Sagebrush cover *pre-fire* as a predictor of native herbaceous cover *post-fire*

Sagebrush Parameters

1. Sagebrush foliar cover

2. Sagebrush relative cover

3. Mean sagebrush plant volume (ft^3)

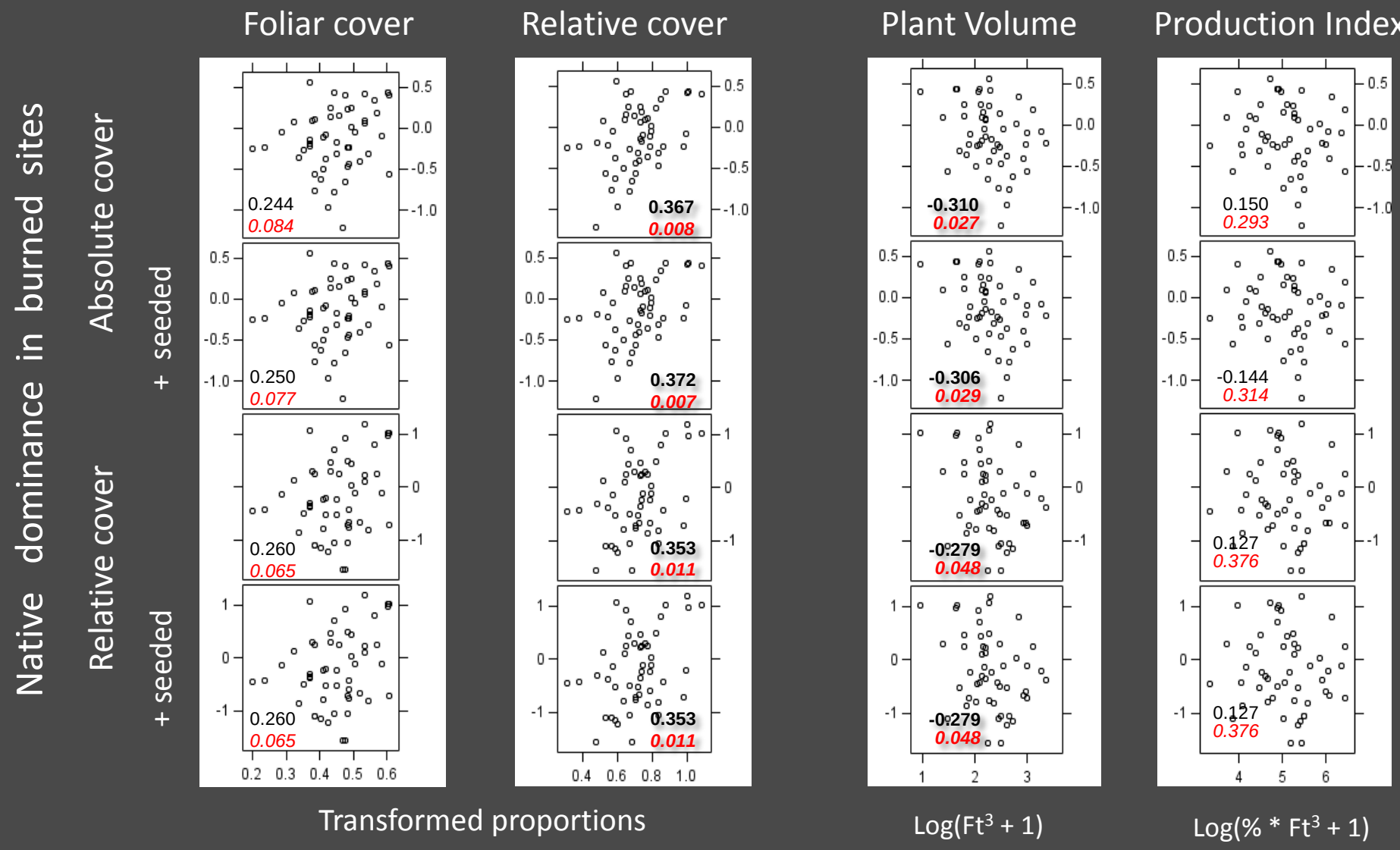
   = π * (½ max. plant width inches) * (½ plant width inches at 90° to max) * (height of canopy top – height of canopy bottom inches) / 1728

4. Sagebrush production index

   = Sagebrush Vol * Sagebrush FC

Does sagebrush cover, volume or production pre-fire correlate with the dominance of native herbs (forbs + grasses) post-fire ?

Burned site herbaceous dominance = Natives + Seeded – Exotics



Putting it all together: the effects of fire (*a first pass*):

What site characteristics pre-fire best predict native herbaceous dominance post-fire ?

