C I N T R A F O R

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Eastern Washington Timber Supply Analysis

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Executive Summary

The Washington State Legislature commissioned a study of future timber supplies for the state during the 1990 session. The analysis for Western Washington was completed and documented in the publication titled "Future Prospects for Western Washington Timber Supply". The Wester Washington ("Westside") study benefited from an enhanced inventory of state and private forests involving a doubling of inventory plot measurements by the Forest Inventory and Analysis (FIA) Unit of the US Forest Service. After completion of the Westside survey, a more limited survey of Eastern Washington ("Eastside") was undertaken which provides the primary data for this report on Eastern Washington's potential timber supply.

Eastside forests are more varied in structure than those of the Westside, yet the number of inventory plot measurements per acre of forest is substantially lower. Hence, the objectives of the Eastside study are more limited. The study attempts to identify the potential range of future timber harvests in Eastern Washington, highlighting those aspects of policy, resource base, and owner behavior most significantly impacting the harvest over time.

The issues of forest age and health are fundamentally different than for the Westside. Most Eastside forests are managed as uneven-aged, so the age class distribution is less important. Nevertheless, there are significant forest health issues that can be affected by management decision.

Commercial timberland covers 7.4 million acres of Eastern Washington, 28% of the land area. About 25% of these acres are reserved from timber utilization by statute or administrative regulation, mostly on federal lands. Consequently, 5.6 million acres are "available" for timber production, with just over 4 million acres on non-federal lands.

The dominant species are ponderosa pine and Douglas-fir or western larch, making up a majority of the timber on over 75% of the non-federal land. The distribution of site class by owner is generally well balanced across owners and regions.

Eastside forests are characterized by substantial differences in stand structures. Each FIA survey plot was grown over time under a number of simulated management alternatives which were estimated from a survey of the owner groups' intentions. Harvest schedules were simulated under a number of different conditions, including variations in the amount of decline in the harvest that would be acceptable from decade to decade, alternative management intensities, and regulatory or land-availability constraints.

There are many reasons to avoid interpreting these results as a precise portrayal of future harvests: accuracy of the basic FIA data, the uncertainty in yield projections, the realism of future management assumptions, the absence of natural disturbances, instability in future markets, and changing forest policies. However, the evidence suggests a potential range of harvests for state, private, and Native American lands relative to the recently-revised management plans for federal forests. The importance of management practices and policies that will affect these practices, including forest health options, is also apparent. The Eastside results do, however, fall short of the Westside study in predictive power because of less certain inventory data and much greater variation in stand conditions.

Historic harvest rates show wide year-to-year variation around a 1,100 million board foot trend. The historic harvest rate in Eastern Washington over the last 30 years has fluctuated as much as 25%, around a fairly stable trend. There is some evidence that changing supply conditions as well as the business cycle affect

the harvest rate, especially at the timbershed level. The large variations in harvest rates from peak to trough provide evidence that the region is likely a marginal supplier that is impacted by competitiveness with other regions. When market conditions are weak, production declines more than in other supply regions.

Potential future harvest levels over the next 100 years differ according to a large number of factors. Under initial condition assumptions, based on FIA inventory data, simulated growth and yield projections, and estimates from land management plans for the national forests, harvest levels range from 1,207 million board feet (MMBF) per year (average for the first decade, 1991-2000) when harvests from one decade to the next can not vary by more than 5%, to 1,897 MMBF when there are no harvest flow constraints. Compared to the 1985-92 base period, these are increases of 0.2 to 57% for the first decade. Extending the harvest period to the next 100 years, the average harvest is 1,173 MMBF under the ±5% constraints to 1,234 MMBF with no new regulations on state and private lands. While these potential harvest levels suggest that historic rates of harvest can be sustained, actual harvest levels will probably fall short of this potential as they have in past years.

This potential harvest level and similarity to the historical trend also hide large uncertainties relative to market conditions, owner behavior, forest health conditions, natural disturbance, policy changes and environmental constraints. At the regional level, projections show an increasing harvest potential for the Inland Empire timbershed but a decline in harvest potential for the Central area.

