

Good morning. Thank you for inviting me to testify on this vitally important matter, forest and rangeland health restoration. In addition to my responsibilities at Oregon State University, I am the Policy Chair for the National Association of Professional Forestry Schools and Colleges, representing more than 60 institutions nationwide.

My colleagues, Deans and Directors of forestry and natural resources academic programs throughout the nation, are very interested in how the U.S. Senate will address forest and rangeland health because current conditions in many places create high risks to our environments, communities, economies and treasuries. Wildfire, water, and invasive species dominate our concerns in the West. My colleagues in the South, Midwest and New England are interested because their forests are increasingly vulnerable to insect and disease epidemics -- as you have just heard from Dr. Stephen, fires, exotic species, and windstorms and many of their forests are municipal watersheds. For all of us across the country, our concerns for forest and rangeland health include the effects that uncharacteristically intense wildfires, insect and disease epidemics, or invasive species epidemics have on sustaining water quality, watershed functions, fish and wildlife habitats, threatened and endangered species, landscape values, forest-related jobs and economies, and roles of forests in biodiversity conservation and atmospheric processes such as carbon sequestration.

The restoration work needed must extend beyond the wildland-urban interface and municipal watersheds, as H.R. 1904 recognizes. It must begin with removal of wood and biomass to reduce drought stress and risks of unwanted wildfire, insects and diseases or to allow for safe reintroduction of managed fire. Where fire must be reintroduced, accommodation with air quality concerns must be addressed. Essential wood and biomass removals have great potential for generating restoration by-products that could be useful in producing wood products and bio-based energy to meet some of the nation's needs while creating living-wage jobs across rural America. The restoration work also needs marked improvements in agency planning processes or additional appropriations will just prolong the waste on process rather than progress.

I will present a case for more fully engaging the nation's colleges and universities in addressing all aspects of our nationwide challenge in restoring and sustaining forest and rangeland resources.

### Forest and Rangeland Resources Are At Risk

According to U.S. Forest Service estimates, the nation currently has approximately 190,000,000 acres of federal lands at risk to wildfire and more than 70,000,000 acres of all forestland ownerships at risk to increased tree mortality from insects and diseases. These are forests and rangelands whose tree and shrub ages, species composition, and stocking rates make the vegetation vulnerable to drought stress, which further exacerbates the potential effects of fires, diseases and insects. Add stresses created by a warming climate, threats from invasive and exotic weeds, and impacts to water quality and public safety following fires and we have a recipe for significant and long-term damage to sustainability of the nations' forest, rangeland and water resources.

The science is clear: we have a major, nationwide problem affecting the sustainability of forest

and rangeland ecosystem health. Large areas of forests and rangelands have excessive buildup of fuels. Others have conditions that leave forests highly vulnerable to disease and insect epidemics. Many forests and rangelands are vulnerable to invasive species following major disturbances to soils and vegetation. But we don't have these problems everywhere and where we do have them they are not the same problem.

Problems in the urban-wildland interface and municipal watersheds are not the same as problems in the backcountry but both areas have problems and both areas need attention. Science tells us what the problems are but science doesn't have all the solutions yet. Solutions need to be tailored to different problems and different places by local, collaborative multi-party groups. The "solutions" must include basic and applied research that is done as the problems are being addressed through adaptive management so that, over time, we can improve our understanding of the dynamic systems at stake and the effectiveness of our solutions. Monitoring by the multi-party groups will be key to long-term effectiveness of investments. Several of these points were affirmed by the recent Western Governor's recommendations.

### Restoration and Sustainability Require Bold, Focused Action at Landscape Scale

The magnitude and scope of forests and rangelands in unhealthy conditions are such that restoration treatments must be taken on a landscape scale, reflecting careful prioritization of places and treatments most likely to yield the desired reduction in risk. Where we have problems, they are measured in thousands to millions of acres; they are not localized site-scale problems amenable to traditional solutions, a dab here and a dab there. But not all of the nation's forests and rangelands are at risk and those that are at risk vary greatly in the nature of the risk, degree of risk, likely impacts of an undesired event, and likely responses to treatments designed to reduce risk.

