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Oversight Hearing on the Crisis on the National Forests:
Containing the Threat of Wildland Fire on the Environment and Communities

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Chairman McInnis, and members of the Committee, thank you for this opportunity to testify on a subject of personal importance to me and of critical importance to the health of our nation's forests and the people and communities that live within them.

My name is Wally Covington. I am Regents' Professor of Forest Ecology at Northern Arizona University and Director of the Ecological Restoration Institute. I have been a professor at NAU since 1975. I have a Ph.D. in forest ecosystem analysis from Yale University. Over the past 25 years I have taught graduate and undergraduate courses in research methods, ecological restoration, ecosystem management, fire ecology and management, forest management, range management, wildlife management, watershed management, recreation management, park and wildland management, and forest operations research. I have been working in long-term research on fire ecology and management in ponderosa pine and related ecosystems since I moved to Northern Arizona University in 1975.

In addition to my publications on forest restoration, I have co-authored scientific papers on a broad variety of topics in forest ecology and resource management including research on fire effects, prescribed burning, thinning, operations research, silviculture, range management, wildlife effects, multiresource management, forest health, and natural resource conservation. I am senior author of the Ecosystem Restoration and Management: Scientific Principles and Concepts chapter of the interagency publication entitled The Ecological Stewardship Reference.

I am a member of numerous professional societies including the Ecological Society of America, the International Society for Ecosystem Health, the Society for Conservation Biology, the Natural Areas Association, the Soil and Water Conservation Society, the Society for Range Management, and the Society of American Foresters. I am also a member of the Society for Ecological Restoration and was founding chair of its Science and Policy Working Group. In addition to publishing in the scientific literature I have been actively involved in outreach efforts to natural resource professionals, community leaders, and the general public on issues related to forest ecosystem management.

Although the general principles that I will discuss apply to the vast majority of the West's dryer forest types, I will focus my testimony on ponderosa pine forests. As the GAO has pointed out over 90 percent of the severe crown fire damage nationally is in this forest type.

My testimony today has four major points:

1. The greatest threat to the sustainability, diversity, and social viability of the forests and communities of the West is our failure to restore forest health in the frequent fire forests of the West.
2. The pace and scale of our forest health restoration treatments is wholly inadequate; treatments should at least be on the scale of acres burned by severe wildfire annually.
3. Knowing what we now know, it is critical that we move forward with large-scale restoration-based fuel treatments using an adaptive management approach.
4. There are emerging models of communities working to reduce the threat of fire while restoring the forest for its full suite of values. Their success depends on meaningful community collaboration, human and financial resources and adequate scientific support to make well informed management decisions. Congress, federal agencies, universities, and non-governmental organizations must support these communities to help them achieve success. These groups should be supported and encouraged to work at the scale of the greater ecosystem, 200,000 to 1,000,000+ acres.

Background

It is an unfortunate set of circumstances that have led to this hearing. Scientists have predicted the current forest crisis for the last 75 years (Leopold 1924, Weaver 1943). In 1994 I was senior author on a review paper in which I stated that we could anticipate exponential increases in the severity and extent of catastrophic fire. It is not a prediction I ever wanted to come true. In that same paper, I also suggested that we have a narrow window of opportunity to take preventative actions to restore forest health and minimize the losses of civilian and firefighter lives as well as the mounting damage to our nation's natural resources.

The forests of the West are full of communities that have poor escape routes and little capability for evacuation in the event of a fast moving fire. It is not likely that our luck will continue. Recent fires have traveled spread at rates in excess of 10 miles in a 24 hour period. Given such a rate of spread in heavy forest fuels there is no way that we will be able to evacuate vulnerable mountain communities in time to prevent the loss of lives. Clearly, if we do not do something quickly we can expect civilian and firefighter fatalities that are today unimaginable. I commend the Committee and Congress for taking a problem-solving approach to the current and future fire situation.

I am optimistic that thoughtful action, adequate resources and public and private leadership we can begin to solve this crisis.

1. The greatest threat to the sustainability, diversity, and social viability of the forests and communities of the West is our failure to restore forest health in the frequent fire forests of the West.

