Forest Restoration and Hazardous Fuel Reduction Efforts in the Forests of Oregon and Washington

Testimony of

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December 13, 2007

Hearing of Subcommittee on Public Lands and Forests of the Senate Committee on Energy and Natural Resources

I am Dr. K. Norman Johnson and I am here today to give testimony for myself and Dr. Jerry F. Franklin regarding forest restoration and hazardous fuel reduction efforts in the forests of the Pacific Northwest. I am a University Distinguished Professor in the College of Forestry at Oregon State University. Jerry Franklin is Professor of Ecosystem Sciences in the College of Forest Resources at University of Washington. These comments represent our view and not those of our respective institutions.

Our testimony focuses on forest restoration in the National Forests of Oregon and Washington. Collectively, we have been studying these magnificent forests and the amazing variety of benefits that they provide for almost 100 years. In addition to research, we have served on many scientific panels analyzing forest policy issues, including the Northwest Forest Plan, and recently completed for the Klamath Tribe, a comprehensive restoration plan for their historic tribal lands, which are currently a part of the Winema-Fremont National Forest.

Our definition of "restoration" is the re-establishment of ecological structures and processes on these forests where they have been degraded and, simultaneously, restoration of economic and other social values on these lands. One product of this restoration will be substantial reductions in uncharacteristic fuel loadings. We emphasize restoration activities in which ecological, economic, and other social goals are compatible.

Northwestern Forests Require Multiple Restoration Approaches

Forests of the PNW are very diverse in their characteristic disturbance regimes and developmental patterns, and therefore restoration policies and practices must acknowledge and accommodate these differences. This diversity is obvious when one compares a typical old-growth forest of Douglas-fir, western hemlock, and western redcedar on the western slopes of the Cascade Range, with a typical old-growth ponderosa pine forest found on dry sites on the eastern slopes of the Cascade Range. The complexity of environmental conditions, as measured by variation in macroclimate, soils, landform, elevation, etc., and related differences in disturbance regimes make simple stratifications of forests, such as into areas either west or east of the Cascade Range divide, poor bases for policy or management prescription.

Plant associations and groupings of similar plant associations (PAGs) provide a sound scientific basis for stratifying these forests into different disturbance regimes for purposes of policy development, management planning, and silvicultural prescription.

Restoration needs and objectives contrast greatly between forests representative of plant associations historically characterized by (1) relatively frequent (<100 year interval), low- to mixed-severity fire, such as the ponderosa pine and dry mixed-conifer forests common east of the Cascade Range, or (2) relatively infrequent (>100 year interval), high-severity disturbance regimes, such as west side Douglas-fir—western hemlock forests. Although there are many plant associations and sites that exhibit intermediate behavior, in this presentation we will focus our discussion on types that are more at one end or the other of the disturbance gradient.

Restoration of Forests Characterized by Frequent, Low- and Mixed-Severity Fire Regimes

These forests have been grossly modified during the last century by a variety of management actions including fire suppression, grazing by domestic livestock, logging, and establishment of plantations. Consequently, they differ greatly from their historical condition in having much higher stand densities and basal areas, lower average stand diameters, much higher percentages of drought- and fire-intolerant species (such as white or grand fir), and many fewer (or no) old-growth trees.

We will lose these forests to catastrophic disturbance events unless we undertake aggressive active management programs. This is not simply an issue of fuels and fire; because of the density of these forests, there is a high potential for drought stress and related insect outbreaks. Surviving old-growth pine trees are now at high risk of death to both fire and western pine beetle, the latter resulting from drought stress and competition. Many fir-dominated stands are now at risk of catastrophic outbreaks of insect defoliators, such as the spruce budworm, as has occurred at many locations on the eastern slopes of the Cascade Range in both Oregon and Washington.

Without action, we are at high risk of losing these stands--and the residual old-growth trees that they contain--to fire and insects and the potential for these losses is greatly magnified by expected future climate change. Historically, much of the loss of old growth trees and forests has come during time of drought. The expected longer and more intense summer drought periods with climate change will put additional stress on the forests here. The stress on old growth trees will be especially severe where they are surrounded by dense understories.

