

Forest Health Protection

Pacific Southwest Region



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To: Susanville Indian Rancheria

Subject: Evaluation of the Cradle Valley Property (FHP Report NE04-06)

At the request of Tim Keesey, Environmental Manager, Susanville Indian Rancheria, I conducted a field evaluation of the Cradle Valley Property, located within the Plumas National Forest, on June 7, 2004. The objective of my visit was to evaluate the existing forest health conditions and to provide management recommendations as appropriate.

Background

The Cradle Valley Property, a 160-acre parcel owned by the Susanville Indian Rancheria, is located within the boundaries of the Plumas National Forest, about 15 miles southeast of Susanville, at an elevation of 6000 feet. Precipitation for the site averages approximately 20-25 inches per year. The land is mostly forested uplands adjacent to Clarks Creek and a wet meadow area just east of Clarks Creek. Jeffrey pine (*Pinus jeffreyi*) dominates the northeast corner and Jeffrey pine (*Pinus jeffreyi*) and white fir (*Abies concolor*) co-dominate the southwest corner. Lodgepole pine (*Pinus contorta*) is the dominant component of the riparian corridor through the middle of the property and makes up a dense stand on the northern perimeter of a wet meadow area. Quaking aspen (*Populus tremuloides*) is present in a few small pockets along the creek and in the wet meadow growing with lodgepole pine and willow (*Salix sp.*)

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Historically, this area was sparsely forested as evidenced by the few, old, widely spaced Jeffrey

pine stumps (representing harvested presettlement trees) scattered throughout the property. There are also very few presettlement live trees, snags and downed logs present on the site, further supporting that this was a very open forest. Harvest activities that have occurred on the property include the past overstory removal of presettlement trees and salvage logging of mostly white fir and Jeffrey pine within the last 15 years. Most of the trees on the site are less than 150 years old. Dominant trees average about 24" diameter breast height (dbh) while midstory trees average approximately 10" dbh. Throughout the area are thickets of small diameter, less than 10" dbh, white fir, lodgepole, and Jeffrey pine. The short-term goal for this land is to reduce hazardous fuels and improve stand health by the pre-commercial thinning of small diameter trees (trees less than 12" dbh). The long-term goal is to restore presettlement stand structure, restore understory vegetation and reintroduce fire into the landscape. A proposal for funding was recently submitted to the Plumas County Resource Advisory Committee (RAC) to facilitate hand thinning of small diameter material (<12"dbh) from some of the stands and to reduce surface and ladder fuels.

Observations

Current stand conditions within the parcel are typical for eastside pine communities that have not experienced fire for 100+ years and have had no mechanical treatments to reduce stand density and fuel accumulation. All stands are at or above normal stocking levels and many are experiencing high mortality. Many stands also contain large amounts of dead and down woody material. This high fuel loading combined with high stand density puts this area at a greater risk for stand replacing wildfire.

In pure Jeffrey pine stands, heavy infections of western dwarf mistletoe (*Arceuthobium campylopodum*) and high stand density have increased the susceptibility of many trees to successful attack by bark beetles. Jeffrey pine saplings and poles that have established under dwarf mistletoe infected overstory pines are severely infected (Figures 1 and 2). Recently,



Figure 1. Dwarf mistletoe fruiting body



Figure 2. Thin crown due to dwarf mistletoe infection

however, mortality levels have been low and involve only the most heavily infected pines. Two

trees were found infested with Jeffrey pine beetle and a couple of small groups of snags and downed trees were observed that are remnants of past bark beetle outbreaks (mainly from the drought of 1987-1992). Field measurements of stand basal area revealed an average of 140 sq. ft./acre, which is close to the upper stocking limit for the site and likely much higher than presettlement conditions.

Some Jeffrey pine stands have been heavily encroached by white fir creating a dense understory of small diameter, suppressed, trees. As a result, many of these small white fir trees have died over the last 15 years from attacks by the fir engraver beetle (*Scolytus ventralis*). However, fir engraver beetle attack and subsequent tree mortality is not just limited to these denser stands. Many white fir trees throughout the area, representing most size classes, are currently being attacked and killed (Figure 3). In some less severe cases, the results of the attacks are top kill or individual branch dieback. No signs of annosus root disease (*Heterobasidion annosum*) were observed in these trees or in the stumps created by past salvage harvesting.

Lodgepole pine stands along Clarks Creek and bordering the wet meadow area contain many trees infected with lodgepole pine dwarf mistletoe (*Arceuthobium americanum*). These stands



Figure 3. White fir killed by the fir engraver beetle

are extremely dense with several hundred small diameter trees per acre. Successful attacks by mountain pine beetle (*Dendroctonus ponderosae*) over time have killed many trees in both the understory and overstory. Pine engraver beetle (*Ips pini*) is also responsible for killing the smaller diameter lodgepole at this site. Larger lodgepole stumps left from woodcutting are presumed to be from past bark beetle killed trees. Most of the lodgepole pine trees along Clarks Creek and within the wet meadow were likely established since the last fire (100+ years ago) and have been steadily encroaching into the meadow areas as well as increasing in density ever since.

Three small aspen stands were observed within these meadow areas as well lodgepole pine areas. All three stands exhibited symptoms of conifer encroachment: loss of mature stems and a lack of regeneration.

