

USING FIRE AND HERBICIDES FOR VERTICAL BRUSH SCULPTING

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Most brush sculpting manipulates brush density on the landscape. From an aerial view the landscape pattern may alternate between areas of undisturbed brush, areas completely cleared or areas partially cleared to create a savanna. Because the pattern alternates laterally on the landscape, I refer to this as “lateral” brush sculpting. Lateral brush sculpting can be achieved easily, although sometimes at high cost, with mechanical treatments or herbicide sprays. Prescribed fire is limited in its capacity for fine resolution lateral brush sculpting because it travels where it can find fuel and not necessarily where one wants it to go. With proper fire guards, usually a bladed line that requires heavy equipment, fire can be used to create patches of burned vs. unburned land. However, the degree of resolution of such lateral sculpting depends on how much the owner wants to invest in fire guards. If multiple strips, bands and patches are needed, it is usually easier to mechanically clear the strips rather than cut a fire guard around the border of each strip or patch and then burn. In fact, I know of no case where this latter option of creating fine resolution brush sculpting with fire has been employed.

The Concept of “Vertical” Brush Sculpting:

There is another aspect to brush sculpting that may be considered, called “vertical” brush sculpting, where the canopies of individual trees, in particular mesquite, are groomed vertically, as opposed to manipulating tree density within a stand as is done with lateral brush sculpting. In a sense, vertical brush sculpting is closer in concept to sculpting by artists where a block of stone is chiseled from top to bottom to produce a single sculpted piece. If Michelangelo were to undertake vertical brush sculpting, he would go from tree to tree with a chain saw, loppers or chisel, working on each tree individually to achieve a vertical shape rather than deciding to either “keep” a tree or eliminate it, as lateral brush sculpting operations do today.

The basic idea of vertical sculpting is to reduce the foliage on mesquite trees, yet still maintain apical dominance and thus avoid the long-term negative effects of basal sprouting which can ultimately turn a stand into a multi-stemmed thicket that is worse for grasses than the woodland was before treatment. Vertical sculpting generates several positive effects on the landscape. First, it reduces the competitive effects of mesquite on grasses so more grass will grow. Second, the partially top-killed canopies increase herbaceous species diversity because some grass and forb species grow better near or beneath mesquite than in open spaces. Third, the presence of a low density of mesquite as a savanna may enhance soil fertility through nitrogen fixation and organic carbon additions. Fourth, the reduced canopy foliage increases visibility for livestock management. Of course, it is not as good as a completely open pasture, but the limitation of basal sprouting maintains the increased visibility for a longer period of time than a treatment that top-kills mesquite and stimulates resprouting. Fifth, the partially defoliated canopies create more shade opportunities for livestock. Sixth, the partially top-killed canopies still provide some screening cover for wildlife.

This paper presents two relatively inexpensive methods to apply vertical sculpting and essentially convert a woodland thicket to a savanna almost instantaneously without having to go from tree to tree with a chainsaw. One involves the use of low-intensity fires and the other is the

use of a low rate of clopyralid (“Reclaim”) herbicide alone.

Vertical Sculpting Mesquite with Low Intensity Fires:

Low-intensity winter fires may be used as a first step for vertical brush sculpting and conversion of mesquite thickets to savannas. Trees partially topkilled by low intensity fires tend to retain foliage in the upper portions of the canopy. Lower-positioned canopy growing points are killed but primary basal support stems are not killed. Overall amount of foliage per tree is reduced compared to preborn levels, yet apical dominance is maintained and basal resprouting is limited (Figure 1). The amount of living foliage that remains on the partially topkilled tree a low intensity fire has direct bearing on whether the tree maintains apical dominance or shifts into a basal sprout mode. Most trees that retain at least 40% of pre-burn foliage maintain apical dominance; below this threshold foliage amount, apical dominance is lost and basal sprouting is stimulated (Ansley and Jacoby 1998).



Figure 1. Mesquite treated with a low intensity fire showing the reduced mesquite canopy foliage and very little basal resprouting.

Creating a mesquite savanna from thickets using low-intensity fires will take time and repeated burning and should be part of a long-term management plan. We estimate that three to four fires in a 10 to 20-year period will be needed. However, almost any fire, regardless of intensity, will topkill mesquite trees that are less than 3 ft. tall. Thus, these smaller plants will basal resprout. It may be necessary to treat these plants with herbicides via Brushbusters IPT techniques or with mechanical grubbing to reduce density of these smaller plants. However, retention of some basal sprouting plants are probably necessary for quail habitat.

High intensity fires will topkill mesquite and stimulate resprouting. Such regrowth will create a mesquite thicket if no post-fire maintenance practices are utilized (Ansley and Castellano 2006).

In this regard, high intensity fire is no better than a topkilling herbicide or mechanical treatment such as chaining or shredding. For this reason, a manager should have clear long-term goals before applying a high intensity, topkilling fire or any topkilling treatment for that matter.