We know enough to take action (uncertainties should not paralyze us). Inaction is a much more risky option for a variety of ecological values, including preservation of Northern Spotted Owls and other old-growth related species. We need to learn as we go, but we need to take action now. Furthermore, ***it is critical for stakeholders to understand that active management is necessary in stands with existing old-growth trees in order to reduce the risk that those trees will be lost.***

Activities at the stand level need to focus on restoring ecosystems to sustainable composition and structure--not simply to acceptable fuel levels. Objectives of these treatments need to include: Retention of existing old-growth tree populations; shifting stand densities, basal areas, diameter distributions, and proportions of drought- and fire-tolerant species (e.g., ponderosa pine and western larch) toward historical levels; and development of spatial heterogeneity. Plant associations provide a good basis for providing site-specific target goals for stand parameters, such as basal areas. Finally, ***restoring old-growth tree populations to, and maintaining them at, historical levels should be a goal of restoration management.***

Action is also needed to restore hardwood species, such as aspen, willows, and alders, which have declined in these landscapes as a result of lack of regeneration and overtopping by dense conifers. Elimination of large predators is probably an additional key factor in the changes that have occurred in hardwood representation and riparian vegetation.

Restoration programs must be planned and implemented at the landscape scale to be effective; management over the last century has altered entire landscapes and created the potential for very large wildfires and insect outbreaks. Treating isolated stands within these landscapes will not be effective.

Creating fuel treatment patches and strips is a useful first step to help control wildfire, but is not sufficient to save these forests or the important array of values that they provide, including owls and old-growth trees. Many of the intervening areas will eventually burn and, even if they do not, old-growth trees will succumb to insects during periodic drought, since they are surrounded by dense competing vegetation.

To conserve these forests, we need to modify stand structure (e.g., treat fuels) on one-half to two-thirds of the landscape. This level of restoration will create a matrix of more natural and sustainable forest, which has a greatly reduced potential for stand-replacement fire and insect mortality, interspersed with islands of dense stands. These interspersed dense stands will provide habitat for species like the Northern Spotted Owl that utilize such areas. In fact, an approach that results in restoring conditions on the majority of the dry forest landscapes is the only way in which sustainable habitat for Northern Spotted Owls can be provided.

Key elements of actions to restore these forests include:

> *Conserving old growth trees as a first priority.*
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> *Utilizing historical conditions, such as historical densities and distributions of tree sizes, as an ecological guide, modified, as needed, by recognition of coming climate change.*
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> *Combining conservation of old growth trees, stand density targets, and emphasis on drought and fire-tolerant species as an overall guide to action.* We suggest moving away from approaches based on diameter limits. Young, shade-tolerant trees of substantial size often contribute to the unnaturalness of many stands, as well as threatening old-growth trees. Also, old-growth trees may be smaller than a proposed diameter limit but still should be retained.
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> *Focusing on areas with concentrations of old growth structure as a high priority for treatment.* Recognition that such areas should receive early attention is recent; there

has been a tendency to think that stands with numerous old-growth trees should be left alone or, at least, be of much lower priority for treatment. The reality is the opposite! Forests that still retain substantial numbers of old-growth trees should be priorities for treatment because these are irreplaceable structures that are at great risk from uncharacteristic wildfire and bark beetle attack. Hence, *reducing the potential for accelerated loss of these old trees should be at the top of the agenda.*

Working to regain complexity—forests have been simplified through harvest, fire suppression, and grazing—work for heterogeneity at all spatial scales.

Returning understory community composition and ground fuels to characteristic composition and structure. Many areas that characteristically had frequent, low-frequency fire regimes no longer do, due to the accumulation of branches and dead trees on the forest floor and the loss of fine fuels (that used to carry these fires) to grazing. Reversing these effects will be needed.

Giving special attention to the hardwood component of the dry forest landscapes, both riparian and upland. In many ways, hardwood species and communities are in as much difficulty as conifer-dominated stands.

Ensuring conservation of aquatic systems. Limiting new roads, closing unneeded roads, improving road systems, revitalizing aspen and willow forests, and controlling aggregate watershed effects will all play a role in this effort.

Prescribed fire is a useful tool in forest restoration but is not sufficient alone—mechanical silvicultural activities typically will be required. Difficulties exist in safely dealing with the build-up in fuel; in many cases harvest is required to help reduce fuel loads. In addition, the uncertainty of a burn program, due both to smoke and safety issues, makes it difficult to base a forest management program for a large area solely on prescribed fire.

Harvest can help pay for actions and provide useful economic and social benefits, but additional funds will be needed. Significant commercial volumes need to be removed to restore these forests. They can provide the funds for treatment and also help maintain milling capacity and communities. Rarely has there been such a coming together of ecological, economic, and social considerations. Commercial harvest, though, will not pay for all that needs to be done.