It is vital that we, as a society, act boldly and quickly to begin reducing the risks to our environments, natural resources, economies and communities posed by those forests and rangelands that are in unhealthy conditions, to have as the Western Governor's recommend a bias for action. Where ecosystems and properties are at risk, excessive avoidance of short-term risk will only exacerbate long-term risk. But it is vital that we not dissipate our resources - people, dollars, or trust -- in places that are not at risk or where treatments will be ineffective in altering the impacts of undesired events. We must design and carry out restoration actions using scientific knowledge coupled with the best local knowledge and community-based expertise and make every problem solving action a learning opportunity.

Making a national commitment to restore and sustain healthy forests and rangelands creates a grand experiment with interlocking social, environmental and economic dimensions. Therefore, we need comprehensive, collaborative, regionally coordinated strategies that engage multiple sectors, public and private including colleges and universities, in restoring and sustaining not only forest and rangeland health but also the health of the communities, economies and businesses associated with those lands and the capacity of agencies to carry out their public trust. Such a model is not in place yet and it is not reflected in H.R. 1904 or other proposed legislation.

## Potentials for Biomass Energy and New Wood Products

Title II of H.R. 1904 is significant in recognizing the need to invest in developing new uses for the materials that must be removed from at-risk ecosystems -- utilizations that maximize economic as well as environmental possibilities. But without a processing infrastructure to harvest, transport and processes restoration by-products, currently eroding due to lack of materials and work, there will not be the physical capacity to carry out restoration work on the scale needed. We also need more innovations than just in biomass uses. Pioneering innovations must also occur in how projects are planned - streamlining and cost reductions, management technologies - light-on-the-land and low cost, and monitoring - employing state-of-the-art technologies for efficient and effective data collection and management.

## New Partnerships Between Academia, Agencies, and Citizens

This nation's historic investments in forest and rangeland research have yielded many benefits in knowledge and technology for resource management and conservation. They have helped us learn how to grow trees, conserve fish and wildlife habitats, reforest cutover lands, and put fires out, well most of them. But our base of scientific knowledge and technologies to support the strategic actions needed at a landscape scale to restore forest and rangeland health under climates that are far different than we have experienced to date is weak. In some cases it is nonexistent. That makes well-intended projects vulnerable to challenge on scientific grounds; they could easily be found to be arbitrary and capricious based on missing science.

However, we cannot forestall taking action on our pressing problems until the new landscape-scale science has matured. We must build the needed scientific knowledge as we take action to solve the problems we face. After all, it will take landscape-scale experiments to generate landscape-scale knowledge; precisely the kind of experiments that forest and rangeland health treatments can provide. The same can be said for cost-effective land treatments and utilization of treatment by-products. Our challenge is not unlike other major challenges this nation has faced in the past where we had to build the science as we built the program.

The current federal investment in research and development to support the National Fire Plan and its Implementation Plan is simply not sufficient for the task at hand and it does not adequately engage the nation's colleges and universities. It is around \$40 million per year, plus or minus \$2-3 million from year-to-year. The total federal investment in forest and rangeland health management and wildland fire management is around \$2.5 billion per year. That puts federal R&D funding at about 1.5% of total investment. I have heard from U.S. Forest Service field officials that they are able to get only 60-70% of their field project funds "on-the-ground" because they must spend so much time and resources on planning, analyses, surveys, appeals and litigation. That means that federal taxpayer dollars are not having the impact they could have. More importantly, it means that problems can increase in severity over time as a result of ineffectively spent resources. Numerous cases of this have been documented in the Forest Service's "Process Predicament" report.

Perhaps the process improvements proposed in H.R 1904 will increase the percentage of dollars that get to the ground, but will they improve the efficiency and effectiveness of those dollars in producing desired outcomes? Only if they are guided by local collaboration and

expertise on strategically designed, landscape-scale strategies, which take long-term ecosystem dynamics into consideration. Will they contribute to development of new technologies and processes to perform cost-effective actions? Will they result in new products and processes for using treatment by-products? Not likely.