By ownership, the greatest annual harvest decline is expected in the national forests, where a decrease of about 229 MMBF per year is expected relative to the 1985-92 base period. Under the ±5% harvest flow constraints, projections also show that forest industry harvest levels are likely to decline by about 120 MMBF per year in the first decade (1991-200) relative to the 1985-92 base period. However, this decline can be offset in the short term if harvest flow constraints are relaxed to allow an accelerated harvest of mature inventories with the attendant decline in harvest in later decades. The DNR could potentially increase harvest levels by 10 MMBF during the first decade, and both Native American and nonindustrial owners could each increase harvest by about 140 MMBF to offset the federal and forest industry declines under the ±5% harvest flow constraints. Over history, substantial changes in harvest levels of the different owner groups have produced a rather stable trend for the total Eastside region. The estimated potential harvest levels suggest the same could be possible in the future for non-federal lands.

The impact of environmental constraints is uncertain. The open question is whether the same environmental factors that are contributing to a dramatic decline in federal harvest will have a substantial impact on the non-federal harvest as well. A harvest sensitivity analysis for the non-federal forests suggests a wide range of outcomes is possible. When questioned on the likely impact of forest practices changes, private owners expressed concern that there could be a 15-20% reduction in productive acres through mandated reserves such as streamside buffers and other habitat requirements, leading to a 10-12% decline in annual harvest volume under the ±5% harvest flow constraints. This impact would be immediate, since it would reduce the available harvestable inventory. Sensitivity analysis with no constraints on decade-to-decade harvest level changes shows that non-federal owners have as much as 7.0 billion board feet of marketable or essentially mature inventory which could be liquidated over a 10-20 year period and potentially offset the immediate impact of increased harvest constraints.

Excess mature inventory could be used to offset constraints in the near term. Using flow constraints to model harvest intentions is at best only an approximation of some owners' rationale for smoothing out harvest levels over time. The favorable economics of harvesting timber as soon as it is mature generally cause substantial year-to-year changes for these owners. Inventories do not steadily move toward maturity because they are impacted by prior natural disasters, changing market patterns, and purchase decisions. With no consideration for stabilizing (unconstrained) harvests, some owners would be expected to liquidate their mature inventory quickly. Early liquidation also promotes management of the stand at an earlier date, thereby increasing land productivity. Such an unconstrained harvest simulation produces a 6% increase in harvest over the long term relative to the 5% harvest flow constraint, while also gaining the economic value of several billion board feet of mature inventory in the first two decades. To a considerable degree the tendency for some owner groups to liquidate mature inventory explains some of the variations in harvest levels between one owner group and another was mature and economical to harvest, subject to the need to stabilize the flow of wood to mills. DNR and nonindustrial owners, on the other hand, feel less economic pressure and have

maintained more mature inventory. They will benefit more from the decline in federal and forest industry harvest levels in the future.

Harvest levels may be impacted by future timber management changes. Harvest levels are also sensitive to management assumptions. In comparison to the initial conditions with ±5% harvest flow constraints, increasing management to the highest levels on non-federal land with no harvest flow constraints increases the harvest level over the next 100 years by 135 MMBF per year. Harvests in the first decade are large and well above sustainable levels but can be partially restored in 80 years. In effect, the liquidation of the mature inventory, in conjunction with increased management of harvested acres, produces nearly the highest long-term harvest, but at the expense of a 30% reduction in harvest for a few decades beyond the first. These sensitivity alternatives suggest one possible response to the increased environmental constraints on private harvest would, therefore, be to accelerate the liquidation of mature inventory, thus postponing the impact of the constraints. Assuming no more than a 5% departure from even-flow harvest levels, a 20% acreage boost to the next higher management level in conjunction with 15% decrease in the productive area results in a 6% reduction in harvest over a 10-decade period but constraints interfere with the motivation to increase management by increasing the cost of management, there could be a reduction in management, compounding the impact of reduced land availability.

Forest health issues increase the motivation for earlier harvests and investment. Attention to forest health issues may increase the near term harvest and increase the long-term harvest at the expense of lower harvest levels over the intermediate decades.

