Understory Vegetation Response to Mechanical Mastication of Piñon and Juniper Woodlands

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Ecological Site

Persistent Woodlands

- Shallow (<0.5-m), rocky soils
- Trees >150 years old
- Infrequent fire

Wooded Shrublands

- Deeper, less rocky soils
- Tress <150 years old
- Frequent fire

PJ Encroachment

1973 **2005**

- Climate conditions
- Over grazing
- Fire suppression

Decreases:

- Biomass
- Cover
- Diversity
- Wildlife habitat
- Watershed function

Increases:

- Erosion
- Canopy fuel load
- Weed invasion

PHASE I

- Trees are sparse
- Shrubs and herbaceous perennials dominate
- TC: <15%

PHASE II

- Trees, shrubs, and perennial herbaceous are co-dominant
- TC: 15-45%

PHASE III

- Trees are dominant
- Perennial herbaceous and shrub cover sparse
- TC: >45%

SageSTEP

Sagebrush Steppe
SageSTEP
Treatment Evaluation Project

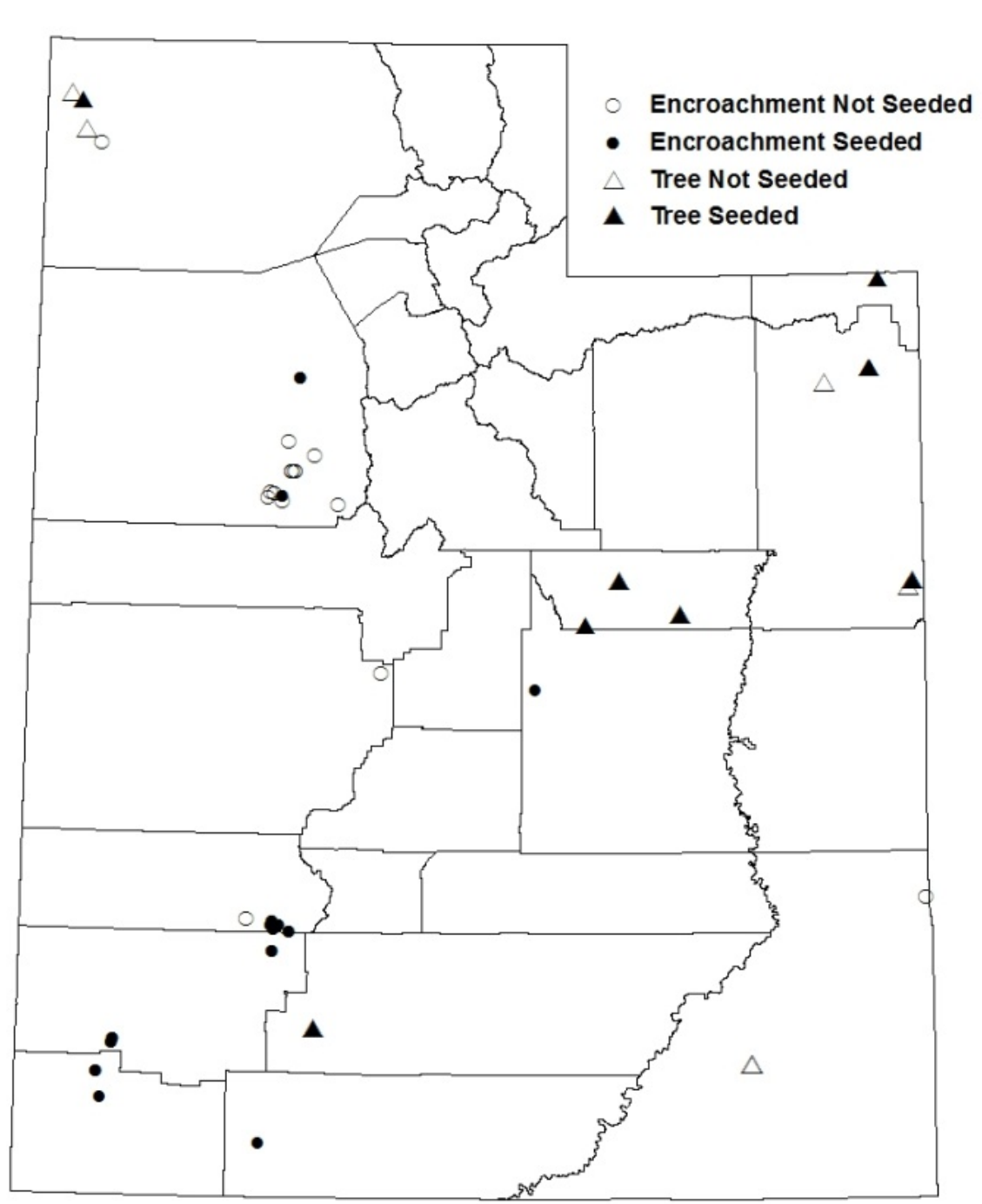
FECON

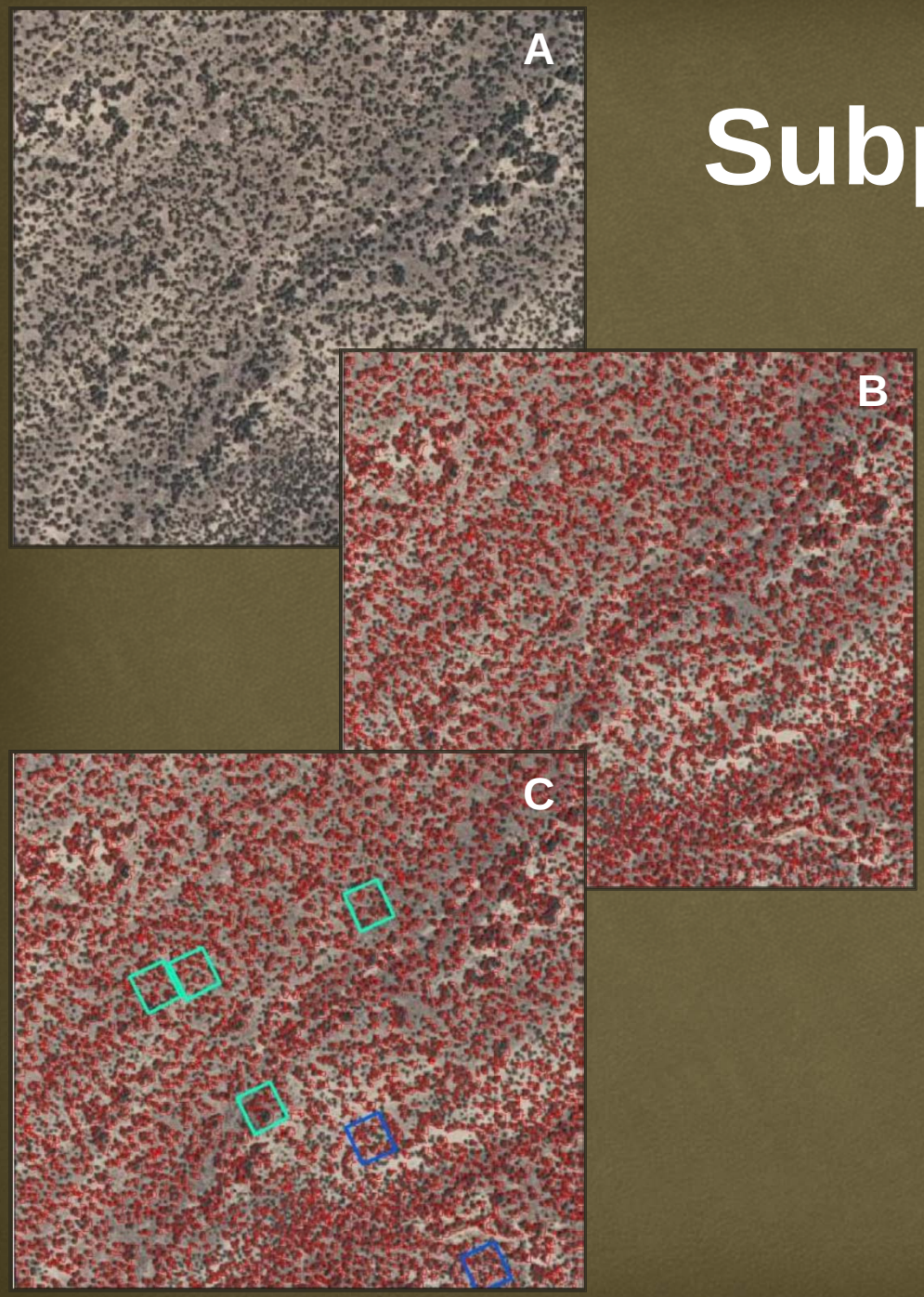
Objective

Give land managers clear expectations of plant response following shredding treatments

- How do responses vary for tree and encroachment ecological sites?
- What is the effect of initial tree cover (degree of infilling) on response?
- How does seeding of shredded treatments affect response?