Technique: multiple regression with predictor variables added in a stepwise fashion:

At each step:

1) the predictor that best-improves model fit is added

"Fit" = a measure of the amount of variation in the response explained by the predictors in the model

3 fit criteria were compared: $AdjR^2$, AIC_c, SBC (Schwarz Bayesian info. Criterion)

2) each predictor added in earlier steps is removed & model fit re-checked

--predictor stays out of model if fit improves

--predictor returned to model if fit worsens

Model building stops when no additional predictors improve fit

Two measures of native herbaceous dominance

1. *Post-fire* native herbaceous dominance

= Native cover (grass + forbs + seeded grass) – Exotic cover (cheatgrass + forbs)

2. *Shift* in native herbaceous dominance with fire

= Native dominance *post-fire* – Native dominance *pre-fire**

where Native dominance
= Native cover (grass + forbs + seeded grass) – Exotic cover (cheatgrass + forbs)

**Pre-fire* data are from unburned (control) plots paired with nearby event plots

Candidate predictor variables

Unburned (control) plot cover variables:

basal cover: *bare soil, litter, rock, cryptogam, live vegetation*

foliar cover: *live sagebrush, dead sagebrush, other shrubs, native forbs, exotic forbs, native grass, seeded grass, cheatgrass*

+ sagebrush mean volume, sagebrush production index

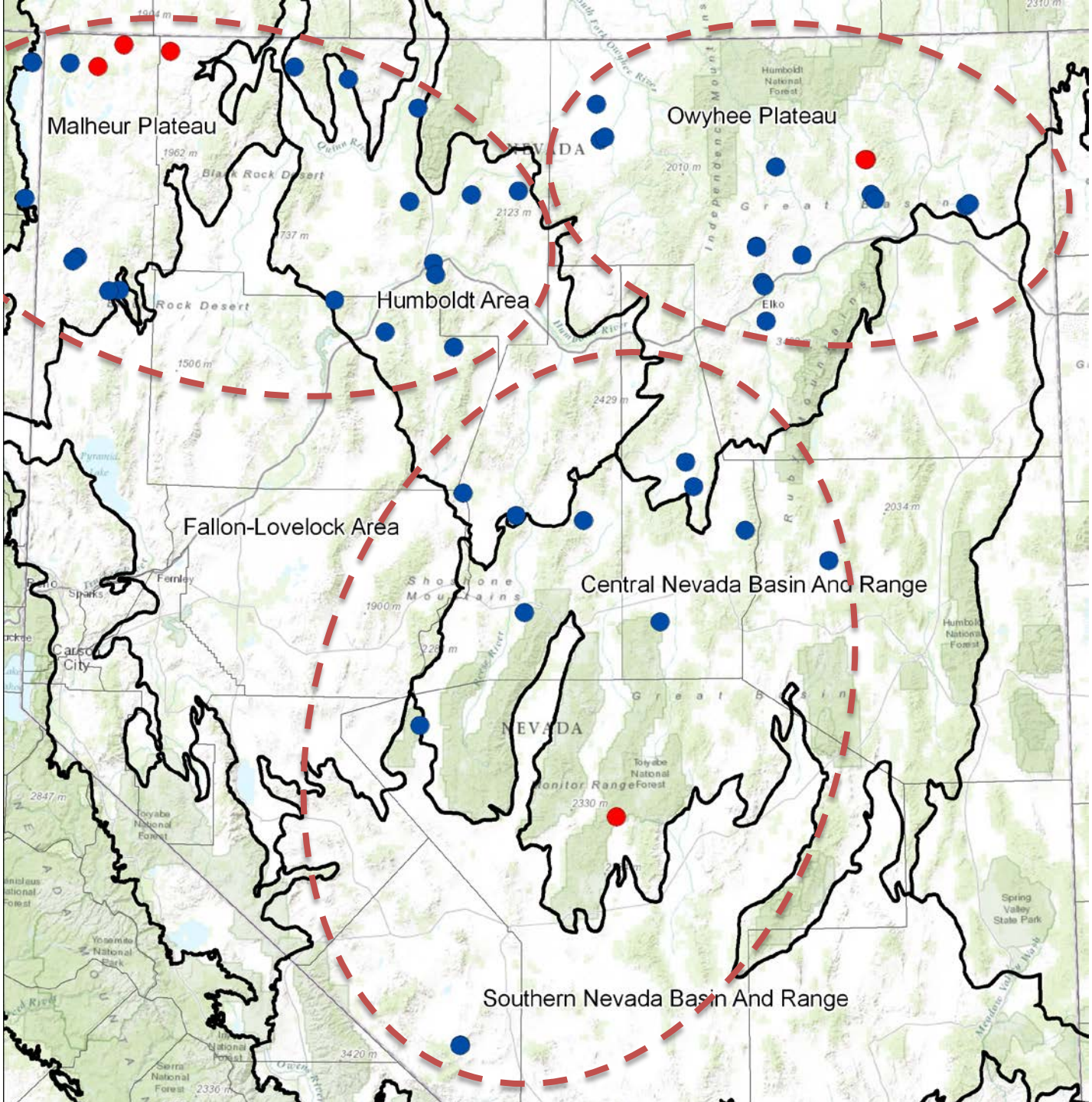
Site covariates:

