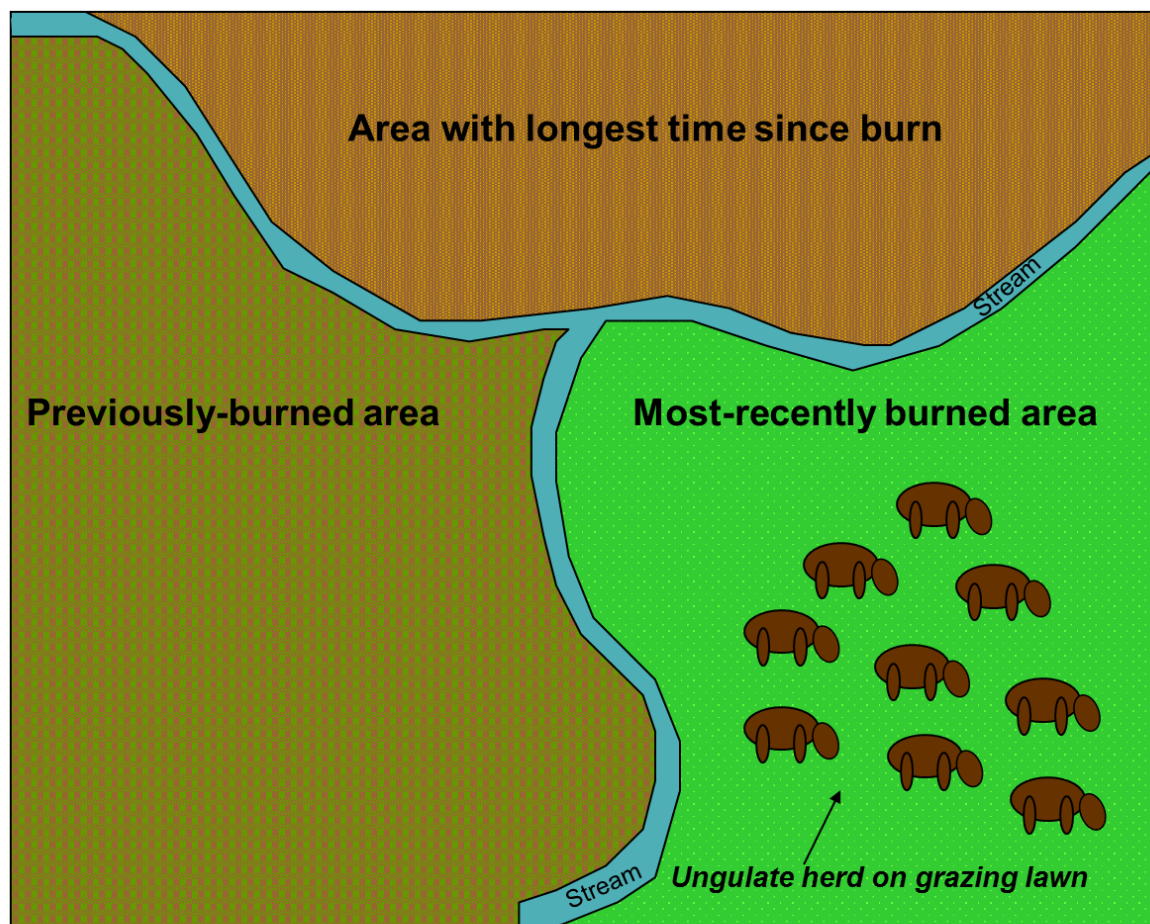
24



36

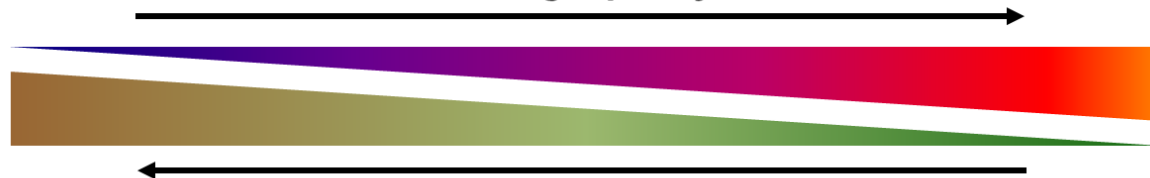
Months since fire

Pictures by Gary Kerby



Grazing intensity

Forage quality



Plant biomass and height

Time-since-fire

Capacity for fire spread

McGranahan & Kirkman.
2013. Land 2:176-193.