In the late 1990s, I was the Forest Service's Director for the Pacific Southwest Research Station in California. We had three examples of projects where scientists worked with field managers on teams to design and implement work to accelerate development of old forests and reduce fire risks while protecting water quality and fish and wildlife habitats. Most of the work required the removal of some trees and use of managed fire. The work went forward in a timely fashion, revenues from tree removals exceeded costs of project work, conservationists supported the science-based work, new knowledge and technologies resulted, and the treatments were effective. The project on the Lassen National Forest changed the behavior of a wildfire this past summer from crown to ground, exactly as intended.

We have experience in large-scale, long-term collaborative research, development and application to solve major problems such as we face today with forest and rangeland health. Historic programs for forest insects, wildfire management and reforestation showed us how to effectively tackle complex problems through integration of research and management in adaptive problem solving. Collaborative partnerships between university scientists, agency managers and local citizens and businesses do work! They can provide multiple benefits essential to success in restoring forests and rangelands to healthy conditions.

Like the new Stewardship Contracts being implemented across the nation, where parties work together locally to design and implement solutions, the positive effects have multiple dimensions. We achieve lasting solutions based on appropriate science, local innovation and ownership of projects, trusting relationships between agency personnel, local citizens and researchers, economic development in local communities, and effective exchange of goods for services. Fieldwork gets done with higher percentage of budget making it "to the ground," broader agency stakeholders give support, and learning occurs as an integral part of problem solving. We call this approach, active adaptive management. But, unlike the past, where there was broad social agreement on what the "problem" was, we now have a highly fragmented society that does not find agreement on the "problem." Thus, the new model we need for restoring and sustaining forest and rangeland health must add the dimension of local, multi-party collaboration to the science-management partnership. And the results of that collaboration must be given some degree of durability so they can be implemented, tested, and adapted over time.

So far, such collaborative partnerships are the exceptions rather than the rule. The results of many collaborative projects are still subject to final resolution in the conflict arena. That needs to be reversed if legislation to improve the conditions of unhealthy forests and rangelands is to be effective in all the good it strives to accomplish. I believe that an authorization to create academia-agency-private partnerships on the order of 2.5 to 5% of annual appropriations from forest and rangeland health management and wildland fire management could result in changing the percentage of appropriations that result in "on-the-ground" work closer to 80%. Forests, taxpayers, managers, local communities and economies, our base of scientific knowledge, and

public trust in agencies would all come out ahead.

### Engage the Nation's Colleges and Universities

Our nation's colleges and universities are ready to pitch in. They have unmatched education, research and extension expertise and capacity. Extension Services at land Grant universities are best prepared to carry out much of the education called for in the Western Governor's recommendations. Federal agencies recently created a network of Cooperative Ecosystem Studies Units at many of these universities across the country. These CESUs provide a vehicle for federal agencies to tap Land Grant university research and education in support of management practices on the ground. Our academic institutional assets have not been fully mobilized in the drive to restore forest and rangeland health. The bulk of work underway and that proposed in H.R. 1904 focuses on federal and state agencies to accomplish the job.

The Western Governor's recommend strengthening multi-party collaboration. This is necessary but not sufficient. It will take the combined expertise and capacity of management agencies, local people, AND research/education institutions to accomplish the work necessary and learn how to use the biomaterials produced as treatment by-products. In Montana, just last week the Western Governors saw an example of Stewardship Contracting that included the state's universities in helping to design and monitor projects. I encourage the Congress to engage the nation's universities, especially Land Grant and 1890 colleges and universities, in formal problem-solving, learn-as-we-go partnerships with the agencies to restore and sustain healthy forests and rangelands and to generate new uses for restoration treatment by-products. The model is there; it can be done.