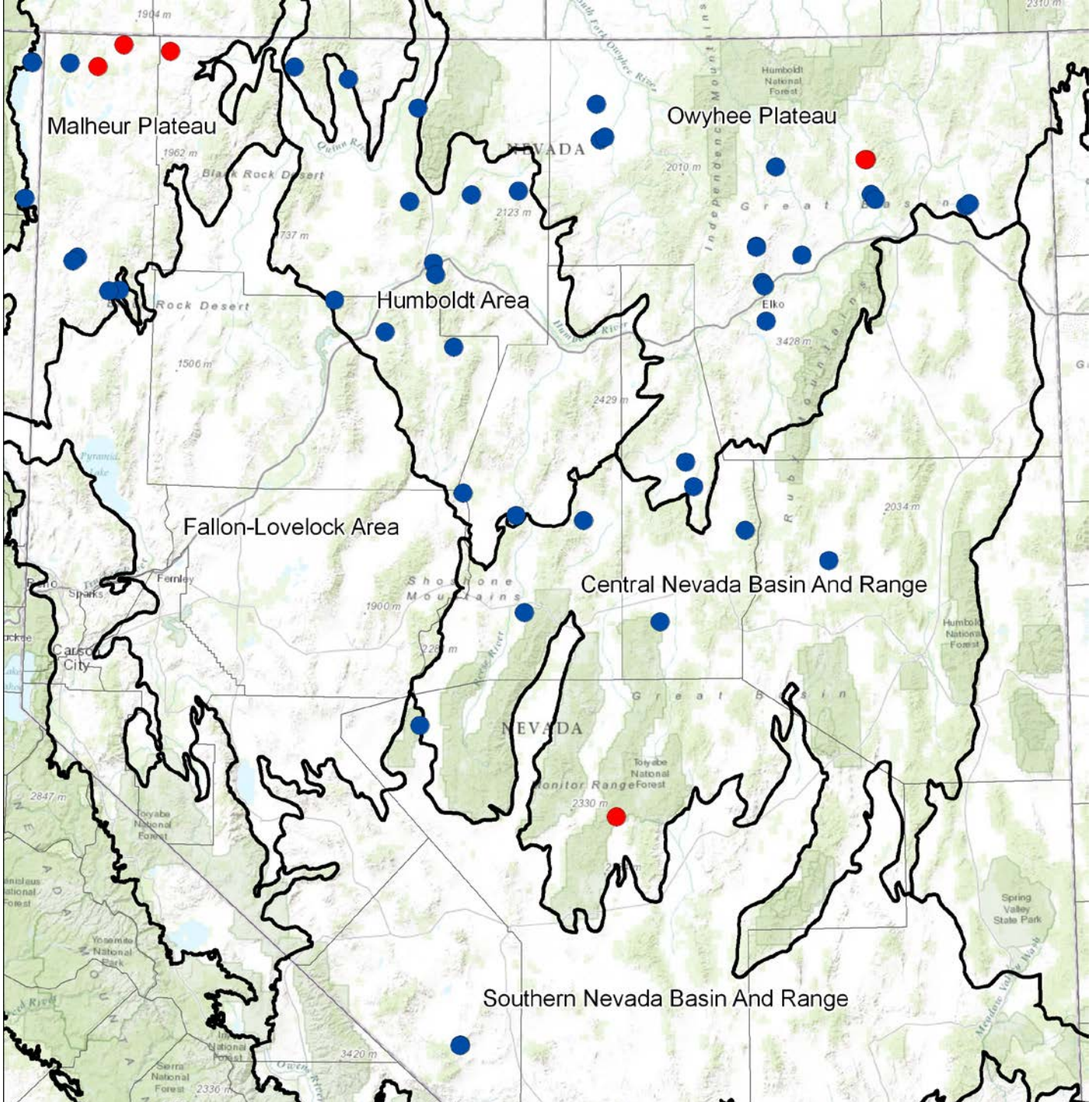
categorical: *region* [nw NV, ce NV, ne NV]
MLRA [Malheur HP, Humboldt, Owyhee HP, Great Salt Lake*]
ecosite [Lmy8-10, Lmy10-14, DrLm8-10, Other†, Unknown]
fire aspect [N {315-45°}, E {45-135°}, S {135-225°}, W {225-315°}]
fire season [spring, summer, fall]

continuous: *elevation*
elapsed time [years since fire]
slope position [1=bottom, 2=lower, 3=middle, 4=upper, 5=top]