Tallgrass Prairie Preserve
NE Oklahoma
Photo by Bob Hamilton

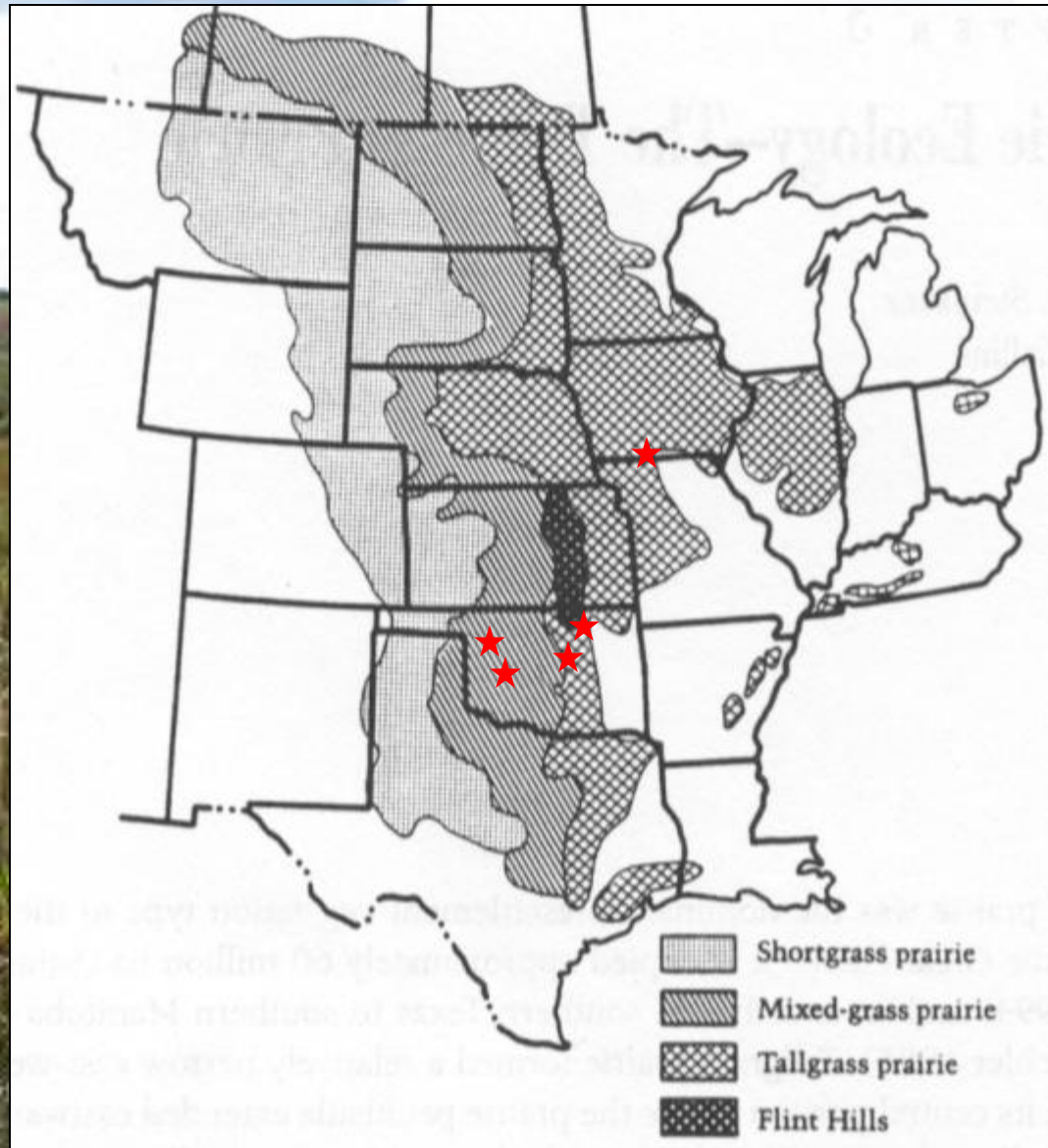


Meta-analysis:

