Impacts of fuel reduction thinning on oak & chaparral communities of southwestern OR

Keith Perchemlides and Patricia S. Muir

Botany & Plant Pathology, Oregon State University, Corvallis, OR, USA.

INTRODUCTION: In response to concerns about high-severity wildfires, land managers in the western United States are carrying out extensive programs of fuel reduction thinning. In some cases, treatments are also intended to facilitate restoration of ecosystems whose composition and functions are known, or presumed, to have been altered by fire suppression. Various treatment methods are used, and these are likely to be differentially successful in achieving fuel reduction and restoration goals. We studied responses of plant communities to two types of fuel reduction treatments in chaparral communities of southwestern OR, where treatments cause radical reductions in canopy cover (see paired photographs, below). Do treatments cause changes in understory communities? Are native species, particularly perennial grasses and forbs, favored by treatments? Alternatively, do treatments result in expansion of weedy species, either native or exotic?

Mixed oak and chaparral – SW OR

Pre-thinning

Post-thinning

BACKGROUND:

Fuel reduction thinnings have taken place on 7,000 + ha of oak and chaparral managed by Medford, OR District of BLM since 1996. Prescriptions include target reductions of stem density by ~ 90% and of canopy cover by ~70%. Thinning is accomplished by hand cut, pile & burn or by mechanical mastication (see panel below).

METHODS:

We sampled site and vegetation using 30 sets of paired 50 X 1 m plots, each pair including one treated and one untreated plot. All treatments had been applied 4 – 7 yr prior to our sampling. Plots were in communities dominated by *C. cuneatus, A. Viscida,* or mixtures.

Ceanothus cuneatus (buckbrush)

Arctostaphylos viscida (manzanita)

Question 1: What effects do treatments have on site conditions 4 – 7 yr post-thinning?

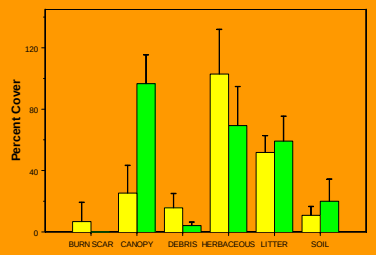
Conditions do differ immediately after the two-types of treatment, as shown below.

Hand cut, pile & burn

Mechanical mastication

However, 4 – 7 yr post-treatment, only the obvious and expected site conditions still differ – hand cut sites had more cover of burn pile scars and masticated sites more cover by woody debris.

Comparison of mean treated (yellow) and untreated (green) site conditions 4 – 7 yr post-treatment across treatment types. Bars = 1 st. error.



Question 2: Do understory plant communities differ between treated & untreated areas 4 – 7 yr post-treatment?

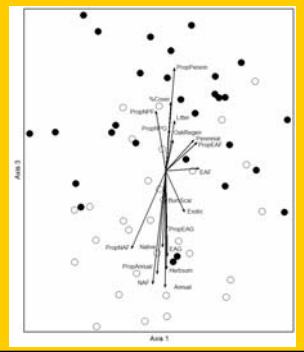
We analyzed data using multivariate approaches – a blocked version of multiresponse permutation procedure (MRBP), blocking on pairs; and non-metric multidimensional scaling (NMS) ordination.

Overall result from MRBP

p = 0.000

A = 0.56 – 0.159

(Strong significance for test of differences, but weak effect size)



NMS ordination
Unthinned = hollow; thinned = solid

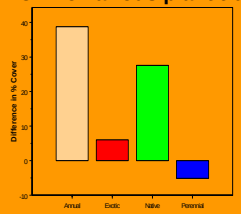
Vegetation variables associated (|tau| > 0.3) with unthinned sites:

canopy cover; perennial species cover; proportions of perennials, native perennial grasses, exotic annual forbs, and native perennial forbs; and oak and conifer regeneration

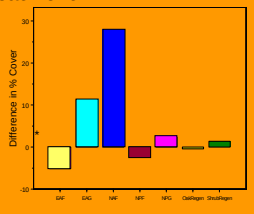
Vegetation variables associated (|tau| > 0.3) with thinned sites:

Total herbaceous cover; cover of native species, exotic species, annual species, exotic annual grasses and native annual forbs; proportions of annuals, exotic annual grasses, and native annual forbs.

Question 3: Do various plant trait groups respond differentially to treatment?



Differences in % cover by trait group (calculated as treated – control)



Proportions of total herbaceous cover comprised of various trait groups.

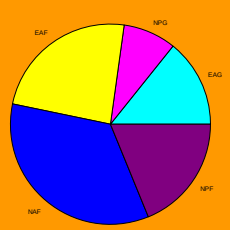
Yellow = exotic annual forbs (EAF)

Pink = native perennial grasses (NPG)

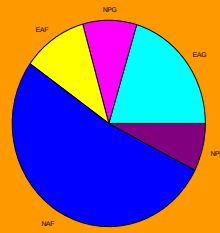
Pale blue = exotic annual grasses (EAG)

Maroon = native perennial forbs (NPF)

Deep blue = native annual forbs (NAF)



Unthinned



Thinned

Question 4: Do effects on communities differ between treatment types?

Uncertain. MRPP comparing within pair (treated minus control) differences between hand cut and mechanically masticated sites indicated no significant difference (p = 0.84). There was suggestive evidence that effects of the two treatment types did differ within canopy community types (*Arctostaphylos*-dominated, *Ceanothus*-dominated, or mixed) but sample sizes were small. This warrants further investigation.

SUMMARY: Four to seven years after treatment, both types of treatments were associated with:

Increases in:	Decreases in:	No change in:
Herbaceous cover	Exotic annual forb cover	Species diversity
Annual cover	Native perennial forb cover	Native perennial grass cover
Exotic annual grass cover	Canopy (tree & shrub) cover	
Native annual forb cover		
Woody debris cover		

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