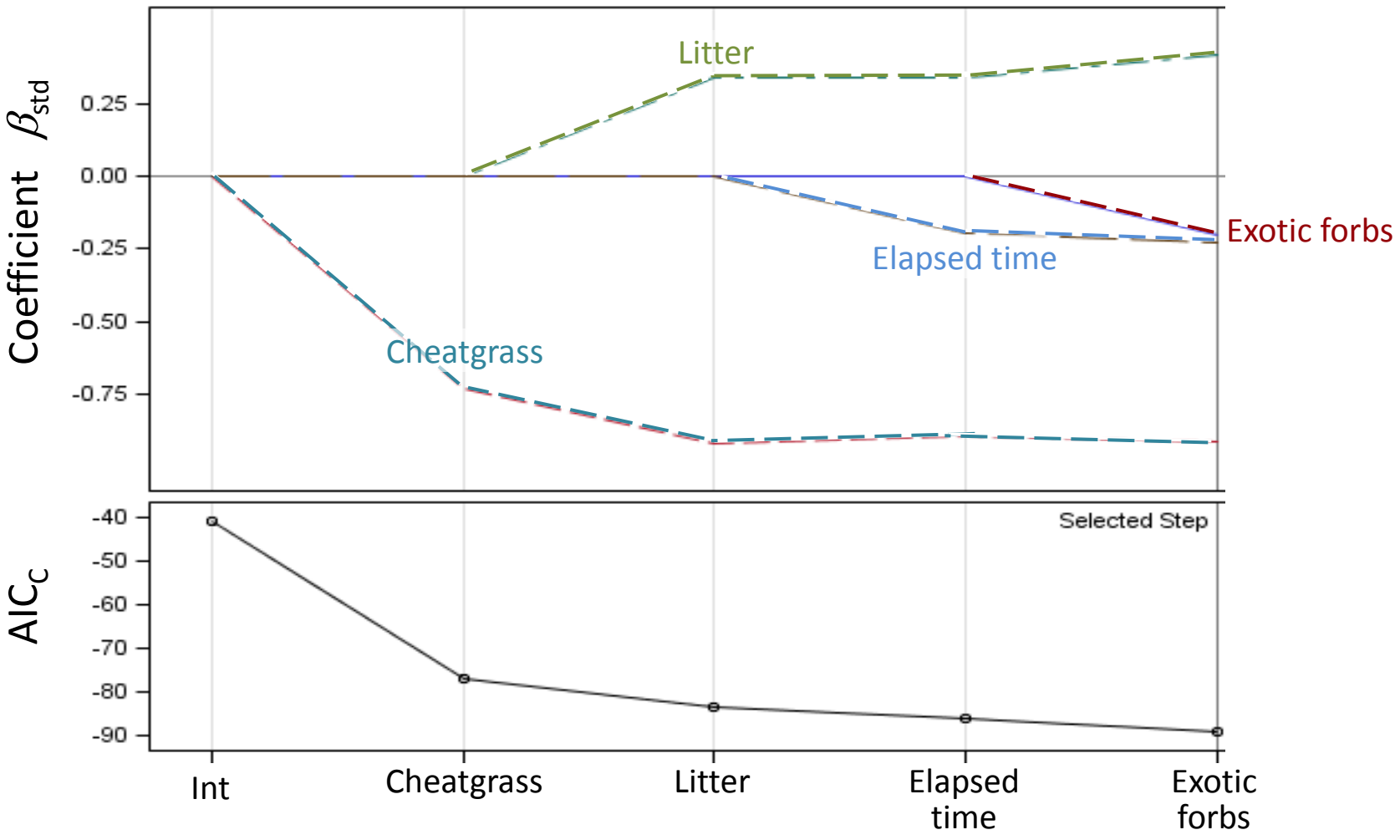
*includes two fire sites from S NV Basin & Range

