Vegetation response to wildfire across an elevation gradient in Southwest Oregon

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Biscuit

The Biscuit Fire burned almost 500,000 acres (approximately 9,000 acres on BLM) and was dominated by plant communities with species that respond to fire by re-sprouting (such as tanoak, *Lithocarpus densiflorus,* rhododendron, *Rhododendron macrophyllum* and beargrass *Xerophyllum tenax).* Point transects were based on plant series and burn severity. Nested frequency transects were paired in seeded versus unseeded areas having similar slope and aspect. These pairs were tested for differences in mean species richness (# species present) of native and non-native species between seeded (with sterile wheatgrass aerially at light density) and unseeded areas. Point transects were compared by burn severity in 2005 for the percent cover of native species.

The F values show a significant increase in mean native species richness between 2003 and 2005 for both seeded [F=20.7 F(0.001)=4.74] and unseeded [F=6.07 F(0.03)=4.74] plots. No difference was found between seeded and unseeded species richness for individual years (2003 and 2005) except in 2003 due to the sterile wheatgrass. Since richness still significantly increased between years regardless of treatment, it can be concluded that seeding had no effect on species recovery and was most likely not necessary in such plant communities. Mean native species cover three years post-fire was significantly lower in high burn severity areas versus low severity areas [F = 9.92 F(0.03)=7.71]; primarily due to conifer cover that remained intact in low severity areas. Tanoak was the dominant tree species returning in high severity areas with the herbaceous response dominated by the re-sprouting ability of beargrass, which is from the Lily family. These plant communities are not naturally dominated by grass species and have a low tendency for invasion by annuals. **Therefore, the planting of species other than grasses may be more appropriate in high severity areas for these plant communities.**

Squires Peak

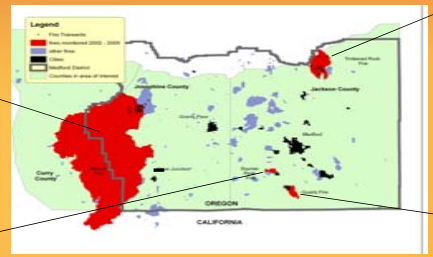
The Squires Peak Fire burned approximately 2,800 acres of public and private land, through a mosaic of mixed conifer, oak woodland and chaparral. Areas of fuel-reduction and untreated portions of woodland/chaparral vegetation both experienced a high proportion of stand-replacement under extreme fire conditions. Fuel reduction within non-conifer vegetation proximal to homes provided the study site for transects and photos examining the effect of seeding by sterile wheatgrass on native species richness and abundance. The Squires Peak Fire is also one of the locations for the examination of the potential benefits of native grass seeding and inoculation by mycorrhizae. Rapid growth of grasses resulted in high canopy stands with enough fuels to raise the concern of local residents. No significant difference was found between seeded and unseeded native or non-native mean cover for the years 2003 and 2005. While natives increased and non-natives decreased, no significant difference in means was found between 2003 and 2005 for seeded areas.

Of most interest is that a significant increase was found in non-native cover between 2003 and 2005 in burned, unseeded areas [F=28.9, F(0.0002)=4.84). This increase was due to both cheatgrass and red brome. Native species increased in burned, unseeded areas, but not significantly. This data was compared with unburned, unseeded areas where neither natives or non-natives increased significantly over the years. **Therefore, while seeding did not completely eliminate the potential for non-native annual grasses, it did provide enough cover to reduce abundance of these aggressive grasses.**

INTRODUCTION

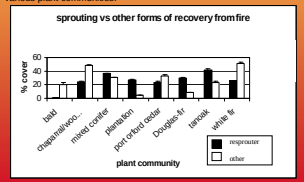
Recent wildland fires on Medford District, Bureau of Land Management (BLM) offer an opportunity to compare vegetation recovery of plant communities found in southwestern Oregon along an elevational gradient. The Quartz fire (2001) and Squires Peak fire (2002) represent the lower elevation plant communities (chaparral, oak woodland, and mixed conifer). The Timbered Rock Fire (2002) is intermediate in elevation and is comprised more of mixed hardwood-conifer and white-fir communities. The higher elevation portion of the Biscuit Fire (2002) that burned on Medford District is dominated by the white fir and tanoak communities.

Point cover transects and repeat photos identify general patterns of vegetation change characteristic of plant communities represented by the fires. Paired transects were placed in burnt and unburned areas to allow the examination of wildfire response to a control. Similarly, point cover, nested frequency and repeat photos were placed in seeded versus unseeded areas within each of the fires. Seed composition (native versus sterile wheatgrass) and seed rate (light versus heavy) varied across transects and fires. The data could therefore only be examined within each fire using Analysis of Variance to determine if seeding affected native species richness cover. Photos at the start and end of each transect provide visual insight about plot-level changes.