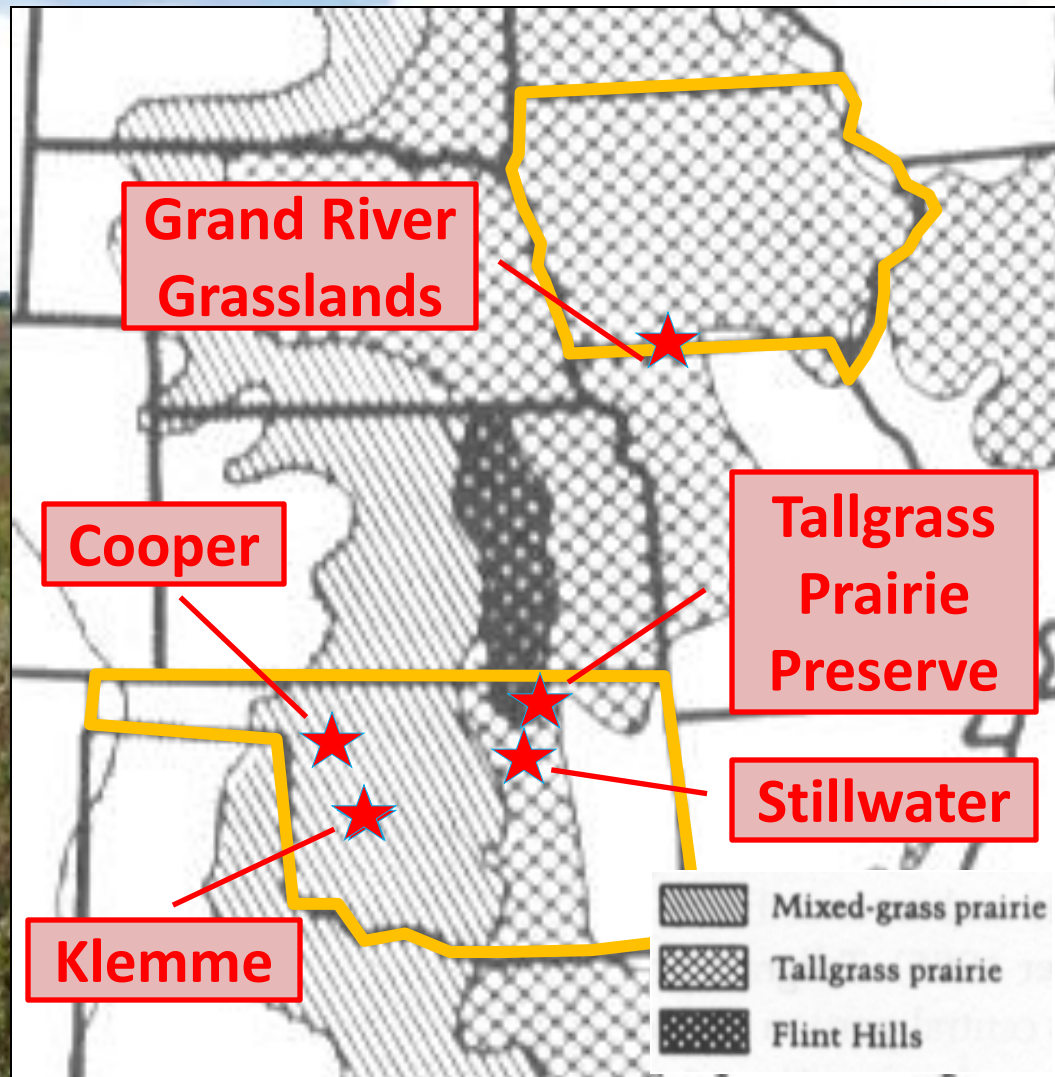
How often does heterogeneity “work”?

- Vegetation data from 5 rangeland experiments
 - Vegetation structure (*correlates w/ biomass*)
 - Plant functional group composition
- Statistical analysis
 - Patch contrast: Variance partitioning
 - Functional group diversity: Ordination
 - Direction, magnitude of effects: Effect size