†pools sandy loam, sandy slope, stony loam, saline terrace, clay slope

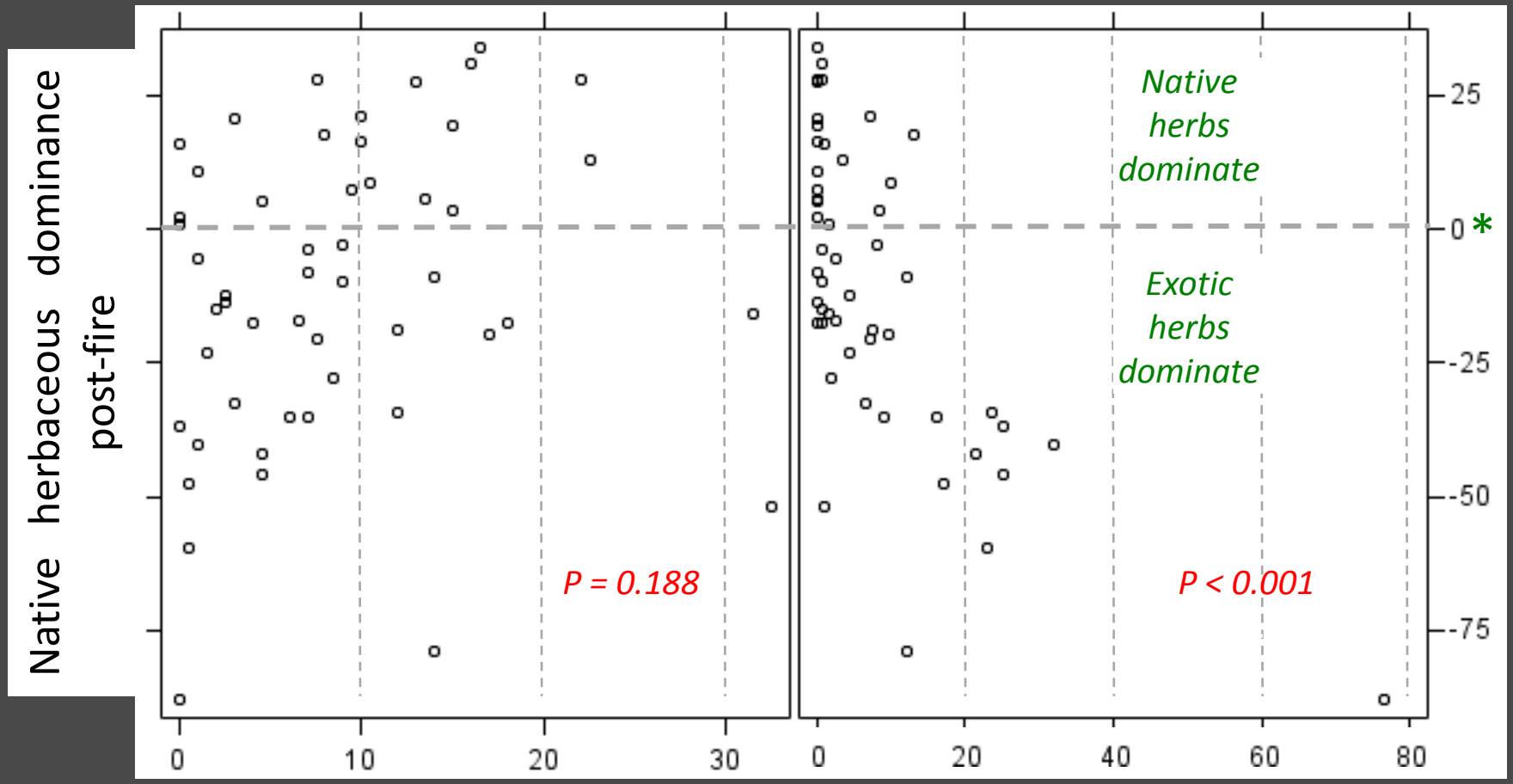

Malheur Plateau
Owyhee Plateau
Humboldt Area
Fallon-Lovelock Area
Central Nevada Basin And Range
Southern Nevada Basin And Range
NEVADA
Elko
Fernley
Sparks
Carson City
Humboldt National Forest
Toiyabe National Forest
Spring Valley State Park
Yosemite National Park
Sierra National Forest
Great Basin
Rock Desert
Black Rock Desert
Independence Mountains
Ruby Mountains
Shoshone Mountains
Monitor Range
1962 m
2123 m
2010 m
1506 m
2429 m
2034 m
1900 m
2330 m
2847 m
3420 m
2336 m


