The Future of Washington's Forests and Forestry Industries

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THE FUTURE OF WASHINGTON'S FORESTS AND FORESTRY INDUSTRIES

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Executive Summary

Forestlands in Washington State have provided many products, services and benefits for its citizens, the nation and other countries. Linked to these forestlands are (i) the forest landowners, (ii) the industry that currently gives forestlands their value, and (iii) local, national and international communities that place both complementing and competing demands on these forestlands. The future of these forestlands and forest industries is the subject of this report.

The report, as requested by the 2005 State Legislature, provides findings of research over the past two years to study the timber availability conditions and management alternatives, the economic contributions the forestlands directly and indirectly make, the competitiveness of the industry in Washington, the land-use pressures that exist for these lands, and the financial returns of State-owned forestlands. The study was implemented by teams of researchers; each team focused on a specific topic.

The study areas are linked by the influences of alternative management options for forestlands and their effects on the economic performance, the industry's competitiveness and impacts of land use pressures. The studies provide a rich array of information from which the Washington Department of Natural Resources (DNR) and the University of Washington, College of Forest Resources (CFR) collaboratively developed policy recommendations for the Legislature. The findings identified issues that require deliberation and actions on the part of policy makers and stakeholders. The issues that are not yet clearly defined and require additional research are noted. With the identification of issues we fulfill a major objective of the study: a discussion of the future conditions of forestlands and forest industries in Washington State.

We briefly introduce the study areas then present a summary of the findings offered in each topical study. Issues and their discussion are then followed by each individual study that provides greater detail of the summarized findings. The reader is invited to peruse these reports for a clear presentation and discussion of the research findings. Citations for findings reported here and attributable to other studies are provided in the studies and discussion papers.

The Study Areas

Timber Supply and Forest Structure Study 1: Study 1 updates information developed in prior studies completed in 1992 and 1994 and provides potential ranges of future harvests, log supplies, and representative ecological measures including selected habitat indices and their effects on the economy and competitiveness. A large part of the effort is to understand the impacts of different forestland treatments on forest structure, timber supply, amenities services, economics and competitiveness. The study produces projections for five timbersheds on the Westside and two on the Eastside, highlighting differences across owner groups and location. It accounts for treatment differences on forestlands in riparian zones and on forested uplands. It studies the effects of land conversion, economics and competitiveness on the performance of forestlands and the forest industry. The study develops alternative forest management options and their impacts on multiple objectives. Computer-generated simulations of potential future conditions provide insight on how ecological and habitat changes are linked to harvest level fluctuations and changes in forest practices.

Competitive Position Study 2: Study 2 provides measures of the competitive position of Washington's forest products sector with respect to other domestic and international forest products suppliers. It examines the influences of changing timber harvest levels, costs, growth pressures, productivity trends, market gains and losses, regulatory constraints, tax policy impacts, and institutional changes within the sector.

Economic Contribution Study 3: Study 3 produces an update of economic data including production levels, revenue, employment, capital investments, and tax contributions from the forest sector to the state economy. The study describes the role of forest landowners and forest products industries in the economy of Washington state. Sensitivities to changing timber supply, forestland management, and regulatory pressures are linked with Study 1.

Land Conversion and Cascade Foothills Forestry Viability Study 4: Study 4 produces an assessment of trends and describes factors contributing to rates of forest land conversion and the impacts of conversion of forest to non-forest land-uses. A discussion paper provides a review of the tools and policy levers available to retain working forests. The College of Forest Resources and Cascade Land Conservancy worked collaboratively to build some consensus recommendations developed by a work group of forestry stakeholders drawn from Northwest Environmental Forum participants for preserving forestry as a preferred land-use and viable industry in the Cascade Foothills.

State Granted Lands Return on Investment Study 5: Study 5 provides an assessment of the expected rate of return from trust-granted forestlands and a review and critique of methodologies for State forestry investment decisions.

The Research Findings

We group our findings into two broad categories: (i) forestlands, their management, and land-uses, and (ii) economics and competitiveness. Forestland-related findings are the most extensive and include findings on timber supply, timber management, and non-timber products. They are further divided into Washington Westside and Eastside findings.

Westside Forestlands

The structure of these forestlands shows a great diversity among ownerships. Industrial owners now manage their forestlands on a shorter rotation. They capture nearly all of net growth. Volume per acre averages one third of the volume on federal ownership. As a consequence, mortality is much lower than on federal forests. Industrial owners plant genetically-improved seedlings, fertilize less, and better control competing and non-commercial vegetation. The combined practice of pre-commercial followed by commercial thinning with a delayed final harvest has practically disappeared.