Location of rangeland experiments



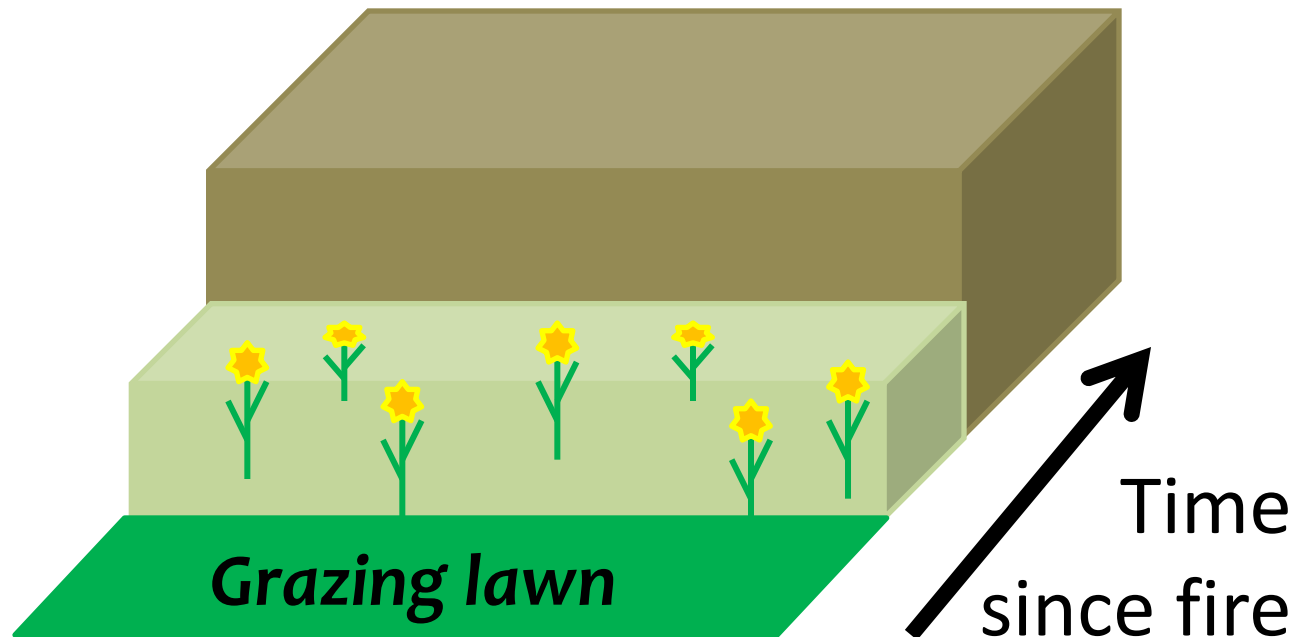
Location of rangeland experiments



Patch contrast = heterogeneity in vegetation structure

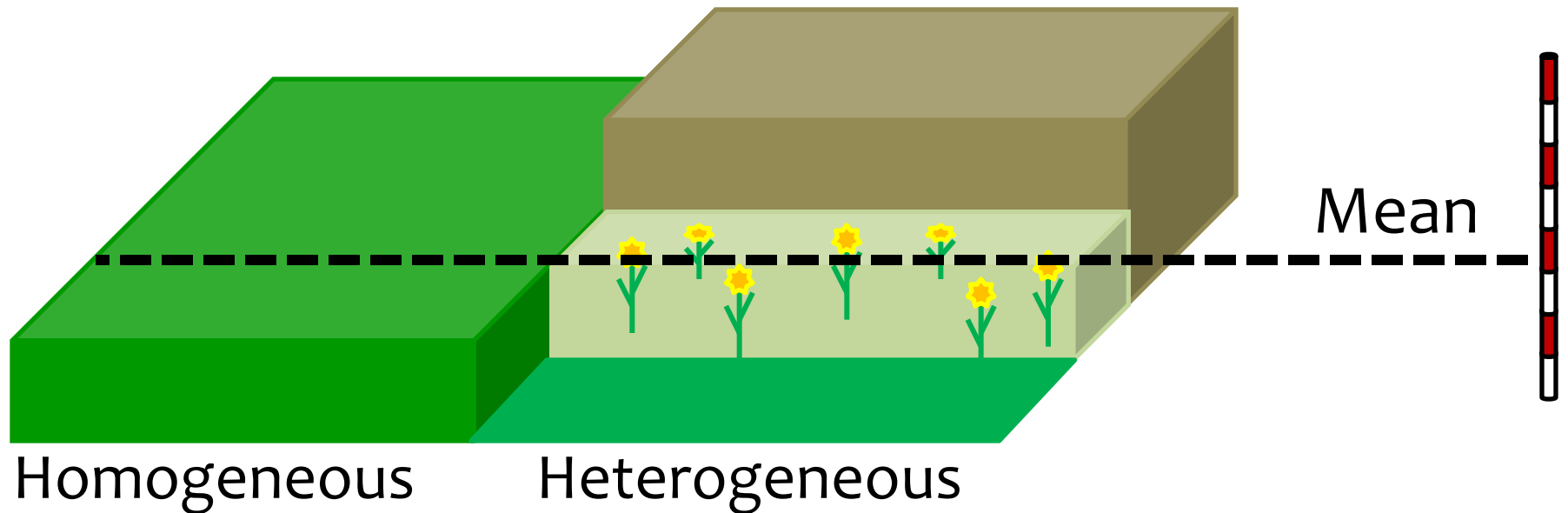
“Contrast: the degree of difference between patches”

