

Assessing the Ecological & Economical Effectiveness of Thinning Techniques in Piñon & Juniper-Encroached Shrublands

The Issue

Piñon and juniper woodlands have expanded beyond their historical range in the western United States, due partly to land management practices that have lengthened fire-return intervals. This woodland expansion has displaced sagebrush steppe vegetation, leading to decreased wildlife habitat and plant species diversity, and increased rates of soil erosion. It has also led to the accumulation of fuels that can cause intense, high severity, crown fires. At the local management scale, the cost-effectiveness and ecological effects of various combinations of thinning, seeding, and burning are typically unknown. The need for this local information is greater now than ever before because recent land management directives call for reducing fuel and fire hazards across broad landscapes.

Research Projects

Our research goal is to address gaps in fuel management knowledge using scientifically robust studies that are conducted & replicated within local areas where fuel management is a priority. We currently have one project in progress, and two more projects planned to begin in FY06.

Our current project, *Effects of Fuel Management Treatments in Piñon-Juniper Vegetation at a Site on the Colorado Plateau (JFSP #03-3-3-58)*, is a Joint Fire Science Program-funded research project with two components. The first component will test the effectiveness of 3 thinning techniques typically used in PJ fuels: 1) Cut & Leave, 2) Cut, Limb, Buck, & Scatter, and 3) Herbicide Application. The treatments, plus an untreated control, were applied to 8 replicate 20-ac. plots. Post-treatment sampling was conducted in summer 2004 and 2005. The US Forest Service—Missoula Fire Lab, has also quantified changes in fuel structure and analyses are now underway. Future plans include resampling vegetation and fuels, and evaluating the effects of vegetation changes on wildlife.

Key Points

- Local land managers need site-specific information when planning large-scale fuel reduction operations in piñon-juniper woodlands.
- Replicated experiments are needed within local areas to produce reliable, site-specific recommendations.
- Repeated local experiments over a larger region will facilitate meta-analyses, which will identify broader generalizations regarding the effectiveness of different piñon-juniper thinning techniques.

The second component addresses the effects of Cut & Leave thinning with and without seeding of perennial grasses (*Bouteloua gracilis* and *Elymus elymoides*). These treatments were applied in fall 2004, and post-treatment sampling will be conducted in summer 2006.

The study site is located in northwestern Arizona on land managed by the National Park Service, Lake Mead National Recreation Area and the Grand Canyon-Parashant National Monument. Results from the first post-treatment sampling for the first experimental component suggest...

- Total vegetation cover in the herbicide treatment increased (28% v. 15% in the control)
- Herbaceous plant density in the herbicide treatment increased (40 plants/m² v. 20 in the control)
- Plant species richness was greater in the herbicide plots (about 10-12 more species than the control at a 100 and 1000 m² scale)
- Vegetation cover, herbaceous plant density, and richness also increased in the Cut & Leave treatment, although not as strong as the Herbicide treatment
- There was little change in the Cut & Scatter, treatment, except for an increase in species richness.

Examples of treatments at the Lake Mead National Recreation Area Site



Untreated Control—a closing canopy has reduced shrub and herbaceous vegetation cover



Herbicide—Tordon 22k was basally applied; there was a strong response in herbaceous cover



Cut & Leave—a basic mechanical treatment, trees are simply left in place



Cut, Limb, Buck, Scatter—spreading the residue may provide favorable micro-sites for plant established, and the fuel arrangement may facilitate future prescribed fire

Our second proposed project, *Evaluating the Effects of Pinyon Juniper Thinning Treatments at a Wildland/Urban Interface (JFSP #05-2-1-08)*, will begin in FY06 with funding from the Joint Fire Science Program. This project will compare thinning options for piñon-encroached shrublands near Mono Lake, California. In cooperation with the BLM, Bishop Field Office, we will compare two thinning techniques: 1) Cut-Remove-Burn Slash, and 2) Masticate-Mulch, each at two levels of piñon density: 1) Fire Regime Condition Class 2, and 2) Fire Regime Condition Class 3, using 8 replicate 2.5-ac plots. We will monitor changes in vegetation cover, vegetation diversity, and fuel structure. Another component of the project will test predicted and actual fire behavior within an additional set of 6 replicate thinned plots that will be burned within 3 years after thinning.

Our third project, *Effectiveness Monitoring of Fuel Management Treatments in the Spring Mountains National Recreation Area*, will begin

in FY 2006 with funding through the Clark County (Nevada) Multi-species Habitat Conservation Program. In cooperation with the USFS—Humboldt-Toiyabe National Forest, we will compare unthinned controls with the Cut-Mulch-Scatter treatment targeting piñon. Effects on sensitive species (especially the Clokey eggvetch [*Astragalus aequalis*] and rare butterfly species) will be the focus of our monitoring efforts, plus standard measurements of vegetation cover and diversity.

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JFSP #03-3-3-50 Project Website: <http://www.werc.usgs.gov/fire/lv/pj/lakemead>