The harvest projection indicates the potential for a slight increase in available timber volume from industrial forestlands. While shorter rotations would have likely reduced available timber volumes, the productivity gain from vegetative control more than offsets lower growth due to shorter rotations. Standing timber inventories increase early in the projection period as younger stands put on volume, then decline and level off as mature timber is harvested. The inventory changes affect the mix of forest structures and habitat on industrial forestlands.

Private, small ownerships capture less than one half of the net growth on their forestlands. They have higher standing timber inventory than industrial ownerships, but only half of that on state, county and municipal lands, and less than on federal lands. Rotation ages are generally longer, and the harvest projection shows much more variability over the decade forecasts than industrial forestlands. Peaks of standing inventory on other private ownerships occur later than peaks on industrial forestlands in the projections. The contribution from other private ownerships to timber supply is significant; two thirds of industrial timber supply.

The state generally manages its ownership on longer rotations than industrial forestlands. They manage their lands under a habitat conservation plan that emphasizes providing a balance in different forest structures. The state harvests slightly more than one third of their net growth and has 2.5 times the standing timber inventory that industrial forestlands have. Mortality on state forestlands is twice as much as industrial ownership, and about two-thirds of that found on federal forestlands. Harvest levels under the habitat conservation plan reach one third the level of industrial forestlands, and half the level of other private owners.

State land management is impacted by the perceived notion that these public lands are managed for the public good. Seventy percent of the state forestlands were granted at statehood with a fiduciary

responsibility to manage these lands in the best interest of trust beneficiaries. These lands return lower rates than industrial acres since they are managed differently with multiple objectives including timber. As such, rotation age is longer and more standing volume per acre exists on state lands. Instead of maximizing economic return to the timber asset in the purely financial sense, the measurement problem faced by the State Lands Commissioner and DNR is defining the ecological and social criteria that can be used to measure the success in meeting these complex and seemingly-conflicting land management objectives. One available approach suggested is to determine management pathways that maximize the criterion of success per unit of lost revenue by establishing monetary values for the environmental or social gains that would be in excess of those gained by a similar private forest land owner.

The combined state and private projected annual harvest levels average 3 billion board feet per year. The economic effects of the harvest level are over 36,000 forest employees, $7.3 billion gross state product and $823 million in state and local taxes. The stable to slightly increasing harvest levels implies steady to increasing log prices since projected demand growth is about 1.8 billion board feet of lumber over the next three decades.

The importance of available fiber supply for industry is a key factor contributing to economic gains in the state and maintaining competitive infrastructure. In the past, studies on timber availability have projected sufficient volumes to maintain current economic contributions by the forest sector. The projections have failed to materialize due to regulatory changes unforeseen in those earlier studies. In addition to regulatory uncertainty it is likely that land-use changes will impact the current timber availability projections.

A continuation of land conversion to non-forest use seems inevitable, particularly in the Puget Sound region. Forestlands are declining by more than 30,000 acres per year affecting the fiber supply base for industry as well as eliminating important forest structures for habitat, clean water, aesthetics, recreation and carbon emission offsets. Data to adequately document the changes are lacking. There has been a shift in forest land ownership from industrial to large non-industrial owners. Higher and better uses attract values that are many times larger than forestry use values. New mechanisms must be put in place to safeguard the forest values. Incentive programs that transfer or lease development rights are recommended. Exploring ecosystem services markets, such as a carbon credit market, need exploration and development.

New market-based approaches to solve regulatory efficiencies are recommended. Objectives of protecting endangered species habitat and fish-bearing streams lack incentives and lead to unintended consequences. Many ecosystem services are being provided by landowners at low cost to consumers, but at great cost to landowners. The economic loss to a landowner following a biodiversity pathway management alternative is large and variable. There is an opportunity cost in net present value terms of $1,500 per acre to produce a target of a desired future condition of a forest stand. Sensitivity analysis indicates the cost can rise to $2,400. Alternative management plans can be devised that meet regulatory objectives while reducing the economic impact on landowners. Otherwise the negative economic impacts can motivate selling forestlands and converting them to alternative uses.

Alternative management plans can address multiple objectives. Any management plan must address the economic, social and silvicultural system requirements simultaneously. Biodiversity goals can be met by designing pathways for forest structure to develop over time. Criteria such as the amount of the forest structure targeted at any point in time can be used to simultaneously measure biological as well as economic goals.