Study sites


Encroachment Not Seeded
Encroachment Seeded
Tree Not Seeded
Tree Seeded

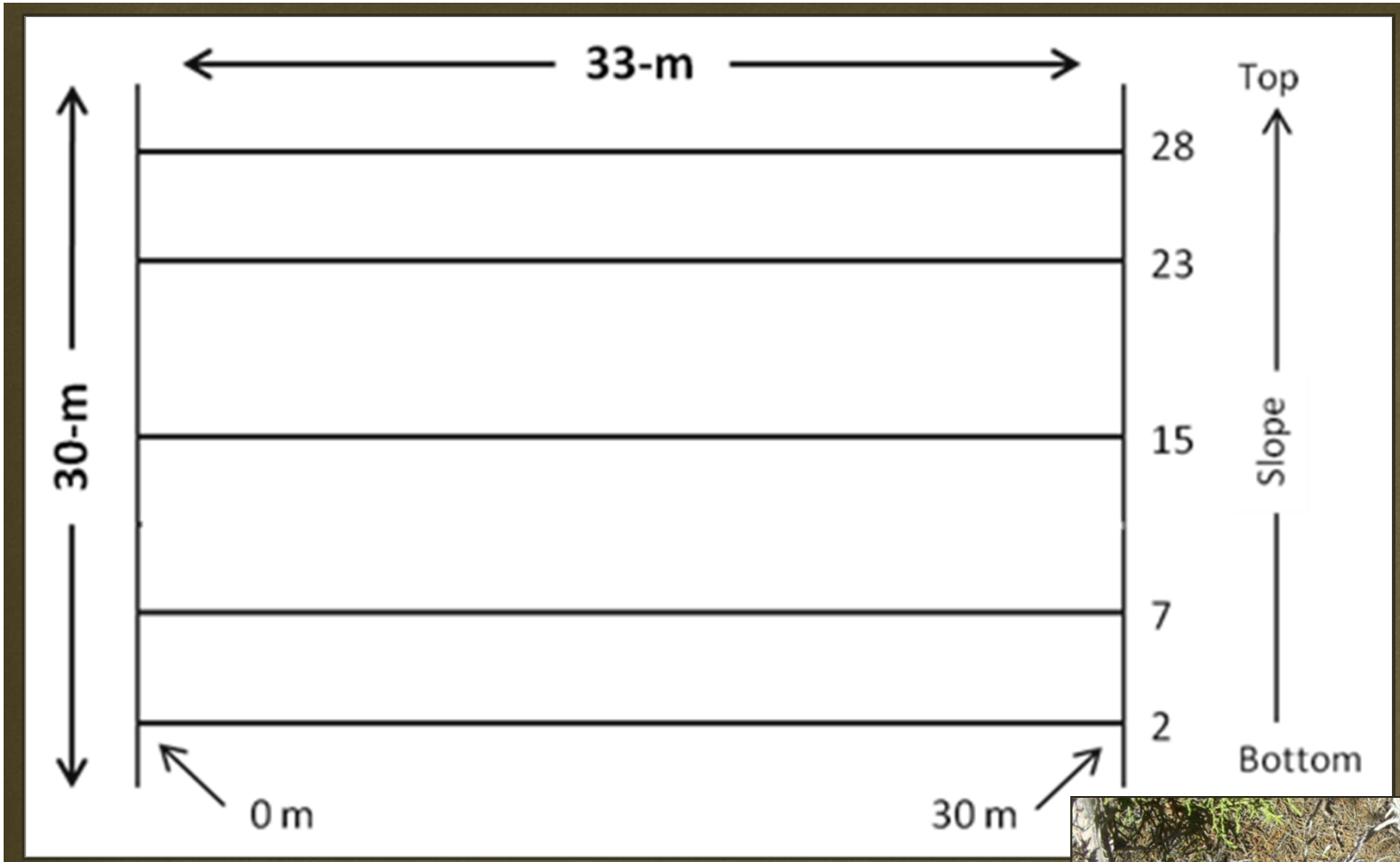


Subplot selection

A. NAIP imagery

B. Classified trees using feature extraction software (ENVI 4.5)

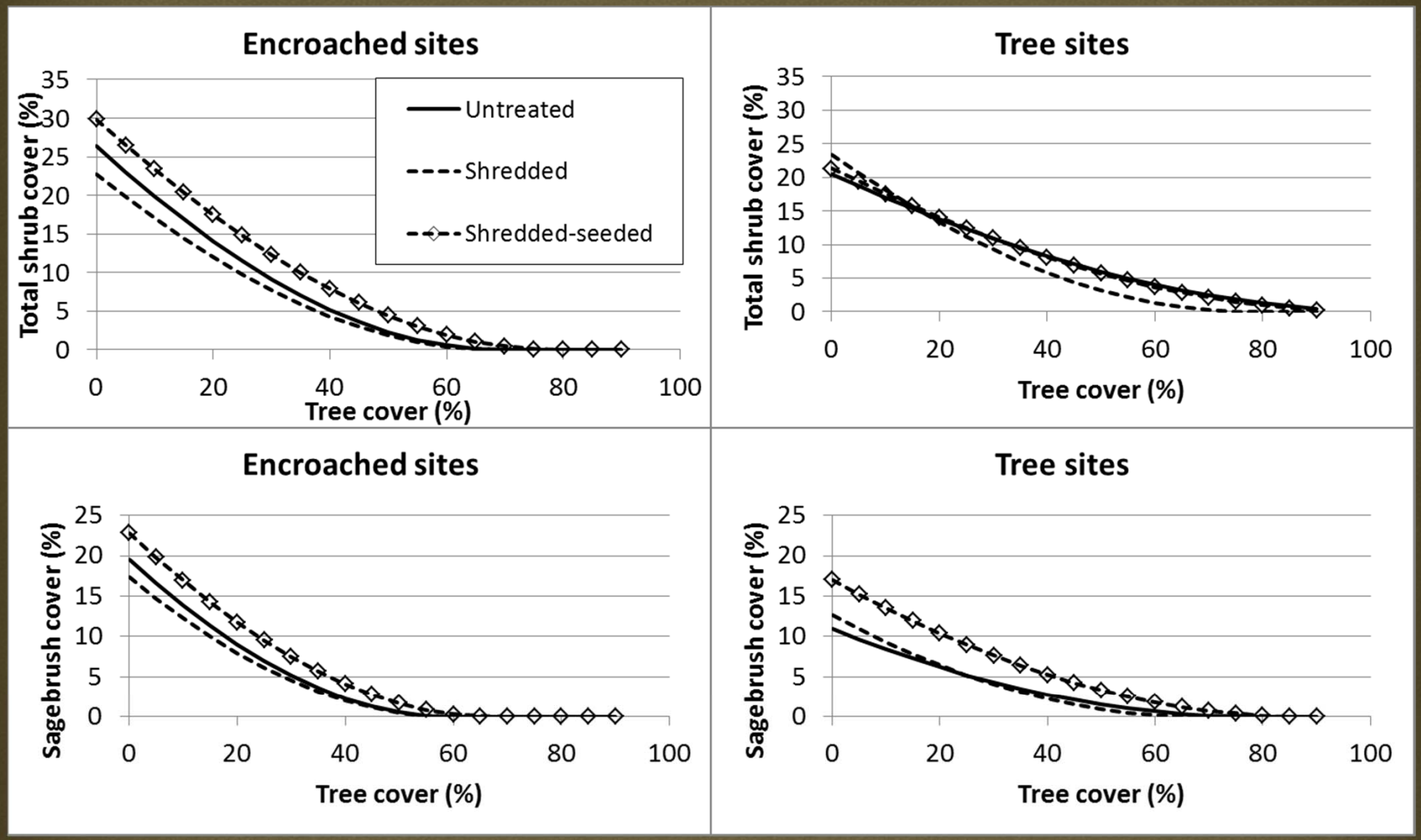
C. Paired subplots with similar tree cover calculated using ArcGIS

