FTM – West Model Results for Selected Fuel Treatment Scenarios

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Abstract:

This paper describes results of FTM–West model solutions for a set of hypothetical future fuel treatment scenarios, which include stand-density-index (SDI) and thin-from-below (TFB) treatment regimes at alternative levels of harvest administrative fees or subsidies. The paper briefly describes estimates of harvestable wood (upper bounds) and acreage treatable under the different thinning regimes. The paper also discusses projected effects that thinning regime, cost assumptions and subsidy levels have on wood removal volumes absorbed by the market, thinning program net costs, and broader impacts on regional forest product markets and timber revenues. Results show that even with industry bearing the assumed administrative costs of thinning programs, substantial volumes of wood could be thinned, but more so in coastal regions than inland regions of the West. Also, replacing administrative fee assumptions with hypothetical removal subsidies increases the proportion of harvestable wood removed; a sensitivity observed primarily in the inland regions. Results show also that wood removals from fuel treatment programs could displace a large fraction of timber supply from conventional sources, reducing regional timber harvest and timber revenues that would otherwise be projected to increase for state and private timberland managers in the West.

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Introduction

The Fuel Treatment Market model for the U.S. West, or FTM-West, is a dynamic partial equilibrium model of the markets for softwood timber and forest products produced in the western United States. The model projects the market for wood from fuel treatments along with the market for timber from conventional sources in order to project the market impacts of fuel treatments (Ince and Spelter, this proceedings; Ince and others, 2005). At the present time, only a small fraction the fuel treatment acreage on federal lands in the U.S. West involves wood harvest (over 90 percent of the fuel treatment acreage involves prescribed burning or mechanical treatment without wood byproduct removal). This paper illustrates projected market impacts of hypothetical expanded fuel treatment programs involving thinning and wood removal on federal lands in the West.

Different scenarios can be run in the FTM-West model with different hypothetical forest treatment programs or with no treatment program at all. The two hypothetical thinning regimes analyzed in this study were created using the Fuel Treatment Evaluator (FTE) model (Skog and others 2006) and the areas considered for treatment were NFS and other federal land (BLM, BIA, etc.). The thinning regimes were developed by a team of researchers whose objective was to identify places where the use of woody biomass from thinning can best help pay for hazardous fuel reduction treatments. The effort identified US Forest Service FIA plots on timberland in 12 western states – 127 million acres - that passed screens which excluded high severity fire regime forest types (where crown fires are normal), low fire hazard plots, plots in roadless areas and plots in selected counties on Oregon and Washington where treatments would be done for purposes other

than fire hazard reduction. Twenty four million acres were identified as eligible for treatment, of which 14 million acres are on federal land. Eligible acres received simulated treatment by one of two silviculture treatment regimes to meet certain fire hazard reduction targets if the treatment would provide at least 300 ft^3 /acre. The SDI treatment (stand density index) removed trees across all age classes in order to leave an uneven-aged stand. The TFB treatment (thin from below) treatment removed trees beginning with the smallest in order to leave an uneven-aged stand. The paper by Skog and others (these proceedings) explains the SDI treatment regime (a combination of treatments 2A and 4A) and the TFB treatment regime (a combination of treatments 3A and 4A).

Each regime was run with two different cost assumptions (making four total scenarios). In one scenario administrative fees (stumpage fees) were levied on the wood available for treatment so as to pay for what is estimated to be the average cost per acre to the Forest Service to make the wood available ($500 per acre) while the other scenario eliminated the fee and instead offered a subsidy for the wood ($200 per MCF). The sensitivity of the volume of wood treated to the stumpage fee or subsidy was not intensely analyzed in this study, and therefore the cost assumptions are not assumed to maximize possible revenue to the Forest Service or the volume of wood treated under any constraints.

Scenario Inputs

Two different hypothetical forest treatment regimes were evaluated using the FTM-West model, the inputs of which were obtained using the FTE model. In this paper they are referred to as SDI and TFB, respectively, standing for Stand Density Index and

Thinning From Below. There were three different aspects of the scenarios required as input for the FTM-West: the volume distribution of available wood by d.b.h. class for each supply region (table 1), the volume of wood to be made available for treatment in each year for each supply region and the weighted average cost of the wood from treatments which includes harvest and transport costs and possibly an administrative cost or subsidy, also in each supply region. Most of the figures in this paper are aggregated for the whole U.S. West. As Skog and others (this proceedings) mention, the SDI scenarios consist of more (about twice as much) total wood and acres available than the TFB scenarios (figures 1 & 2). Also note that the FTE only gives the total amount of wood available for treatments in each region so a logarithmic-growth function was used to smooth this amount over a 16 year period, 2005 to 2020. Each scenario was run once with an added $500/ac administrative fee (equivalent a stumpage fee) for wood available from forest treatments, which is estimated to cover the cost of making the wood available, and once with no fee and an unconstrained $200/MCF subsidy.