Forest health issues include problems of imbalances of forest structures or processes, such as excesses of dense or multi-canopy stands susceptible to insect attacks, mistletoe, fungi, and fire. Past management and natural cycles have led to many forest stands in Eastern Washington being attacked or susceptible to attack by bark beetles (over-crowded stands), mistletoes and defoliating insects (multiple canopy stands), and root or stem rots (over-crowded or previously injured trees). These conditions not only reduce volume through rotting wood or killing trees, they also lead to increased forest fires.

Active management for forest health could lead to thinning or harvest of “unhealthy” stands and active management of other stands to avoid the unhealthy conditions. These activities would lead to increased harvest in the short term, less harvest in the intermediate term and higher harvest in the long term as the earlier-harvested stands become available for harvest again.

Another scenario would be for the unhealthy stands to burn in wildfires (a highly likely scenario for many areas). Such fires occurred in 1994 will probably occur again in the next three decades. Sporadic salvage harvesting could occur for about three years after the fire, creating “pulses” of wood from the burned areas. If the fires are large enough, they will create the same pattern of harvest as more intensive management with high harvest levels in the next few decades, low harvest levels in the intermediate decades, and high harvest levels in the long term as the burned stands again become harvestable, assuming the post-harvest stands are managed (regenerated or thinned, as necessary).

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The standing inventory volume may remain stable, but the mean diameter will decline. Under initial condition assumptions, the standing inventory volume remains stable over time. If the mature inventory is harvested early, stand inventory volume declines. Sensitivity analysis shows that the highest levels of management and most rapid levels of inventory reduction reduce the standing inventory by over 30% by 2090.

The average diameter of trees harvested decreases with the reduction in mature inventory from approximately 20 inches to 14 inches over 90 years; hence, the relatively stable inventory is made of a larger number of smaller trees. Alternatives that result in a more rapid liquidation of mature inventory and intensive management lead to a more rapid reduction in the diameter to about 13 inches. The reduced average diameter at harvest may not mean reduced wood quality if the harvest tree size is made more uniform. Presently, many

stands contain a few large trees and many small trees as a result of past selective harvesting. Other stands are over-crowded and contain many very small stems, resulting largely from past stand-replacement fires.

The increasing share of grand fir in the late decades is evidence of generally undesirable shade tolerant, fire intolerant, and disease susceptibility trends under almost all alternatives. These scenarios suggest that even selective cutting that emphasizes leaving preferred trees for the next growth cycle may not be sufficient to contain health degeneration in the absence of occasional fires.

Employment will be impacted by harvest levels. Historically there has been a reasonably stable relationship between harvest level and employment. The forest sector directly employs about 7,000 workers in the region. Labor productivity gains have not been steady and have been impacted both by the severity of business cycles and, even more substantially, by the price of the resource. More labor is used when resource prices are high, than when prices are low, so higher values can be obtained from the resource. A decline in federal and forest industry harvests may be at least partially offset by increases from other owners: but if they are not, the annual harvest could decline by about 348 MMBF per year, leading to an employment decline of over 2,000 jobs in the forest sector. If prices remain high, they will induce a substantial offset to employment losses from reduced harvest. Employment could also be higher with high management levels or lower with policies that inhibit management.

Summary: Non-federal harvests may be stable, but only through a market- and policy- sensitive shift in share. The potential harvest level on non-federal lands appears to be relatively stable in the aggregate but requires a shift from forest industry harvests to other owners and from the Central Cascades to the Inland Empire timbershed. Forest practice constraints may cause a 10-12% reduction in the harvest on non-federal lands, but the existence of significant mature inventory could reduce the impact of this over several decades. There is also a chance that increased management activities could offset some of this impact over the longer term.

Environmental constraints, management practices, market conditions, forest health, natural disturbance and policy are all likely to be important determinants of future harvest levels. The decline in federal harvests and constraints from changes in forest practices on private harvests, accompanied by the decline in industry harvest based on declining mature inventory, may be more certain than increased harvests from DNR and Native American lands or increased harvests from managing land more intensively. With declining harvests resulting in high prices, increased harvests from nonindustrial lands are more likely, potentially offsetting the industry decline. An overall decline in harvest of about 100-200 MMBF, or 9-18% of the historical average, is likely, even without additional constraints from changing forest practices. Part of this decline could be deferred by several decades by accelerating the removal of existing mature inventory.

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