Discussion and Recommendations

The Jeffrey pine stands within the Cradle Valley Property appear healthy but Jeffrey pine beetle related mortality has been increasing in the surrounding area over the past two years and it is likely to occur here under the current stand conditions: high stand density and high levels of dwarf mistletoe infection. High stand density and dwarf mistletoe infections combined with the last prolonged drought negatively impacted Jeffrey pine on this site as evidenced by the presence of groups of snags and downed logs containing bark beetle galleries. In addition, some stumps present within the stand were likely the result of salvage logging of bark beetle killed trees.

The high level of white fir mortality occurring on the property is likely a result of high stand density, prolonged drought, and possibly annosus root disease. These factors compromise tree health and vigor making them more susceptible to fir engraver beetle attacks. In addition, the average annual precipitation of 20 to 25 inches for this site is below what is generally required to sustain this species over a generation. Therefore, even with lower stocking levels, white fir growing on this site is at a higher risk for engraver beetle related mortality.

The lodgepole stands are currently overstocked and will continue to experience high levels of bark beetle related mortality until stand densities are reduced to about 80 sq. ft./acre. Thinning of lodgepole stands can often result in wind throw and/or snow breakage of residual trees, therefore, managers should expect to have an even lower stand density and increased fuels resulting from wind thrown trees within a few years of opening up the stand. An alternative management option in these lodgepole pine areas, since restoration of presettlement conditions is the long-term goal for the parcel, is to remove all but the largest trees from the riparian corridor and wet meadow area. This treatment would help increase the water table and expand and enhance riparian plant communities. Aging and measuring a sample of larger trees with an increment borer will allow for a rough determination of tree size versus age. This will help in determining the upper diameter limit for tree removal so that any presettlement trees are left on site. This type of treatment is especially appropriate for lodgepole pine growing within aspen stands. Current recommendations for aspen stand restoration include the removal of all post-settlement conifers from within the stand, from a 150 foot buffer around the south, west, and east sides of the stand and a 100 foot buffer on the north side to increase sunlight and promote warmer soil temperatures for regenerating aspen.

Hand thinning trees up to 12" dbh from overstocked stands will reduce tree competition for limited water and nutrients. Furthermore, selecting for more drought tolerant species such as Jeffrey pine over white fir will make the stand more resilient to disturbance agents such as insects, disease, and fire. However, removal of small diameter (<12" dbh) material from the overstocked Jeffrey pine stands on the Cradle Valley Property will only provide a short term benefit as most trees contributing to the high stand density are larger than this upper diameter limit. In order to reduce the susceptibility to future bark beetle related mortality, these stands should be thinned to densities that are 80% or less of "normal" for the site. A thorough stand exam from a registered professional forester would determine site class and the appropriate upper diameter limit for a "thin from below" operation that would achieve the desired basal area. In addition, if the long-term goal is to restore presettlement conditions, including the restoration of understory plant communities, then removal of more large diameter trees will be needed in the future to achieve historic stand densities.

Effectively managing dwarf mistletoe infection levels within the Jeffrey pine stands will require the removal or killing of heavily infected trees (mistletoe present and abundant throughout the entire crown), including trees larger than 12" dbh. Dwarf mistletoe disperses most effectively from overstory trees to smaller trees of the same species. Thus, spread tends to be most efficient in multi-aged stands of the same host tree species. Young Jeffrey pine establishing under an infected overstory will most likely become infected and not reach maturity. It may be desirable to remove or kill infected overstory trees from some areas to allow for healthy stand regeneration. Removal of all heavily infected trees, especially heavily infected trees in the

overstory, combined with general stand thinning will reduce the spread of mistletoe to insignificant levels while increasing the health and vigor of trees with light infections.

In addition to reducing tree stress and lowering the spread and intensification of dwarf mistletoe infections, thinning and fuels treatment will reduce the risks and damage from any fire that might occur and provide a more defensible space. This is especially important where current bark beetle related mortality of white fir and past bark beetle related mortality of all tree species (from the last drought period 1987-1992) has increased the amount of fuels. When carrying out thinning treatments, it is recommended that a registered borate compound be applied to all freshly cut stumps >14" dbh. This will reduce the chance of successful colonization of stumps by spores of *Heterobasidion annosum*.

It is recommended that any green pine slash created from hand thinning operations during the late winter or early spring be chipped or cut into firewood and removed from the site in order to prevent population buildup of the pine engraver beetle (*Ips pini*). If allowed to sit untreated, infested green pine slash could produce a significant number of adults that may attack live trees. These attacks may result in top kill or whole tree mortality within the stand. Alternatively, this material could be piled and burned with dry fuels before beetle emergence (generally in early May) if weather conditions permit.

It is important to minimize fire-related injuries to residual trees when burning piles, particularly during periods of below normal precipitation. Piles should not be burned if they are located near the boles of live trees. Prolonged exposure of roots and lower boles to lethal heating could kill trees outright or increase their susceptibility to bark and engraver beetle attack.

Conclusion

Forest Health Protection may be able to assist with the funding for thinning and removing green material from overstocked areas within the Cradle Valley Property. If you are interested in this funding please contact any of the Forest Health Protection entomology staff for assistance in developing and submitting a proposal.

If you have any questions regarding this report and/or need additional information please contact me at 530-252-6431 or at dcluck@fs.fed.us.

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