Simply installing fuel breaks around our cities and rural developments and forsaking the wildlands would be an abdication of our responsibility to future generations. Attention cannot be narrowly focused on a ring around the developed areas. Such actions will fail to address one of the most contentious issues of our time, the protection of endangered species. Severe wildfires in frequent fire forests of the West are the greatest single threat to critical habitat for many of these vulnerable species because they are not adapted to stand replacing fires. According to a recent draft plan by the Coconino National Forest surrounding Flagstaff, Arizona, over the last ten years the nesting habitats of seven northern goshawks and six Mexican spotted owls have been eliminated or severely altered by stand replacement fires in the vicinity of the San Francisco Peaks.

There are numerous factors that contribute to the decline of species in this country but the biggest threats, according to experts like E.O. Wilson, a Harvard conservation ecologist, are habitat destruction and degradation. Degradation of habitat occurs for many reasons but one of the most severe factors is the elimination of important ecological processes, such as the periodic, low-intensity burns that characterize the fire dependent ponderosa pine forest. By not restoring the forest we contribute to the decline of habitat and the collision between society and nature.

From a conservation biology perspective (conservation biology deals with the biology of rare and declining species), one of the most critical needs for species conservation is the ecological restoration of the core areas of greater ecosystems. Core areas are large areas that are managed as source areas for native plants and animals to disperse across the larger landscape. Core areas are typically, but not always, wilderness areas, National Park backcountry, and similar undeveloped areas. In the ponderosa pine type, these core areas are often even more overcrowded by unnaturally dense stands of trees than is the rest of the landscape. As such, our parks, wilderness areas, and other reserve areas are at a much greater risk of catastrophic crown fire than is the rest of the landscape. Furthermore, because of the importance of these areas as strongholds of biological diversity, their loss to crown fire is a much more critical blow to biological diversity than are fires in other areas. If we are serious about restoring ecosystem health we must confront the difficult problem of how to restore these critical core areas and do so immediately. At the very least we should seek to protect them with a defensible perimeter using restoration based fuel breaks much as we are trying to do with urban areas.

2. The pace and scale of our forest health restoration treatments is wholly inadequate; treatments should at least be on the scale of acres burned by severe wildfire annually. The current rate of acceleration in the severity and size of wildfires in the West indicates that average annual losses over the next two decades will be in excess of 5-10 million acres per year. Using the reasonable assumption that preventative restoration treatments should at least be at the pace and scale of losses to severe stand replacing fire, one would conclude that we should be treating 5-10 million acres per year. Our current pace and

scale is woefully inadequate given the scope of the problem. Unless we accelerate treatments rapidly and immediately we will never get ahead of the problem.

3. Knowing what we now know, it is critical that we move forward with large-scale restoration-based fuel treatments using an adaptive management approach.
We have a solid body of scientific information to support a systematic scientific approach for implementing forest restoration that will protect people, communities and the forest. Adaptive management would use this information, coupled with ongoing monitoring and evaluation, to ensure that maximum learning comes from ongoing operational treatment implementation.

We have sufficient knowledge to implement large, landscape scale restoration treatments in ponderosa pine and related ecosystems. Such a scientific approach should be based on attempts to objectively discover the truth about how best to learn how to improve treatments during the course of ongoing large-scale restoration of the landscape. The scientific method has been developed as a systematic way to discover truth, or more specifically to avoid being fooled by biases about how we imagine that things might be. A.D. Bradshaw (1993) of the University of Liverpool in England has presented a particularly cogent discussion of the need for objectivity in ecological restoration work. Otherwise, he fears that arguments over restoration objectives and approaches will tend to degenerate into decisions and actions based on intuition and impressions instead of the best knowledge available. He goes on to state that, "With this goes the belief that good restoration is intuitive, stemming from feelings rather than logical understanding, and that because of this it is only learned by experience… Certainly nobody should ever decry the importance of intuition…Yet applied to the exclusion of other principles, these beliefs will destroy the efficiency and effectiveness of restoration ecology…"
Restoration ecology, he posits, must be based on six cardinal points:

1. Awareness of other work.
2. Preparedness to carry out proper experiments to test ideas.
3. Preparedness to monitor fundamental parameters in a restoration scheme.
4. Further tests and experiments suggested by these monitoring observations.
5. The restoration of functioning ecosystems in which a whole variety of species is involved.
6. Published results.