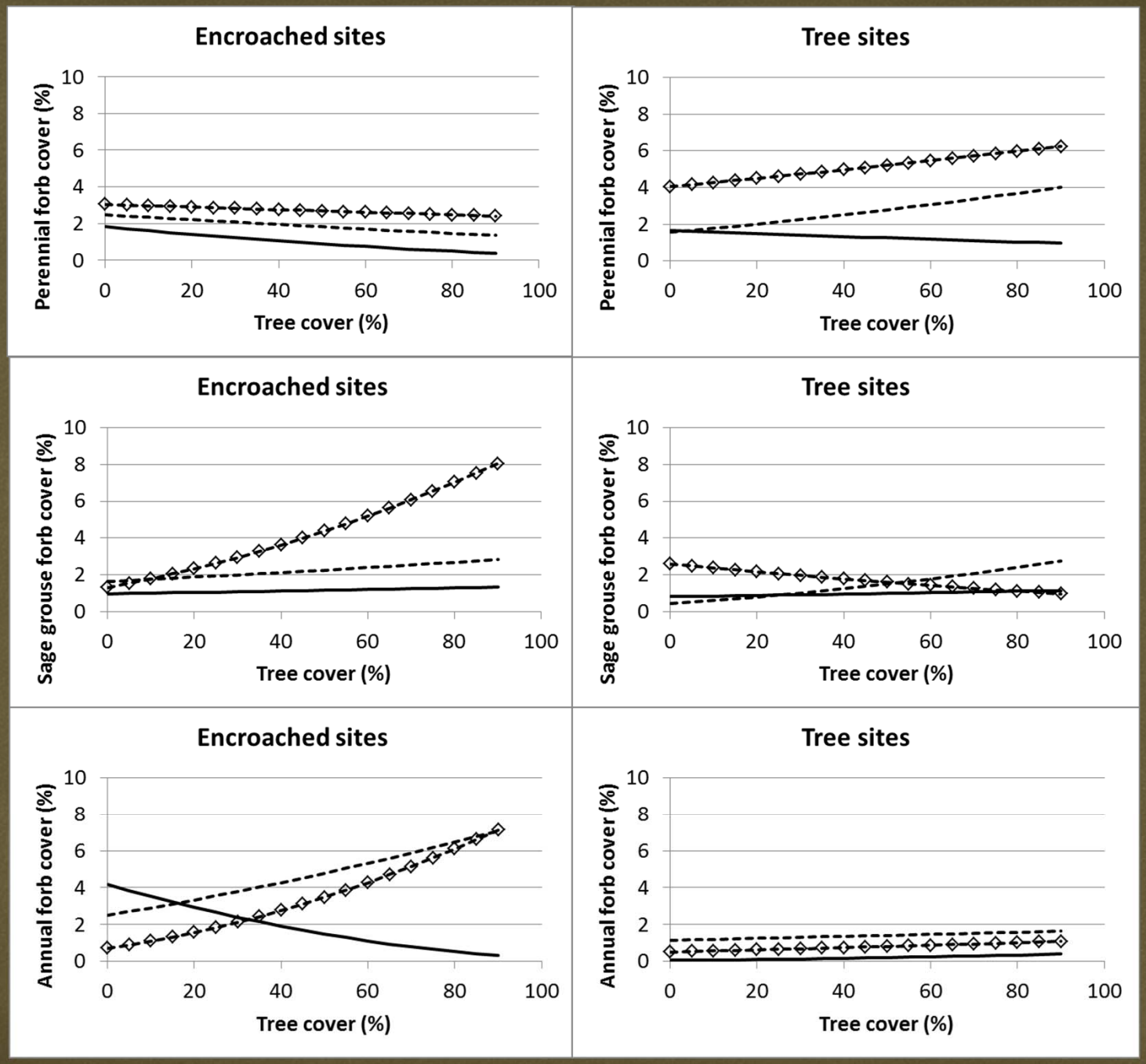


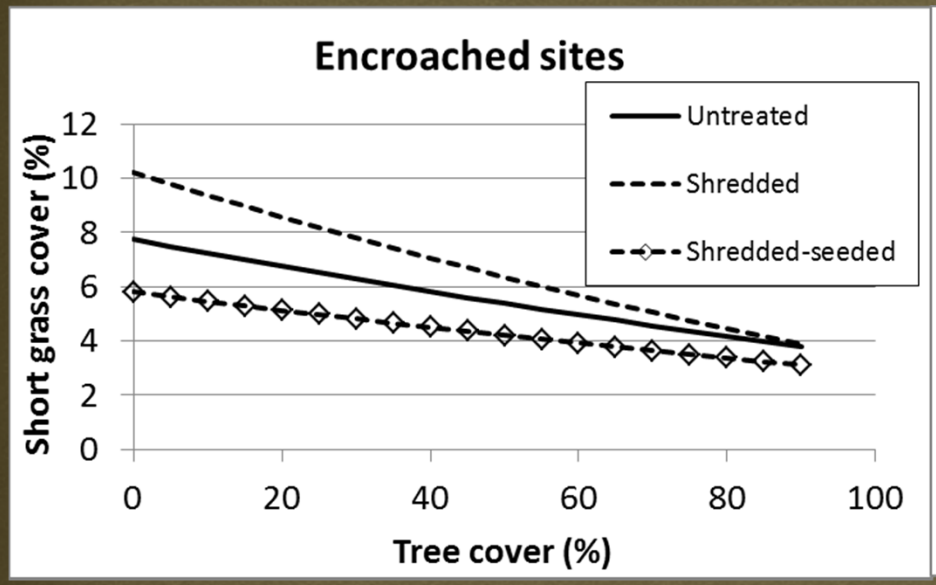
5 lines x 60 points per line =
300 points per subplot