Kotliar & Wiens. 1990.
Oikos 59:253-60



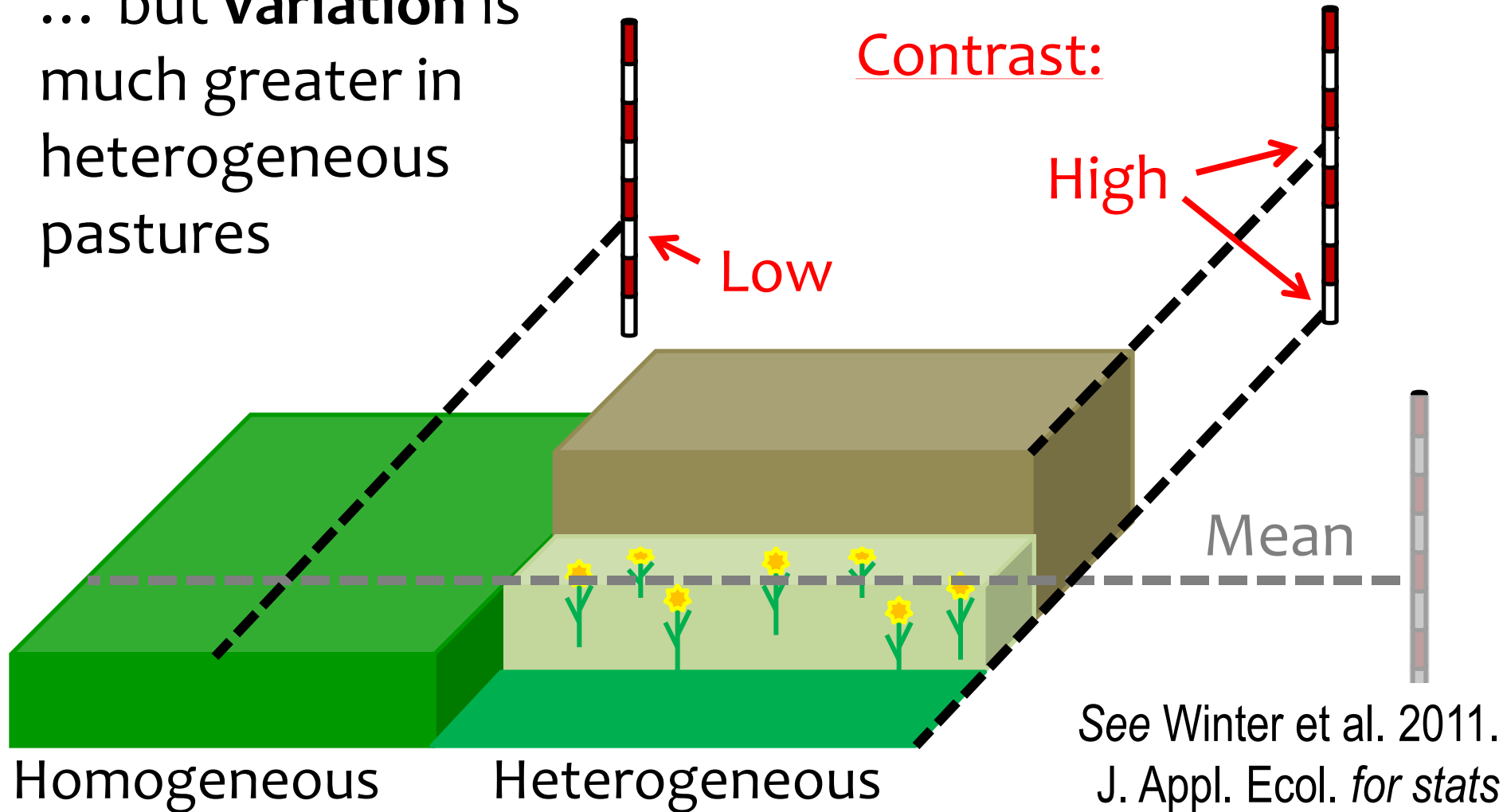
Statistical variation *meets* structural heterogeneity