There is abundant scientific research that began in the 1890's and continues today that provides a sound scientific framework for implementing the science and practice of restoration in ponderosa pine and related frequent fire ecosystems. We have solid information about presettlement forest conditions, changes in fire regimes over the last century, deterioration of overall ecosystem health, and ecological responses to thinning and prescribed burning—the key elements of any attempt to restore ecosystem health in ponderosa pine and related ecosystems. We know that current overcrowded stands of trees do not sustain the diversity of wildlife and plants that existed a century ago. We know this by examining the data of early naturalists and scientists. We also know this to be true from primary research. Scientists that have compared biological diversity of overstocked stands—stands that have had decades of fire exclusion--with open, park-like

stands that have not had severe fire regime disruption, have found greater plant diversity, greater insect diversity, and greater bird diversity. Similar studies have also found greater old-growth tree vigor and resistance to insect attack in open, park-like stands—stands similar to those present before settlement. We also know that stopping ecologically based forest restoration that includes thinning, is not saving the forest as some would like you to believe, but only contributing to its demise and causing severe losses to the wealth of species that depend on it.

Research across the Intermountain West has shown that restoration treatments substantially reduce fire hazard by thinning trees to decrease tree canopy density, break up interconnected canopy fuels, raise the crown base height, and then reduce accumulated forest floor fuels and debris with prescribed fire. Where tree density is great, fire alone is inadequate. Without thinning, fire can lead to increased mortality, especially among old growth trees. This is the typical case over most of the ponderosa pine type throughout the West.

Restoration thinning enhances the productivity (growth) of trees, allowing young trees to develop old-growth characteristics such as large size and full crowns. Perhaps most importantly, restoration has been shown to increase rapidly the productivity of native understory grasses and herbs, the species that make up 90-99% of the plant biological diversity in western fire-adapted forests. The resources provided by abundant understory vegetation—seeds, flowers, fruits, and cover—translate into key wildlife habitat components. For example, the number of butterfly species and individuals increased within two years in Arizona sites that had received ecological restoration treatments.

A variety of restoration options are being investigated at research sites across the West, applying treatments developed locally by scientists, managers, environmental activists, resource users, and members of the public. It is important to continue and expand the research effort, but at the same time it is imperative that we accept the responsibility to apply the extensive knowledge we already have, before more forests are lost. Restoration faces many challenges, because ecosystems have been highly fragmented and degraded by decades of overuse. It is not necessarily simple nor is success always guaranteed. But the preponderance of research clearly indicates that restoration management approaches stand in striking contrast to the destructive effects of unnaturally intense fires. Clearly the risks of inaction far outweigh the risks of scientifically based restoration treatments.
The actions that others and I believe should be taken to restore the ecological integrity of ponderosa pine forests and therefore reduce the threat of crown fire are well known. I do not advocate a “one-size fits all approach” but rather crafting management approaches based on the location under analysis, its presettlement condition, and its relationship to the broader ecosystem and the communities that live within it. In this sense, ecological restoration should not be viewed as a strict recipe or a rigid set of prescriptions. Rather, ecological restoration should be viewed a broad intellectual framework for restoring and enhancing not only ecosystem health, but also sustainable human uses of the land.
At the Ecological Restoration Institute we have developed some general principles for restoration of ponderosa pine ecosystems http://www.eri.nau.edu/. In general, treatment design should:

· Strive to emulate, insofar as is practical, natural ecosystem patterns and processes. In ecological restoration we refer to these natural conditions as “reference conditions”. In most cases for ponderosa pine forests this includes fewer trees per acre; retaining older trees and removing the excess trees thus opening up the forest canopy to promote increased numbers and species of plants and grasses.
· Seek to incorporate human needs with ecosystem conservation goals. For example, in many circumstances it may be desirable to deviate from strict-sense restoration prescriptions to accommodate specific uses by humans, endangered species, or other ecosystem management objectives.
· Recognize that ecologically based restoration treatments not only provide fuel breaks to stop crown fires from spreading across the landscape, but also enhance resource values and minimize the risk of environmental degradation.
· Be based on comprehensive economic analysis. Initially the cost of pre-suppression treatments and restoration appears large, however, when compared to the cost of fire suppression, property loss, environmental services lost (such as water), potential loss of lives and other factors it is relatively small. As others have said, we can either pay now, or pay much more later.
· Recognize that initial costs will be higher than maintenance costs. For example, in a degraded forest the cost of restoration can be as high as $700/acre. Following treatment, prescribed, low-intensity fire can be used as the primary tool at a much lower cost, as little as $40/acre for large areas.
· Recognize that agency staff capacity and operational funds are limited and must be increased to meet the challenge. In the near term, fire suppression costs will continue to mount and implementing pre-suppression treatments will require resources as well.
· Consider the potential for the creation of new restoration based jobs and industries. Many new jobs will be created throughout the nation as a consequence of implementing ecological restoration. Furthermore, in many situations the woody material could be removed and used to produce wood products to provide jobs and offset some of the costs of the restoration.

