Webinar Brief for Resource Managers

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Effects of Fire and Mechanical Treatments on Plants and Wildlife in Western Juniper and PJ Woodlands

Presented on January 24, 2011 by Rick Miller, Professor of Range Ecology and Management

Project Summary: Rick miller discusses how fire and mechanical treatments effect plant and wildlife communities in the western juniper and pinyon-juniper woodlands. Several examples of different responses to fire and mechanical treatments are examined and evaluated.

Management Implications

- Pre-fire vegetation is important in determining an area's response to treatment, whether known or estimated.
- High spatial heterogeneity is common on burned lands. Close evaluation is necessary for determining the most appropriate course of action.
- Longevity of a recovery needs to be forefront in management plans. How long will a site take to reestablish? What will a site look like decades into the future?

Abstract: Plant succession following a fire is related to several key components: treatment impacts, fire behavior, pre- and post-fire climate, pre-fire vegetation, heterogeneity and the Ecological Site Description (ESD). ESDs are composed of several site descriptors, primarily focused on climate, topographic position, and soil temperature & moisture. Moisture and temperature regimes are applied to land units, called Major Land Use Resource Areas (MLRAs). Determining whether or not an area will reestablish to PJ woodlands after a fire is a multistep process. First, it is important to determine if the woodland was an old growth forest or if it was recently invaded shrub land. In concert, managers must also determine what phase the woodland was in before the fire (I, II, or III). The phase that the woodland was in prior to the fire offers a lot of information on burn intensity and fire behavior, and, as such, can help illuminate possible succesional pathways. Some of the most influential aspects to succession are soil temperature and moisture, with sites progressing faster on warmer, wetter soils than colder, dryer soils. However, warmer and wetter sites will be more exposed to invasive weeds, so comprehensive, long-term management needs to be applied. The SageSTEP program has been looking at succession in the long term for several sites under several pre- and post-fire conditions and management regimes. Burning will remove most shrubs and, depending on the burn, be overall positive just in the first few years following the fire; the areas burned, however, may be more susceptible to invasives, depending on ESDs and soil regimes, so careful attention

must be paid. Mechanical treatments, overall, are less effective at encouraging succession and create a few problems with smothering and encouraging invasives. Wildlife responses to fire depend very heavily on local conditions and the animal class in question. Different animals require different things following a fire, but generally, the more diverse the ecosystem before, and the heterogeneity of the landscape, with respect to unburned and burned patches, is overall positive for most wildlife species.

Questions:

Are there other weedy species that are a problem? *Ventenaba dubia* for example.

It's been a real problem in Washington [State]. 15 years ago, an ecologist made a statement that he mapped it. While it was unknown at the time, it is now encroaching. It hasn't been encroaching in large part to fires fueled by cheatgrass, but it is coming in. We need to watch it, though. It could be seed source not available or it's not as well adapted, but it's just a matter of time. We are kind of worried, and interested in seeing what it does over time. Small problems have a way of becoming huge over time. Sure there are some that could become a problem, but some come in and fade out. I'm not as familiar with Colorado plateau, Robin Tausch talks about cheatgrass being a problem with OJ in Nevada. Knapweeds are becoming invasive in Nevada, and Northern California and Oregon, but it's not moving into PJ stands. However, it is different in Montana, and is quite the problem. Whitetop is spotty, but not big problem yet, but those are the ones that need to be watched and dealt with as early as possible.

Climate change is becoming a bigger issue for the BLM. How do you think responses to burning with cutting will change?

The big thing is dealing with carbon. We need better info on carbon. Ben Rau on the SageSTEP project is one of the more knowledgeable people who deals with soil and carbon issues. If we burn, we will lose more than if we cut and drop, right? Well, decomposition by cutting is slower for carbon loss, but unless carbon gets incorporated into the soil, the carbon is going to go back into the atmosphere. Some of the work they've done has shown, even though a lot of the carbon is volatilized and lost very quickly in a fire, much of the ash gets incorporated into the soil and you may get more carbon retention in the long run. But again, very little, limited information on it. A big complaint is the amount of carbon you're dealing with from burning is very small compared to anthropogenic sources. It's something that we need more information on. When doing ecological assessments, keep carbon in mind and try to figure out what effects these treatments are having on carbon, in the short term and long term. Hot fires will lose more wood and carbon, and have more detrimental effects. Hard issues to address with limited resources. Ben Rau is a good person to talk to.

Do you have any research on PJ sites that have been masticated rather than cut and leave?

We don't, but Bruce Roundy does. As part of SageSTEP, Bruce has been working on that, and they're looking at when you masticate, and what affect the smothering effect has, depends on coverage area and depends on the woodland phase. Later produces larger amounts of low quality litter, with lots of carbon but little nitrogen so it will be hard for microorganisms to break the litter down. Breakdown is slow and tough. Bruce is the best person to contact at BYU with the mastication program. There is not a lot of information. We evaluated drop and burn versus cut and pile and burn. An advantage of pile and burn is that the interspace sagebrush will not be burned. However, there are concerns, such as hotter burning so we will get hotspots that may turn into cheatgrass. This has happened less severely when burned in winter with colder ground.

Historically, is there a lot of evidence of juniper that occurred naturally encroaching on lowlands? Not anthropogenically?

Yes, there is. The pollen record and pack rat middens hold evidence. Pete Mehringer's work shows, as you move north, juniper wasn't up here in Pleistocene and has been expanding into northern range within the last 6000 years. We find that it relates a lot to the climate and there were spiking situations where it filled in and moved out from grassy areas. In the pollen record, it shows that invaded grassy areas were fairly open; this assertion is speculative. Expansion and contraction occurred, especially in the Colorado plateau operating differently than the Great Basin. That is, you have big droughts from 1575-1700, it is hard to find trees that predate that time period. Drought removed trees and caused major fire, mainly resulting in pinyon die off. In 2003 and the 1950s major die offs happened due to a combination of drought and beetles. Pinyon pine is more dynamic, but juniper is more resistant to drought. Mehringer states that, in late 1800s, it was cooler and wetter, and juniper was expanding. He feels that fire regime really impacted it and let it move into deeper mountain big sage sites. Fire was a big impact on it spatially on where it is and is not.

Central Nevada basin and range, what were the defining characteristics to separate the two classes that overlapped on the mesic-warm and mesic-cool?

The soil scientists are more splitterdown in Nevada. Soil temperatures are based on how many days you have what temperature during the soil season at a certain depth.