Average structure varies little
between management types...



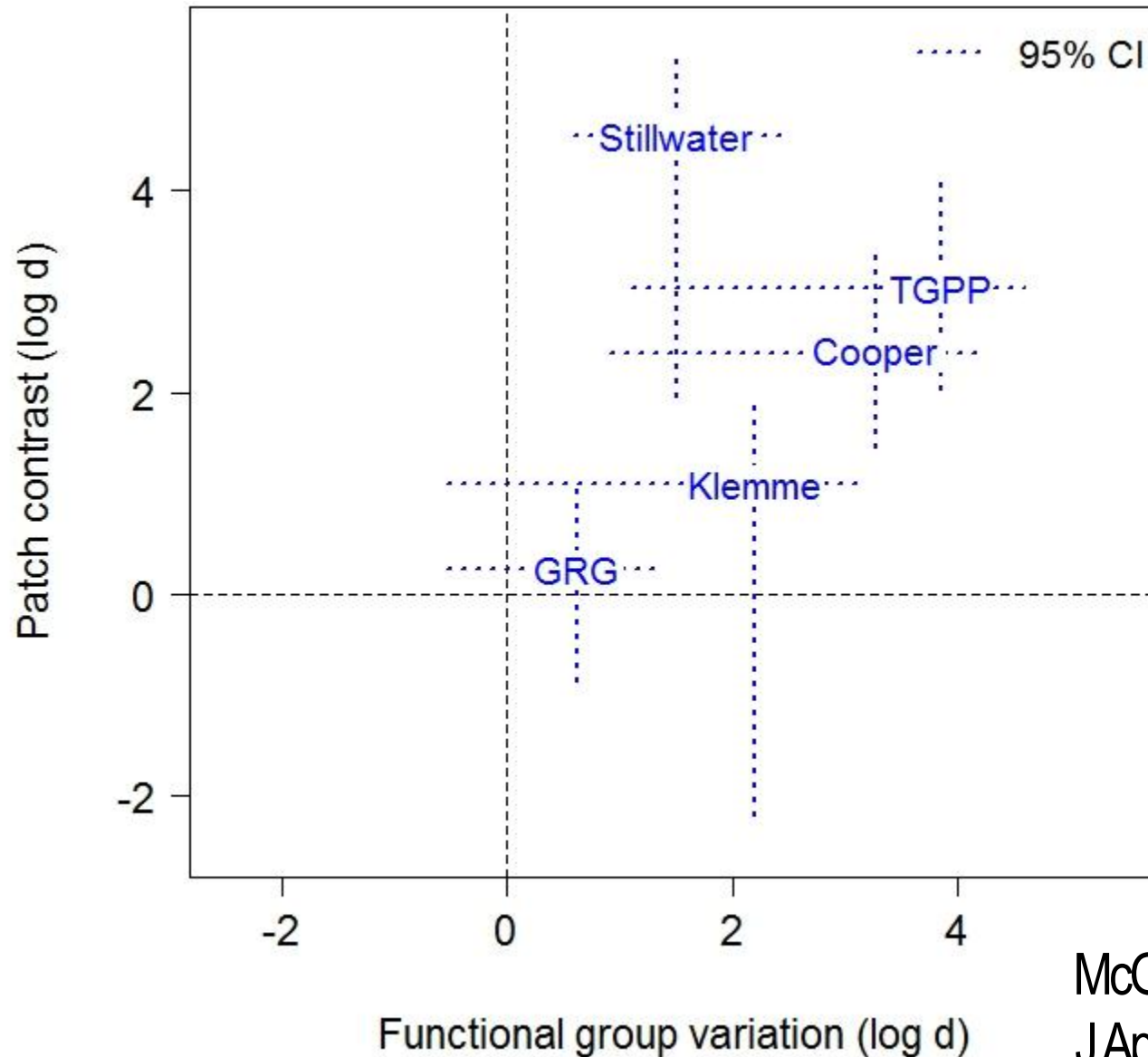
Statistical variation meets structural heterogeneity