RESULTS

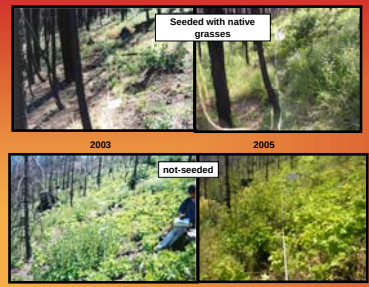
The results presented in this poster are preliminary. Each of the four fires had common variables in which to compare across fires. The same methodology was used to accommodate such analysis, but the placement of transects per fire varied based on unique questions asked for each fire. Therefore, results are reported individually by fire (as seen in the four boxes) and across fires (which follows). Lower elevation plant community response in non-conifer communities of the Quartz and Squires fires is typical of a stand-replacement chaparral response. Hardwoods (Oregon white oak and madrone) show a strong re-sprouting response. Shrubs show either a sprouting response (birchleaf mountain mahogany, poison oak), or germination from a seedbank (whiteleaf manzanita). Herbaceous response was characterized by the rapid growth and flowering response of geophytes and other wildflowers. Throughout the fires, mixed conifer generally experienced stand replacement fire and a strong sprouting response by understory shrubs. Higher elevation sites of the Biscuit fire showed similar stand replacement followed by the rapid domination of re-sprouting species (tanoak) with low diversity in the herbaceous layer. The graph below shows the % cover of plants responding post-fire by re-sprouting versus other responses by various plant communities.



CONCLUSIONS

The plant communities of southwestern Oregon have characteristic proportions of re-sprouting plants versus plants arising from seed. Plant communities with a high abundance of re-sprouting species (for example, tanoak and Douglas-fir communities) may not require reseeding. Chaparral has a high abundance of plants growing back from seed, but may require seed application where the native seedbank has become depleted and the potential for non-native species invasion could be high. A knowledge of plant community interaction with fire and health of the landscape may improve the identification of areas requiring emergency seed application. Such information is key to ensuring that limited native plant materials are used most effectively and where most needed.

Timbered Rock



The Timbered Rock fire burned across 27,100 acres; 11,700 on BLM lands. The majority of stands were late seral in the Douglas-fir (*Pseudotsuga menziesii*) plant series, but white fir (*Abies concolor*), Oregon white oak (*Quercus garryana*), and ponderosa pine (*Pinus ponderosa*) series were also represented. The hardwood tree and shrub layers were dominated by species that regenerate after fire through re-sprouting including madrone (*Arbutus menziesii*), chinquapin (*Chrysolepis chrysophylla*), canyon live oak (*Quercus chrysolepis*), deerbrush (*Ceanothus integerrimus*), poison oak (*Toxicodendron diversiloba*) and oceanspray (*Holodiscus discolor*).

Seeding was done in high severity burn areas on steep slopes, particularly in plantations. Transects were placed in different plant communities in both mid- and late seral stages. Seeding was primarily done with native grasses. Blue wildrye, (*Elymus glaucus),* responded the best. Natural regeneration was high in these seeded areas. A significant increase in both native species richness (F=20.9, F(0.00012) = 4.26 and cover F= 19.6, F(0.00037)=4.45 occurred between the years 2003 and 2005. Increases in cover were found for such native species as Douglas fir, as well as *Ceanothus* and *Rubus* species which naturally occur at higher cover than species in the herbaceous layer

A significant increase in non-native species cover (namely *Lactuca* species) occurred on seeded plots between 2003 and 2005 (F=6.07; F(0.26-4.54). These seeded plots showed less cover of annual grasses than unseeded plots. **Therefore, seeding may not have been necessary where re-sprouters were dominant, but did help to reduce the abundance of non-native annual grasses.**

Quartz

The Quartz fire burned a total of 6,160 acres of private property and lands administered by the BLM and the National Forest Service in 2001 (one year prior to the other fires shown). The fire burned mostly mixed conifer, but also chaparral, and woodlands. The accumulation of fuels consequent to the active fire suppression of the past resulted in areas with high fuels.

Native grass seed was in the most intensely burned areas. Limited results are available from one set of paired seeded transects. Idaho fescue, (*Festuca idahoensis)* responded the best compared to the paired unseeded site where Sandberg bluegrass, (*Poa secunda)* dominated along with thimbleberry, (*Rubus parviflorus),* in the shrub layer.

Other unseeded sites showed a healthy seed germination and re-sprouting response by native forbs, shrubs and grasses such as poison oak, (*Toxicodendron diversiloba)* and Poa *secunda*. A significant increase in non-native species [F=14.4, F(0.001) = 4.38) was found for unseeded areas between 2002 and 2003. Prickly lettuce, *Lactuca serriola* was the dominant non-native in unseeded areas, but the species was not as dominant in the seeded areas. **Therefore, seeding may be used to reduce the cover of this invasive species in similar plant communities.**