Malheur Plateau
Owyhee Plateau
Humboldt Area
Fallon-Lovelock Area
Central Nevada Basin And Range
Southern Nevada Basin And Range
NEVADA
Great Basin
Humboldt National Forest
Toiyabe National Forest
Elko
Fernley
Sparks
Carson City
Spring Valley State Park
Yosemite National Park
Inyo National Forest
Sierra National Forest
Black Rock Desert
Rock Desert
Pyramid Lake
Shoshone Mountains
Monitor Range
Independence Mountains
Ruby Mountains
Humboldt River
Owyhee River
1904 m
1962 m
2123 m
2010 m
1737 m
1506 m
3428 m
2429 m
2034 m
1900 m
2330 m
2847 m
3420 m
2336 m

Cheatgrass & litter cover in unburned sites best predict *post-fire* native herbaceous dominance

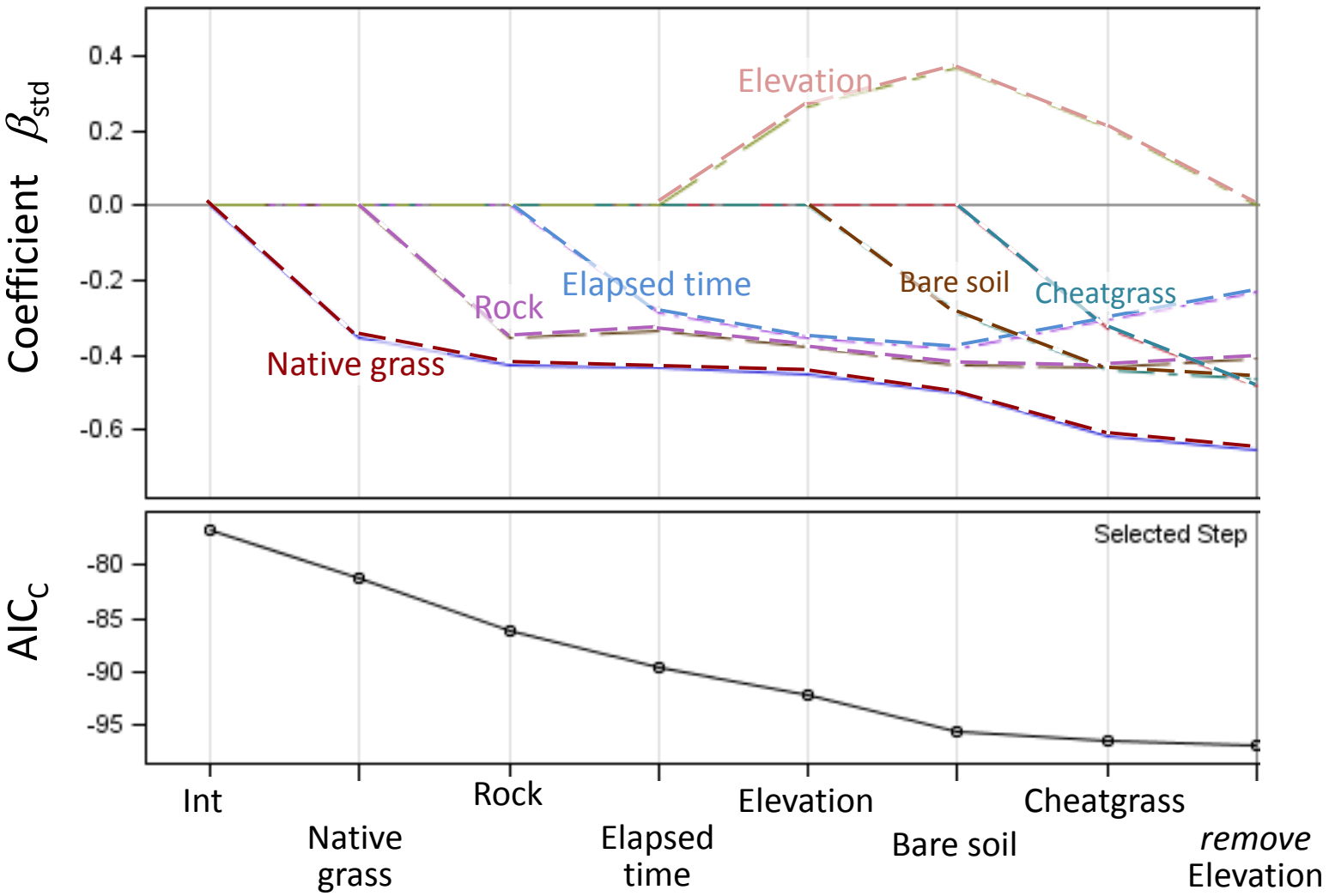


Post-fire native dominance: Cheatgrass cover *pre-fire* is a better predictor than native grass cover