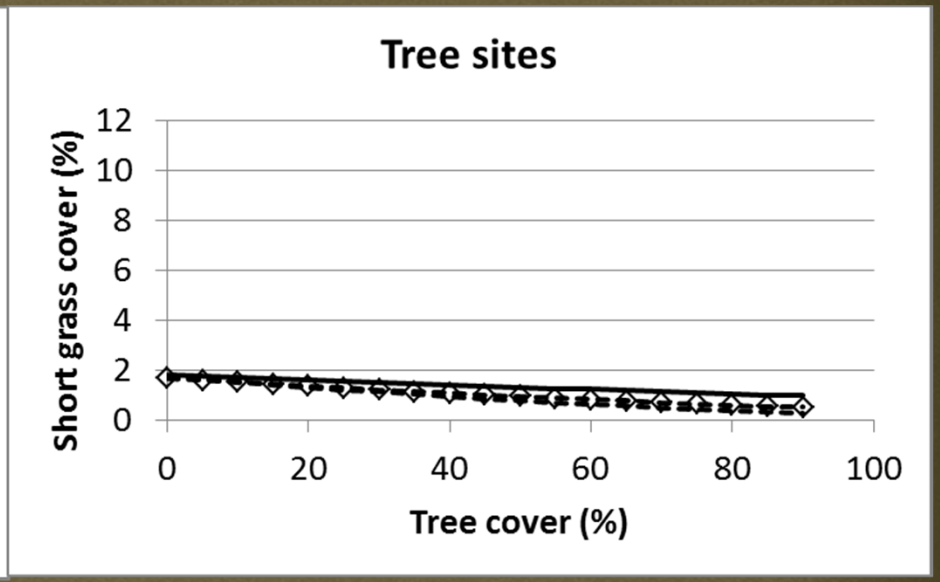
Understory cover covariance analysis

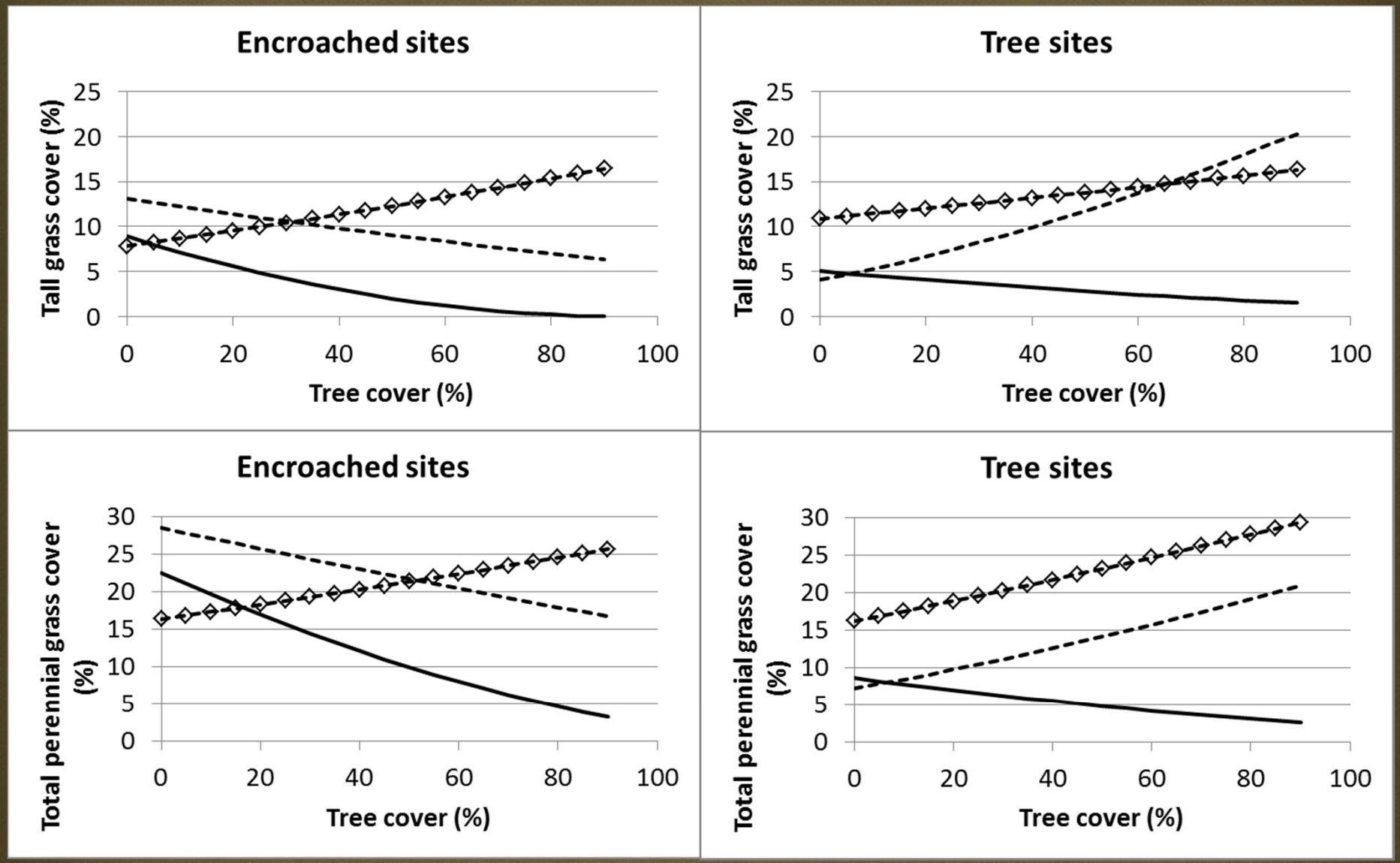
	Total shrub	Sagebrush	Perennial forb	Sage grouse forb	Short grass	Tall grass	Total perennial grass	Cheatgrass	Bare ground	Total perennial herbaceous	Biotic crusts	Annual forbs
Ecological site (ES)	0.290	**0.033**	0.900	0.819	**0.034**	0.204	**0.028**	0.111	0.065	0.061	0.347	0.076
Treatment (TRT)	0.766	0.093	**0.045**	0.334	0.646	0.432	0.828	0.579	**0.021**	0.714	0.449	0.382
ES*TRT	0.521	0.562	0.596	0.399	0.694	0.073	**0.032**	0.338	0.474	**0.036**	0.523	**0.010**
Tree cover (TC)	**<0.0001**	**<0.0001**	0.784	0.086	**0.026**	0.891	0.662	0.370	**<0.0001**	0.485	0.300	0.186
TC*ES	**0.007**	**0.000**	0.107	0.285	0.601	**0.022**	**0.030**	0.726	0.880	**0.038**	0.146	0.770
TC*TRT	0.689	0.922	0.184	0.634	0.856	**<0.0001**	**<0.0001**	**0.000**	**0.023**	**<0.0001**	0.506	**0.006**
TC*ES*TRT	0.365	0.580	0.769	**0.043**	0.936	0.059	0.389	0.279	0.780	0.354	0.136	**0.003**