... but **variation** is
much greater in
heterogeneous
pastures



↑ Plant diversity, ↑ Patch contrast

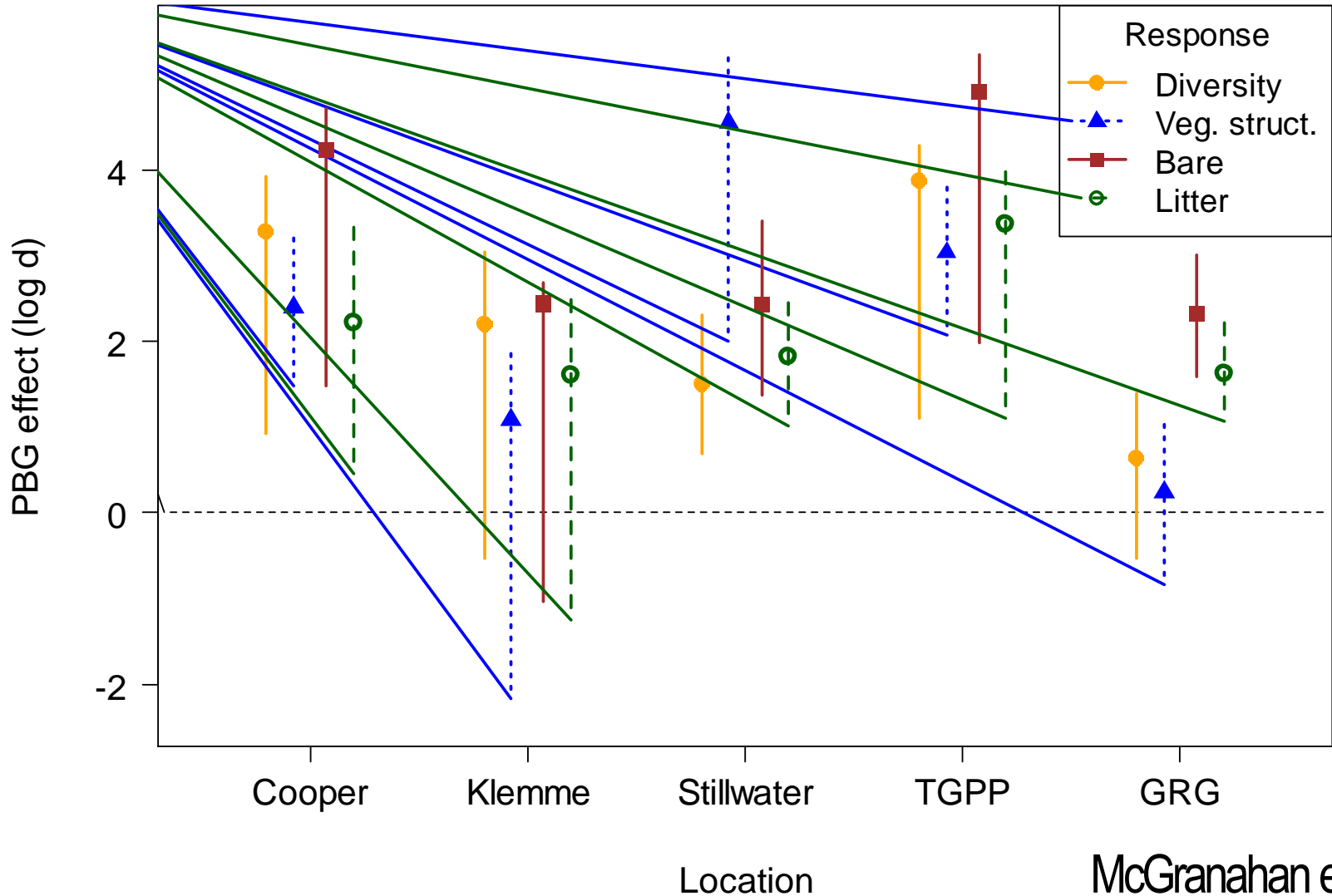
Meta-analysis effect sizes, log scale



McGranahan et al. 2012.
J Appl Ecol 49: 903 - 910

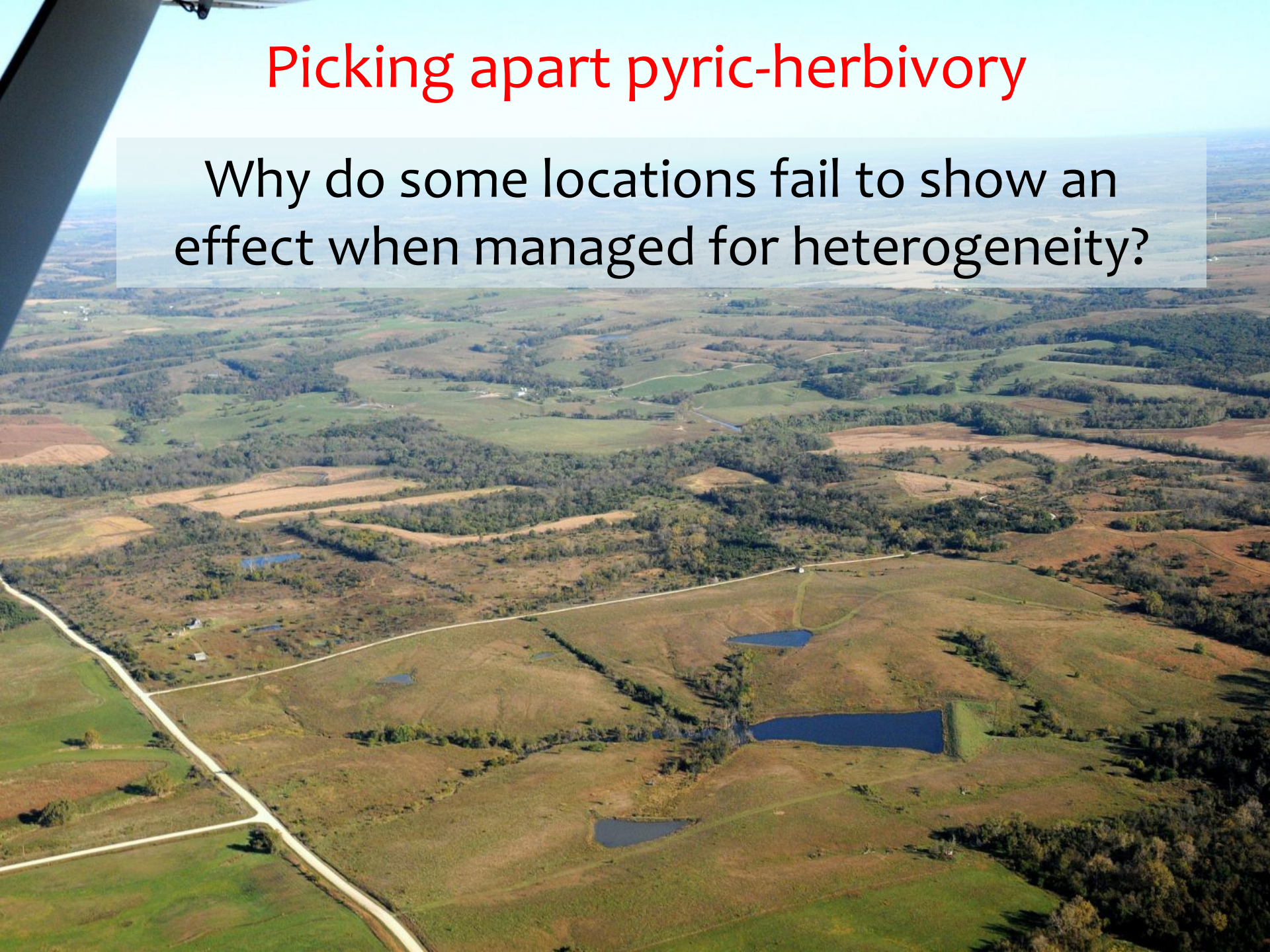
Response matters!