Title IV of H.R. 1904 currently calls for significant roles for Land Grant and 1890 colleges and universities in addressing insect problems in forests. These roles could and should be called for across the entire Act, academia-agency partnerships in all Titles. If there were only one thing I could change to make H.R. 1904 more likely to achieve its intended outcomes for healthy forests and rangelands and use of biomass removed through treatments, it would be integrating specific roles for colleges and universities into each title. The academia-agency-private partnerships would result in increased capacity in education and technology outreach, the landscape-scale knowledge needed to improve treatment effectiveness, new biomass and bio-materials technologies and products, graduating students better prepared to continue the kind of work that will be needed for several decades, and increased public confidence in state and federal resource management agencies. Following are some specific areas where research and education are needed:

1. Key elements for success of community-based collaborative forest restoration projects.
2. The economics of restoration under different forest and rangeland conditions.
3. New technologies and processes for cost-effective restoration treatments.
4. The economics of restoration under different levels of community infrastructure.
5. Restoration treatments under different ecological and stand conditions.
6. Options for use of small diameter materials as biomass for local industries and biomaterials for new products.
7. Ecological and economic effects of taking action and not taking action.
8. Monitoring of the effectiveness of community-based forest restoration projects - ecological

and economic impacts.

9. How much vegetation and of what sizes and species must be removed from specific places and across the landscape to restore resilience and resistance to drought stress and its companions, insects, fire and invasive species, i.e., how big must the removed trees be and how many to accomplish desired outcomes?

10. How effective is stewardship contracting and local collaboration in problem solving in improving both the efficiency and effectiveness in health restoration treatments?

11. Once initial treatments are done, what kinds of maintenance actions are needed to sustain healthy ecosystems and prevent landscapes from returning to pre-treatment conditions?

12. When an uncharacteristic disturbance occurs, such as we have seen recently with major wildfires and insect outbreaks, what are the implications to environments, communities, and economies of letting nature take its course versus actively intervening to reforest or revegetate the area with desired native species?

13. Efficient and effective monitoring systems to support adaptive management.

### Some Things to Consider

There are many parts of H.R. 1904 that should be retained in eventual legislation, as they are essential for success:

1. NEPA provision in Title I, Sec. 104 for developing one proposed agency action and its environmental assessment.
2. Public collaboration on the proposed agency action in Title I, Sec. 104(d).
3. Provisions for expedient yet equitable administrative and judicial reviews.
4. Consideration of short and long-term consequences of agency action or no action in injunctive relief (Title I, Sec. 107(b)).
5. Incentives for watershed health and healthy forest reserves provided through Titles III and V.
6. Early warning system development in Title VI.

If I could fix more than one part of H.R. 1904, those would include:

1. Add definitions for "restoration" and "forest health" in Title I.
2. Add a clause prior to Sec. 102 (b) in Title I calling for all land and resource management plans to be consistent with the National Fire Plan and its Implementation Plan prior to requiring that all fuels treatment projects be consistent with land and resource management plans, many of which are not currently well aligned with the Fire Plan.
3. Remove arbitrary acreage caps for how much land could be treated during the applicability of the Act (limiting treatments to 20 million acres, only 10% of at risk lands, is not ecologically sound).
4. Acknowledge that prohibiting treatments in the National Wilderness System, Congressionally designated Wilderness Study Areas, and roadless areas will not in any way protect them from the damaging effects of uncharacteristic wildfire (as seen this past summer in the Biscuit Fire in Oregon) or from insect or invasive species epidemics.
5. Add the USDA Cooperative State Research, Education and Extension Service to assist in implementing Title III Sec. 6, and authorize and encourage the Forest Service State and Private Forestry to enter into technology transfer agreements with land grant universities and associated forestry research, education, and extension programs to assist in this

implementation.

### Closing

In closing, I commend the Senate for recognizing the risks to major portions of this nation's forests and rangelands posed by current unhealthy conditions regarding wildfire, insects, diseases, and invasive species. I encourage the Congress to engage the nation's colleges and universities in assisting federal and state agencies and tribal and private groups with all actions taken to restore and sustain healthy conditions in the nation's forests and rangelands.