Carbon is becoming more important as a forest ecosystem service. Westside forestlands can play an important role. Forest carbon sequestration is only one of three components of an integrated lifecycle account of forest-related carbon. Acknowledging the wood product carbon pool and avoided emissions carbon account would lead to a different set of forest management plans than acknowledging only the forest component. This is an important finding since existing carbon registries do not recognize product or avoided

emission pools and can lead to counterproductive management options on commercial forestlands. Carbon sequestration as an ecosystem service could add $500 to $700 of net present value per acre at a carbon price of $20 per ton.

Eastside Forestlands

Eastern Washington produces timber and other amenities that are vastly different than western Washington. Management of these lands is also more complex. Currently the existing forest structure is dominated by poor heath conditions, mainly on public lands. The condition is likely to continue into the future since stand conditions are not improving. Federal lands harvest only 7 percent of their growth. Other ownerships have higher harvest level shares but, with the exception of the industrial forestlands, the harvest levels are well below the additional biomass that forestlands put on each year. Data on mortality are lacking to adequately assess the problem.

Tribal response to insect infestation and fire hazard on Native American forestlands was to reduce forest stand density. Tribal management on the Eastside contributes one third of total harvest volume, about the same amount as industrial ownership. Further understanding of their approach to forest health solutions and their applicability to public land management is recommended.

Harvest projections produced in Study 1 for the Eastside are based on past harvest levels. The results show forest conditions that might exist if these past harvest levels were to be maintained. Studying future forest conditions in this way produces interesting insights for the different ownerships. Industrial ownership for example does not maintain standing inventories were they to continue with their past harvest levels. This bodes well for their forest health conditions, but it is not good news for sawmills and others dependent on the fiber. Sawmills in the east Cascades have been shut down primarily due to the lack of available fiber.

The economic foundation based on existing sawmills needs further research. A lack of demand for the materials obtained in thinning operations, as well as the high cost of treatment, are barriers to manage insect- and fire-prone stands. Traditional markets for forest products can not resolve the forest health problem. In fact, it is likely that the continuation of the forest health problems will impose greater costs on the existing industry reducing its competitiveness and economic contribution to the area. The declining harvest levels and lack of new investments in the area will continue.

A continuation of the past management practices can lead to conditions suitable for extensive insect and disease epidemics and high fire risks. The two are closely related. We know that lodgepole pine is the most affected species. We also know that younger pine can be more resilient to beetle attacks. Targeted management activities to build resilience into the forests can mitigate the magnitude of forest disturbance events. With our current understanding, we can recommend management practices that thin forest stands and remove the materials from the area to minimize the insect outbreaks and fire impacts. New treatment regimes can provide effective control over insect populations, thus reducing epidemics and mortality.

Tree mortality due to the Mountain Pine beetle has reached record levels and continues to increase, climate-induced temperature and vapor pressure deficit are outside of their historic range, and mature pine trees that are not able to adjust to these climatic conditions and are more susceptibility to beetle attacks substantiate concerns about the future forest health of these Eastside stands. The extent of wildfire in inland west forests will increase 2 to 3 times over the next century.

State planning on its ownership is under way. Their forestlands appear to be approaching the level of forest health problems experienced on federal lands for at least portions of the Eastside area. Restoration plans for the southeast Cascades area exist, but planning for the northeast Washington area is lacking. This northeast area would seem to be a candidate for more aggressive forest health treatments and can contribute to mitigating an expected decline in the regional harvest level.

One way to justify the cost of treatments is to use an avoided-cost approach. The savings in fighting fires, fatalities, facility losses, regeneration costs, erosion restoration, smoke and other non-market benefits are examples of the data required to calculate the avoided costs. Another opportunity is to develop markets for the materials obtained from thinning operations. Biofuels achieved from biomass conversion appears promising, but require a sustainable flow of materials. More research in the area of biorefining is needed.

As with Westside forestlands, management options were analyzed to reach stated objectives for Eastside forestlands and improve economic efficiency. Maximizing net present value of cash flows through removal of merchantable volume to the limits permitted by state forest practices laws and partial cutting from below to a target basal area can immediately move stands away from high hazard thresholds for fire, insects, and disease, regardless of differences in the long-term management goal. However, forest management treatments that reduced fire risk also reduced habitat levels.

New markets and approaches to sell ecosystem services apply for Eastside forests as well. The potential for forest biomass as liquid fuel or to produce electrical energy may create sufficient market demand to make removal of small diameter wood economically feasible. Over the long-term, the maximum carbon storage in the standing forest biomass will be achieved by reducing the fire hazard and the number of acres burned. New thinking about carbon and how it is credited and measured is required to achieve fire hazard reduction goals. No active forest management results in significantly greater carbon emissions to the atmosphere than all prescriptions that allow stand treatments to occur.