Different variables, different outcomes.



Picking apart pyric-herbivory

Why do some locations fail to show an effect when managed for heterogeneity?



Severe grazing = fuel gaps, reduced fire spread at Klemme ca. 1999



Fuel load and continuity recovered under moderate stocking by 2011



Severe grazing + live fuels create
fuel gaps & reduce fire spread in the GRC



Reduced stocking + cured tall fescue
increase fire spread



Conclusions

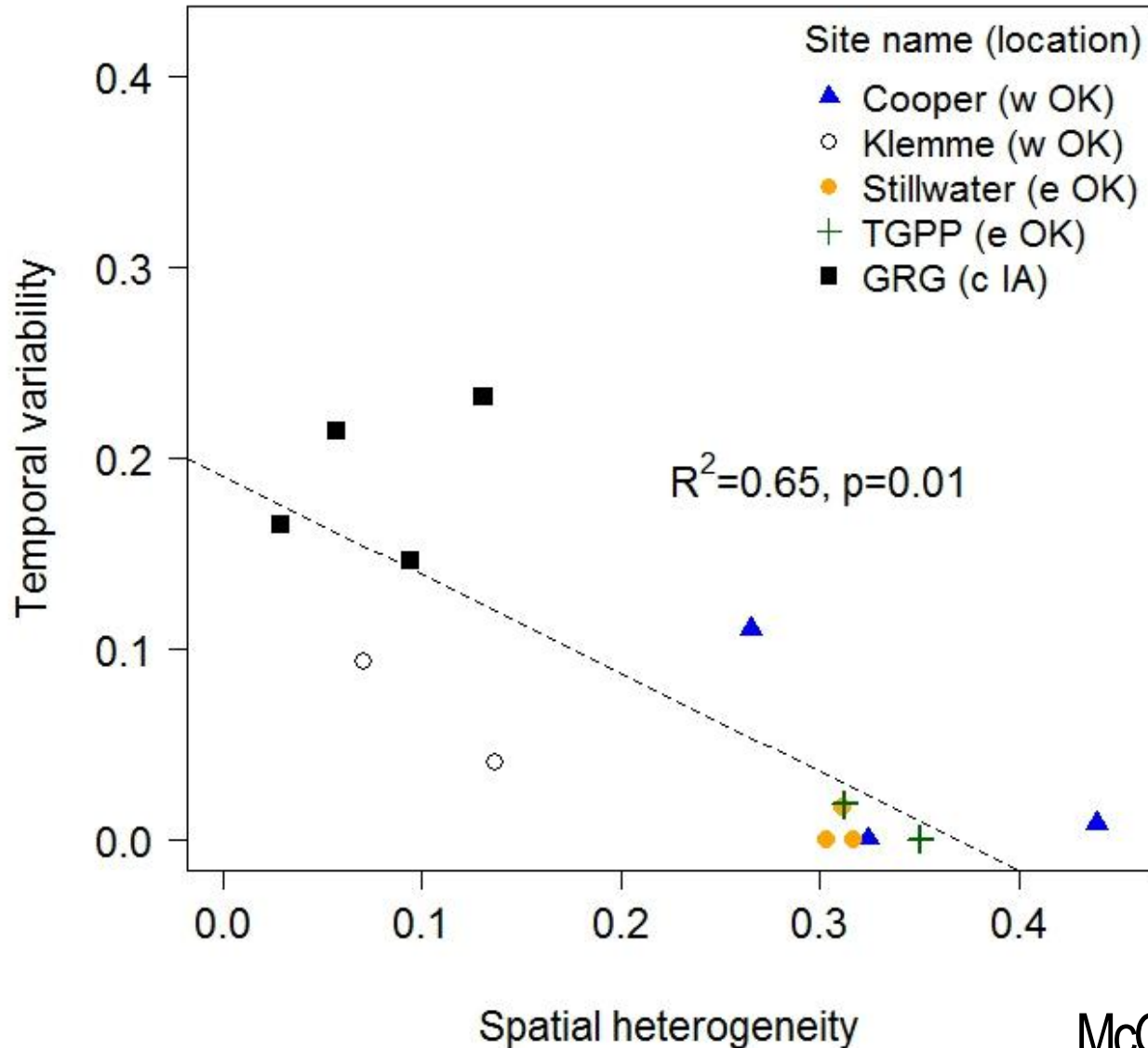
- Heterogeneity not a universal response to heterogeneity-based management

Fire must influence spatial pattern of grazing

- Responses to heterogeneity-based management might not be consistent

Measures of response must be matched to management objectives

Heterogeneity-based management might reduce temporal variation in range production



**Any
burning
questions?**