In order to reduce reiteration it will be noted here that for all of the effects discussed here (volume harvested, timber prices, producer and consumer surplus) except the change in net market welfare, the SDI scenarios had larger impacts compared to the TFB scenarios as did the scenarios where forest treatments were subsidized when compared to the scenarios which required administrative fees.

Volume Harvested and Timber prices

In all four scenarios more than half of the wood made available from forest treatments was utilized (table 2). Subsidizing the programs resulted in an additional 3.6

and 3 billion cubic feet representing 16 and 30 percent of the total FTE volume for the SDI and TFB programs, respectively. This additional wood treated was located exclusively in the interior region of the U.S. West because in every scenario one hundred or nearly one hundred percent of wood made available in the costal region (Coast PNW and CA) was treated. For the interior regions this amounted to an increase from 5 to 42 percent of available wood treated and an average of 2.6 million acres for the SDI program and 5 to 66 percent and an average of 2.1 million acres for the TFB program as a result of dropping the administrative fee and adding the subsidy (figure 3).

In all four scenarios the total harvest of wood increased as compared to a scenario where there was no wood available for treatment (figure 4). However, the additional utilization of wood from forest treatments displaced wood utilized from conventional sources (mostly state and private). This crowding out of conventional timber ranges from 5 to 12 billion ft^3 over the 16 year time period, depending on subsidy and thinning regime (figure 5). Over the time period the wood from treatments accounted for an average of 10 to 30 percent of the total volume of wood harvested, also depending on subsidy and thinning regime. Consequently, the boost in timber supply from thinning and reduction in harvest from conventional supply sources is projected to result in lower timber prices as well (figure 6).

Producer Surplus, Consumer Surplus and Net Welfare

All four scenarios project a decrease in potential revenue to conventional timber suppliers, a loss of producer surplus, which is a direct result of the decrease in regional timber prices and the volume of conventional timber harvested (as compared to a no-

treatment scenario). The cumulative potential losses over the 16 year projection period (2005 to 2020) are quite significant, ranging from $34 billion to $70 billion (figure 7).

On the other hand, all four treatment scenarios projected lower wood product prices and increases in wood products consumption resulting in increases in consumer surplus. Over the projection period the cumulative increases ranged from $26 billion to $74 billion (figure 8).

When we observe the changes in cumulative net welfare, defined as the change in producer surplus plus the change in consumer surplus, we see a deviation from the theme of the other results. Both TFB scenarios result in decreasing net welfare totaling as low as –$8.3 billion after 16 years with the subsidy making little difference. Conversely, the SDI scenarios show an increasing net welfare and, in fact, the unsubsidized program shows the largest increase in net welfare, $5.7 billion after 16 years (figure 9). This can be seen mainly as a result of the fact that the SDI treatment makes much more high value large timber available than the TFB. This large timber has lower harvest costs, higher product yields, higher output capacity and lower manufacturing costs (all per volume) and only a model like the FTM-West which models these economic complexities of tree and log size class can observe such economic effects. Note that these figures for changes in net welfare do not include a quantification of the effects from reduced fire hazard; they represent only economic welfare. The financial benefits from reduction in fire hazard are difficult to assess. However, Lippke and others (2006), in his analysis, makes a conservative estimate to be from $1,186/acre to $1,982/acre increasing with initial fire risk.

Conclusions

There are several important conclusions we can draw from these results. First, there appears to be a substantial market for wood from fuel treatment programs, even if administrative fees are levied. Second, subsidies for wood from forest treatments seem unnecessary in the coastal region yet crucial to achieve forest treatment goals in the interior region. Third, expanded fuel treatments can have substantial positive impacts on consumer surpluses yet negative impacts on revenue to conventional timber sources. Lastly, the SDI thinning regime can result in potential decreases in producer surpluses being more than out-weighed by the increases in consumer surpluses, resulting in positive net market welfare while the TFB regime produces the opposite result.

In addition, since the SDI scenarios result in more acres treated and more wood per acre removed, logically they would also result in greater reductions in forest fuels and related fire hazard, producing consequently unambiguously higher net welfare than the TFB scenarios, taking into account both the market welfare and fuel reduction impacts. Other factors should also be considered such as forecasted changes in suppression costs, public sentiment, environmental impacts, wildfire damages and other less tangible costs and benefits of reduced fire hazard which are addressed for example by Lippke and others (2006). All these factors are important when considering public policy. The totality of public costs and benefits should be considered along with market welfare in a broader cost-benefit analysis of fuel treatments on public lands. In this study we have focused primarily on the market welfare and fuel reduction impacts.

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