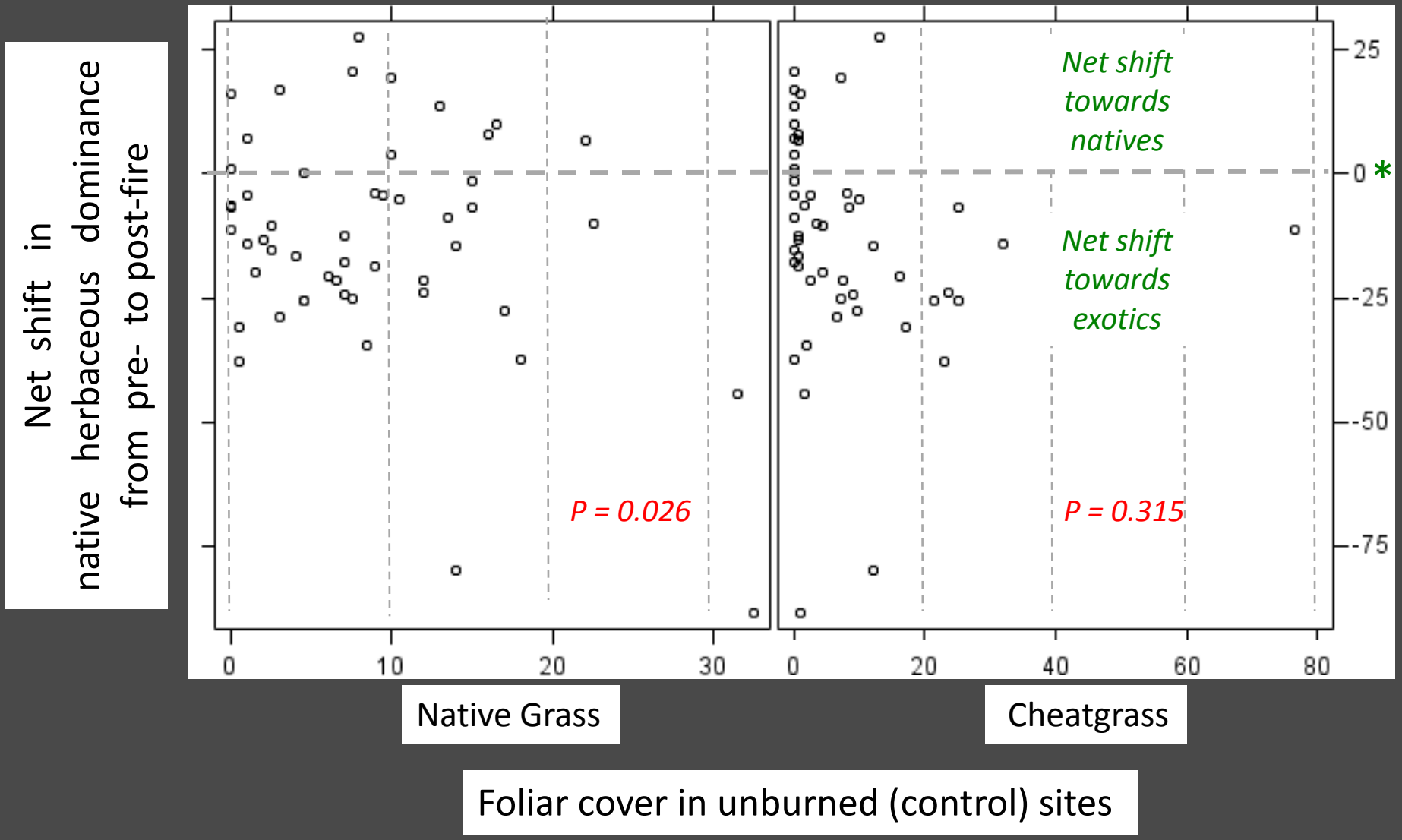


Foliar cover in unburned (control) sites

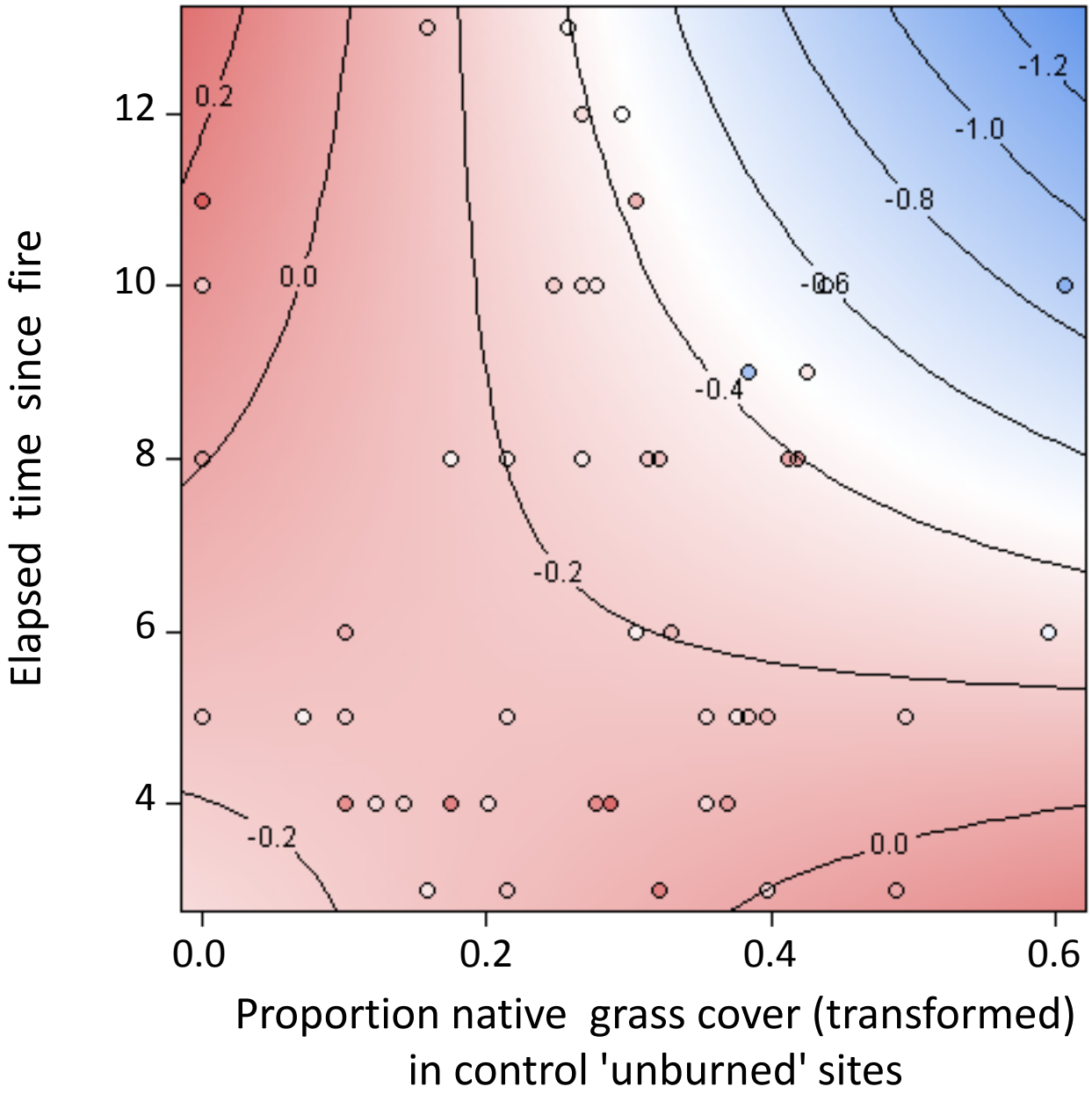
Native grass & rock cover in unburned (control) sites best predict the *shift* in native herbaceous dominance from pre- to post-fire



Shift towards native dominance:
Native grass cover *pre-fire* is a slightly better predictor than cheatgrass cover



Interaction of native grass cover in unburned sites & time since fire on ***the shift*** in native dominance from pre- to post-fire



Shading topography = **degree of shift** in native herbaceous dominance pre- to post-fire:

What cover & site characteristics in unburned sites best predict *post-fire* native herbaceous dominance ?

- The cover of *cheatgrass*, *litter*, and *exotic forbs* (in unburned sites), & *the time since fire*

  are the best predictors of native herbaceous dominance after fire.

- No 2-way interactions are significant between the top 4 predictor variables.

What cover & site characteristics in unburned sites best predict *the shift* in native herbaceous dominance from pre- to post-fire ?

- The cover of *native grass*, *rock*, and *bare soil* (in unburned sites), and the *time since fire* and *site elevation*

  are the best predictors of the *shift in native herbaceous dominance* from pre- to post-fire.

- Native grass cover & time since fire *interact strongly* in their effect on the shift in native herbaceous dominance pre- to post-fire.

9.
Is there a threshold of native grasses pre-fire that predicts native or exotic domination post-fire ?

10.
Are the important predictors to predict native dominance after the event (fire or mowing), the same for both types of event ?