Unlike the Westside forestlands, the infrastructure needs for several Eastside timbersheds need further study. The decline in management on federal ownership contributed to greater harvests from private forestlands to sustain mills in Eastside timbersheds. The gap in available timber has led to regional mill closures.

Economic and Competitiveness Findings

Any management action on forestlands has economic consequences and since fiber available is a key factor impacting industry costs, forest management and access to fiber supply affects the industry's competitiveness. Forest products businesses make significant contributions to the state economy. The sector produced $16 billion in gross business revenue. It provided over 45,000 jobs and paid $2 billion in wages. The sector paid over $100 million in tax receipts. Forestry operations also contribute a significant share to the economic wellbeing of the state.

Changes are occurring at the forest and industry levels. The character of the state's industry is transitioning from a vertical ownership (land ownership to mill and marketing outlets) to an industry-like, but non-vertical ownership primarily since C-Corporations have a tax disadvantage over TIMOs, REITs and S-Corporations. Landownership taxation regimes have considerably changed forestland ownership in Washington state. Washington continues to have the highest per acre taxation in the nation for forestry activity. Companies owning forestlands own them for their timber revenue potential and for their higher and better use potential.

The number of sawmills have declined from 217 in 1994 to 128 in 2005. The number of plywood mills has dropped from 35 to 8. The state's industrial make-up has transformed to primarily sawmilling, and this industry provides the majority of the raw fiber needs to the pulp and paper sector. Pulp mills numbers have steadily declined. Pulp and paper companies are important consumers of lower quality pulp logs as well as providing a demand for by-products from other forest products industries. Export market shares are in decline or lost completely.

The U.S. housing market is the main end user of softwood lumber produced in Washington. Lower log cost in Interior Canada and the U.S. South gives them a competitive edge over Washington sawmills. Nevertheless Washington has transformed its sawmilling sector to a highly competitive one, able to sell its excess lumber production profitably in the major U.S. markets in the West and Midwest regions. The downside of this transformation is in the commodity nature of softwood lumber production. The downturn in

Washington's new housing market outlets in 2006 was estimated to be over 0.5 billion board feet; about 9 percent of 2005 production levels. Reductions in repair and remodeling activity are likely to significantly increase this decline in demand.

Alternative management activities at the forest levels have the potential to impact the economic contribution of this sector. A first thin management option can increase near-term jobs by 13 percent. Long rotation management options can increase the job activity in the far-term by 44 percent and are subject to substantial uncertainty in structural economic changes. The positive net benefits from fuel removals are $1,483 for high risk and $706 for medium risk fires.

Land use changes are likely. Such a potential decline in forestlands implies less readily available and sustainable timber supply for the forest products industry. Forest parcelization affects the cost of forest management activities by reducing the size of forested tracts. As more forest land on the urban fringe is converted to urban uses, the non-timber amenity value of the remaining forest land increases, resulting in less management for timber production and more management for non-timber values. The loss of forestland to other uses is likely to increase the price of timber through less supply, and its impact on future fiber availability and competitiveness is still largely unanswered.

The Research Needs

Research needs were identified in the studies. More needs were discussed in Forum meetings over the two year study period. The reader is directed to the previous publications by the Northwest Environmental Forum and the Washington Department of Natural Resources for a more complete understanding of the research needs.

- Federal Forests need assistance in analyzing the impact of traditional NEPA no-action alternatives which contribute to high fire fighting and fire damaging costs that could be avoided.
- Existing inventory data are not sufficient to promote on the ground site-specific forest health restoration activities or monitor changing health conditions.
- The impact of climate on stand carrying capacity, site specific density management and tree adaptability to support overstory retention and regeneration strategies is poorly understood.
- LIDAR opportunities in collecting inventory and hydrology data need attention to better understand regulatory impacts.
- Land-use change data are needed, and an assessment of these data is clearly lacking. Incentive programs based on market solutions need examination.
- Research to analyze infrastructure needs is important, to better handle the changed forest structure in eastern Washington.
- Updates to economic sector models have not been completed since the 1990s and should be addressed.
- Calculating state granted land returns, the effects that management alternatives have on returns, and criteria that better measure state land management performance would be useful to trusts and DNR. Non-timber ecological and amenity valuations should be integral to such measurements.

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Acknowledgement

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A study of this scope is a complex undertaking depending upon many inputs from many individuals and organizations; however, any opinions, findings, conclusions, or recommendations expressed in this publication are those of the authors and do not necessarily reflect the views of supporting agencies or project cooperators.