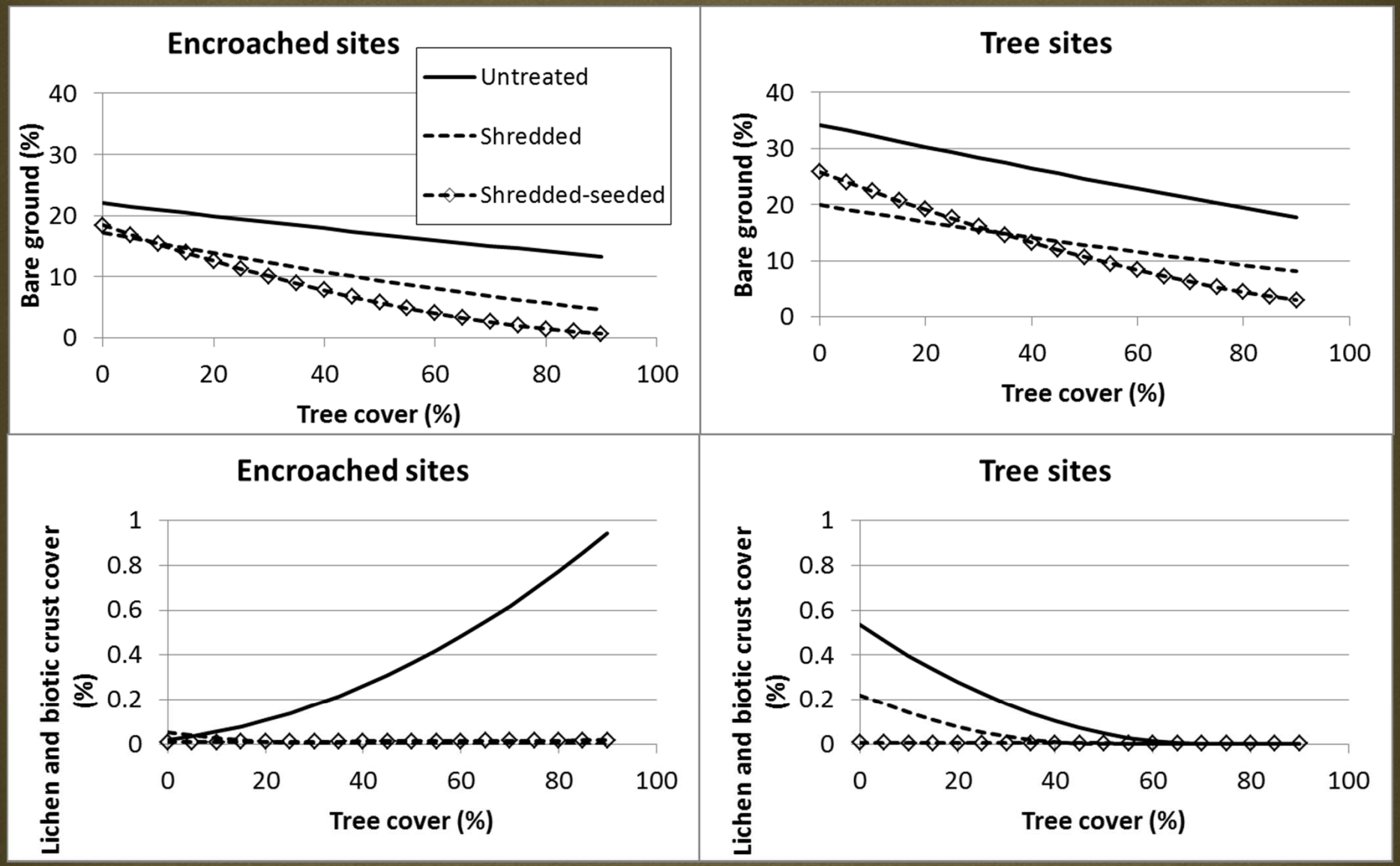

Encroached sites
Total shrub cover (%)
Tree cover (%)
Untreated
Shredded
Shredded-seeded
Tree sites
Total shrub cover (%)
Tree cover (%)
Encroached sites
Sagebrush cover (%)
Tree cover (%)
Tree sites
Sagebrush cover (%)
Tree cover (%)

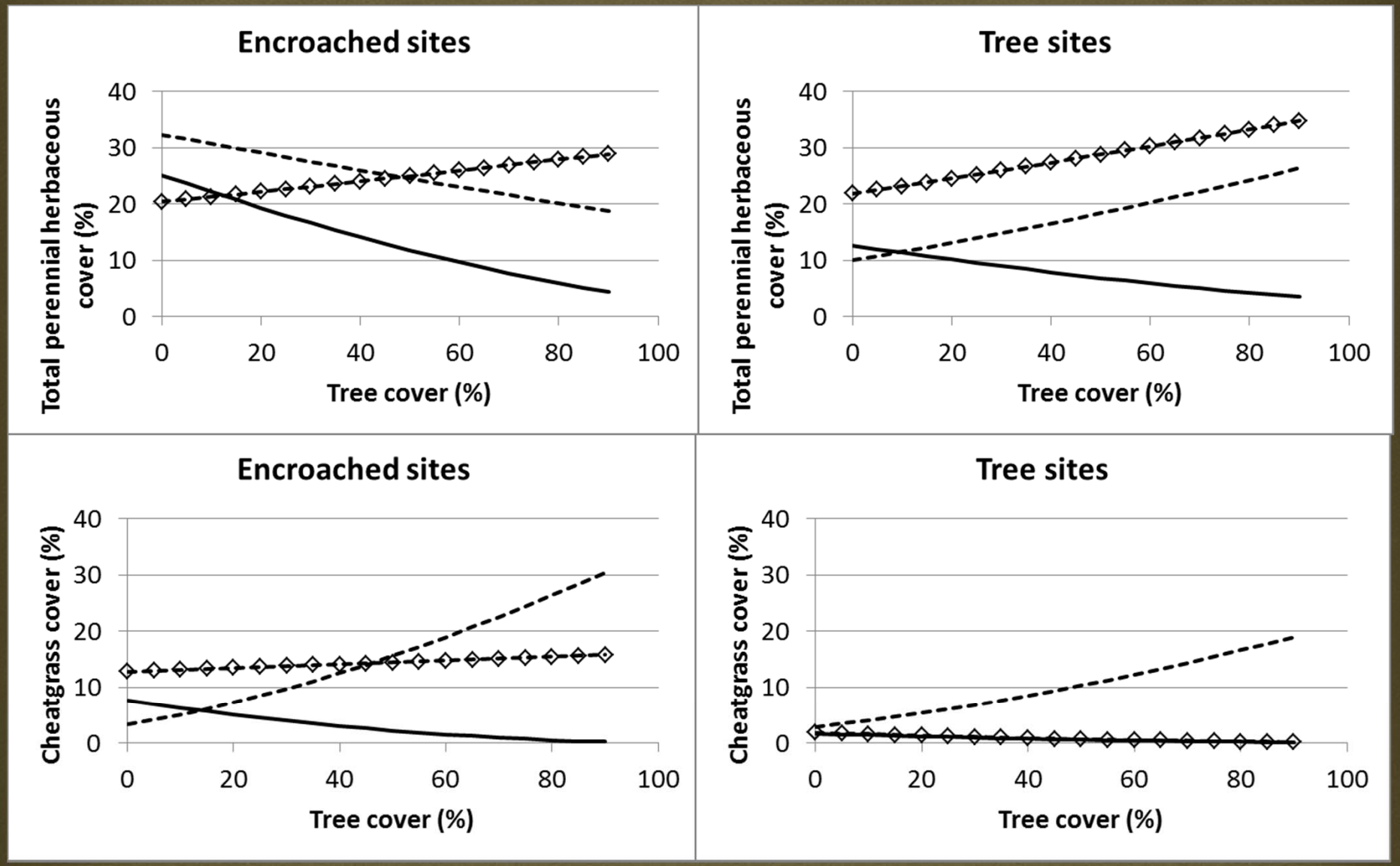

Encroached sites
Perennial forb cover (%)
Tree cover (%)
Tree sites
Perennial forb cover (%)
Tree cover (%)
Encroached sites
Sage grouse forb cover (%)
Tree cover (%)
Tree sites
Sage grouse forb cover (%)
Tree cover (%)
Encroached sites
Annual forb cover (%)
Tree cover (%)
Tree sites
Annual forb cover (%)
Tree cover (%)