Fire or other actions must follow harvest to reduce the short-term fuel hazards generated by mechanical treatment. Fire, at least to consume activity fuels (debris and small trees left on site), is an ideal follow-up to harvest where it can be carried out. Without treatment of activity fuels, thinning has a significant probability of actually accentuating the fuel hazards in treated forests for at least a period of time. *Better yet, use this residue in biomass power plants.*

Finally and most profoundly, policy makers and managers need to plan for continued active management of these restored stands. *These activities and others will need to be repeated* *through time to maintain the sustainable structure and composition.* Sometimes, this may be accomplished with burning but most of the time repeated silvicultural treatment of stands and landscapes will be required in the more productive mixed conifer types.

Restoration of Forests Associated with Infrequent, High-Intensity Fire Regimes

On the west side of the Cascade Range, the primary restoration need is for silvicultural activities to accelerate the development of structural complexity in the plantations created following timber harvest. Tens of thousands of acres of young stands exist which could benefit from activities that reduce stand densities, favor biodiversity, and create spatial heterogeneity. There is an immense opportunity and need for restoration in these plantations that could result in significant contributions to ecological, economic, and social goals.

Restoration efforts can increase structural complexity in the plantations created after clearcutting. These plantations usually contain dense conifers dominated by one or two commercial species. Most have little or no structural legacy of standing and down trees from previous stands. Thus, these stands are much simplified from the young naturally regenerated forests that would have developed historically. Thinning and other activities can accelerate the development of complexity within these stands. Also, such thinning can speed the development of late-successional characteristics.

Key elements of actions to increase structural complexity in plantations:

> *Conserving all remnant old growth trees.* There is rarely an ecological justification for cutting old growth trees as a part of restoration programs.
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> *Utilizing silvicultural prescriptions that encourage development of spatial heterogeneity, such as variable density thinning.*
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> *Allowing plantation thinning beyond 80 years of age.*
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> *Ensuring conservation of aquatic systems* Limiting new roads, closing unneeded roads, improving road systems, and controlling aggregate watershed effects will all play a role in this effort.

Using Management Objectives and Restoration Principles to Guide Activities Following Severe Disturbances

Management activities following major disturbance events, such as large intense wildfires, are among the most controversial issues in national forest management. Such "restoration" activities should follow the same principles previously emphasized with the goal of restoring structures and ecological processes where they have been degraded while simultaneously restoring economic and social values on these lands.

Management goals should be the starting point in determining appropriate post-disturbance activities. Hence, if ecological objectives are primary objectives prior to the disturbance they should be primary considerations in any post-disturbance restoration process.

Comparable structural goals should guide management before and after wildfire; these will certainly differ depending upon whether the management focus is primarily on ecological processes or wood production. Where ecological objectives are primary, proposed salvage operations should retain structures of the same size and density as those developed for the green forest. Old-growth trees should be conserved, whether alive or dead. This approach provides a solid reference for action and can eliminate intense arguments over such issues as the probabilities that burned trees will die.

Similarly, approaches to reforestation should reflect restoration principles and management objectives. For example, attempts to establish dense conifer plantations on ponderosa pine and dry mixed-conifer sites are not appropriate; if successful, such efforts simply have created, at best, stands in need of restoration thinning or, at worst, the next generation of uncharacteristic stand-replacement fires. Furthermore, the structurally-rich early successional communities that exist between a severe disturbance and re-establishment of a closed canopy of trees are very rich in biological diversity, including species and key ecological processes. Rapid termination of this successional stage is inappropriate where management objectives emphasize ecological objectives.

Trust but Verify; Third-Party Review as a Key to Forest Restoration

Successful restoration of these forests will require large-scale actions over space and time, as we have discussed above, and managers will need the latitude to adapt general policies to specific situations. Public acceptance and support will be needed and the social license for these efforts is tenuous in many places. A key component in gaining public support will be credible evidence that the actions are moving the forests toward restoration goals and a mechanism for changing management where the actions are not achieving the desired objectives.

Monitoring is necessary but not sufficient. Given the uncertainties that we face in forest restoration, keeping track of the state of the forests and the effects of actions is a first principle of forest management. We believe, though, that people are increasingly skeptical of an agency keeping score on the effectiveness of its own actions.

Third-party review will be essential to gain and retain public acceptance. We need mechanisms that provide trusted evaluations of the linkage between actions and goals along with the ability to suggest change as needed. Creation of third-party review as a regular part of forest restoration would go a long way toward this goal. As an example, a broad group of community leaders and resource managers could periodically review the results of restoration work and publish a report on their findings and suggestions for change. Other approaches, such as certification, could also be used. In sum, third party review could go a long way toward dispelling distrust in the public about the purpose and results of forest restoration programs.