Vertical Sculpting Mesquite with Clopyralid:

The current aerial spray recommendation of a mixture of clopyralid (Reclaim) and triclopyr (Remedy) herbicide, usually at 0.25 lb/ac + 0.25 lb/ac, achieves adequate root-kill (60-80%) and topkills surviving mesquite plants. This treatment is favored by livestock producers who seek to restore pastures to grassland. In time, however, most surviving mesquite basal sprout into multi-stemmed regrowth and must be re-treated (Ansley and Castellano 2006).

Low rates of clopyralid alone at 1/4 or 3/8 lb/ac yield moderate mesquite root-kill (20-40 %) so the stand is thinned. However, most surviving plants are not completely and are partially topkilled, retaining some foliage in the canopies (Figure 2). This partial topkilling preserves apical dominance and inhibits basal resprouting (Ansley et al. 2003). Over time, mesquite that survive clopyralid treatments are few-stemmed, have elevated and not basal canopy foliage, and are much less of a problem in terms of competition with grasses than they were before treatment.



Figure 2. Mesquite treated with 0.38 lb/ac of Reclaim (clopyralid) showing the reduced mesquite canopy foliage and little basal resprouting 4 years after treatment. The person in the center of the photo would not be seen prior to treatment due to thick mesquite foliage.

Figure 3 depicts effects of a high-intensity top-killing fire, a low-intensity savanna fire, and a low rate of clopyralid on vertical brush sculpting. A high-intensity fire (top) will provide temporary suppression of mesquite before basal sprouting dominates. A low-intensity fire (middle) partially topkills mesquite by killing lower growth points but apical dominance is maintained. The bottom of the figure shows a combination of an initial low-rate of clopyralid followed by a low-intensity fire to thin foliage to the maximum level (30-40% of initial levels), yet still maintain apical dominance. The herbicide/fire option should accelerate mesquite savanna development over the use of low-intensity fires alone.

A “Messy” Landscape – Good or Bad?

At first glance, vertical brush sculpting may appear “messy” and disappointing when viewed through eyes that want to see nicely manicured brush-free lanes alternating with wooded thickets, like a golf course. Each tree has a different amount of foliage and this foliage is located on different portions of the canopy (Figures 1 and 2). However, this messy kind of landscape may be ideal for certain kinds of wildlife and plants. We don’t know for certain the effects of vertical

sculpting, but it makes sense that a highly diversified and more “messy” landscape would be attractive for many wildlife and plant species. This treatment, of course could be mixed with regular sculpting to create even more diversity on the landscape.

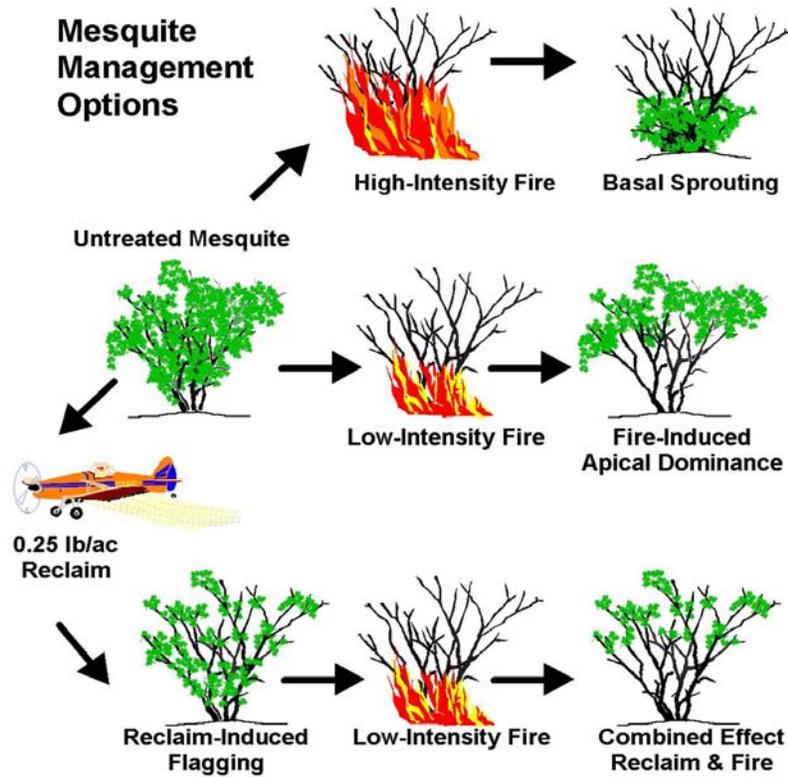


Figure 3. Illustration of effects of high and low-intensity fires and a low rate of Reclaim (clopyralid) followed by low-intensity fires on mesquite canopy foliage and basal sprouting.

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