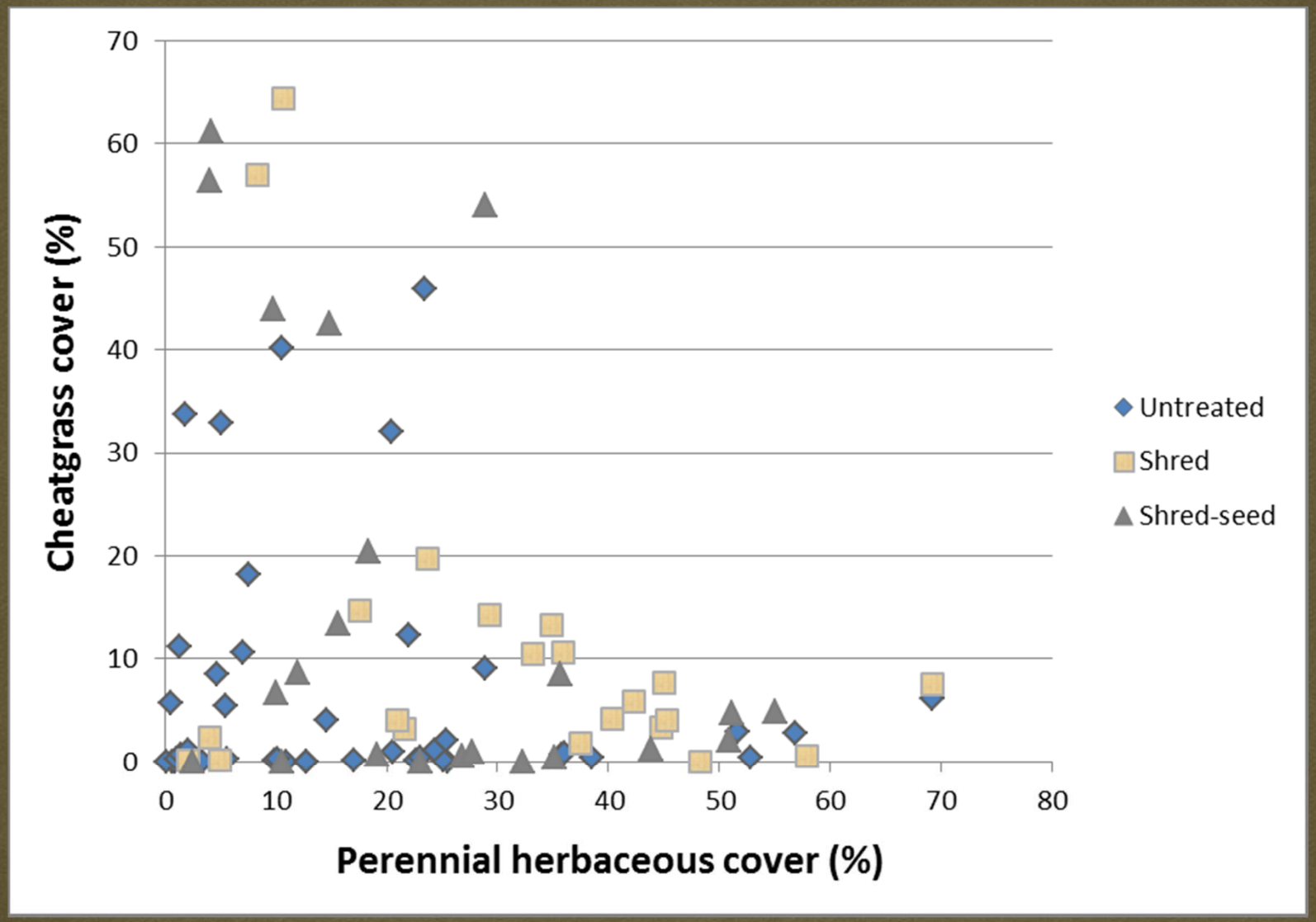

Encroached sites
Untreated
Shredded
Shredded-seeded
Short grass cover (%)
12
10
8
6
4
2
0
0
20
40
60
80
100
Tree cover (%)


Tree sites
Short grass cover (%)
12
10
8
6
4
2
0
0
20
40
60
80
100
Tree cover (%)


Encroached sites
Tall grass cover (%)
Tree cover (%)
Tree sites
Tall grass cover (%)
Tree cover (%)
Encroached sites
Total perennial grass cover (%)
Tree cover (%)
Tree sites
Total perennial grass cover (%)
Tree cover (%)


Encroached sites
Untreated
Shredded
Shredded-seeded
Bare ground (%)
Tree cover (%)
Tree sites
Bare ground (%)
Tree cover (%)
Encroached sites
Lichen and biotic crust cover (%)
Tree cover (%)
Tree sites
Lichen and biotic crust cover (%)
Tree cover (%)


Encroached sites
Total perennial herbaceous cover (%)
Tree cover (%)
Tree sites
Total perennial herbaceous cover (%)
Tree cover (%)
Encroached sites
Cheatgrass cover (%)
Tree cover (%)
Tree sites
Cheatgrass cover (%)
Tree cover (%)


Cheatgrass cover (%)
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
Perennial herbaceous cover (%)
Untreated
Shred
Shred-seed

Summary

- Shrub cover declined with increasing tree cover
- In general shredding and especially shredding and seeding increased the various herbaceous components
- Increase in cheatgrass cover with treatment

Additional Information

http://sagestep.org/pdfs/newsletter/SageSTEP_News_Issue_22.pdf

SageSTEP Newsletter Issue 22, Fall 2013