This is not to suggest that we do not need more research or that we should not continue to learn from current treatments so that we can improve future treatments. One of the most important contributions the scientific community could make to improve land management is to develop monitoring protocols that are simply applied, affordable, understandable to land managers and that can be quickly synthesized to inform adaptive management.

This need for continued research and monitoring is particularly acute for processes that operate at the landscape scale. For example, with regard to endangered and threatened species as well as many other species occupying the forest, we need more information on wide-ranging animals that we cannot gather until there are more and larger restoration treatments in place. Ironically some critics of forest restoration argue that before we can implement landscape scale restoration treatments we must know the effects of treatments on this scale—a Catch-22 argument.

4. There are emerging models of communities working to reduce the threat of fire while restoring the forest for its full suite of values. Their success depends on meaningful community collaboration, human and financial resources and adequate scientific support to make well informed management decisions. Congress, federal agencies, universities, and non-governmental organizations must support these communities to help them achieve success. These groups should be supported and encouraged to work at the scale of the greater ecosystem, 200,000 to 1,000,000+ acres.

There are emerging models of communities working to reduce the threat of fire while restoring the forest for its full suite of values. Designing restoration and fuel reduction strategies that protect towns and their wildland habitats is not easy because of the social, economic and philosophical ties people have to forests. In addition, even with broad support for treatments there are some people and organizations that will choose not to participate, yet will litigate if the approaches don't match their ideology. The towns working to implement fire risk reduction and the ecological restoration of forests are developing important models for accomplishing protection. In addition, their experiences are an important source of information that should be used by decision-makers, agency officials and others for adapting their own ways of operating to support community-based decisions.

An exemplary community based collaborative group has been working to restore the forests right here around Flagstaff. For the past six years the Greater Flagstaff Forests Partnership has worked to develop and implement strategies to prevent catastrophic fire and restore the ecological integrity of ponderosa pine forests in the Greater Flagstaff Forest Ecosystem. Over 25 public and private organizations participate in the Partnership. Members include Northern Arizona University, the Coconino National Forest, the City of Flagstaff fire department, the Chamber of Commerce, the Grand Canyon Trust and many others. The group was formed in response to the volatile fire season of 1996. During that season fires were a constant threat within the city limits and two wildfires in the Coconino National Forest demonstrated the vulnerability of the San Francisco Peaks to fire. In fact, it was the decision to re-deploy fire fighters from the Hochderffer fire in the Coconino National Forest to a fire within the Flagstaff City limits that resulted in the Hochderffer fire growing to approximately 16,000 acres.

The goal of the Partnership is to analyze the forest surrounding Flagstaff and within that area to treat strategically located areas to achieve fire protection for the town, the surrounding wildlands, and especially the San Francisco Peaks. Although there are aggressive fuel reduction treatments underway on city property and on private property in the city, the Partnership recognizes the social and economic importance of applying ecologically based restoration to the forest surrounding Flagstaff. The Ecological Restoration Institute at Northern Arizona University in collaboration with the Rocky Mountain Research Station and others is developing the science-based treatments, research and monitoring that are essential for developing effective approaches.

Developing the science behind each treatment is a critical part of achieving community consensus and responding to criticism. Other important activities include developing

economically viable approaches to restoration by promoting and developing the use of small diameter trees (where feasible), community outreach and education, and exploration of restoration based employment options.

What Congress Can Do

There are several constructive steps Congress and the federal agencies can take to improve our current situation.

1. Treatments to reduce fire threat and restore the ecological integrity of forests should become the single biggest priority of forest management policy and the land management agencies working in the West. The 1999 GAO report pointed out that the Forest Service has estimated that 39 million acres of Forest Service lands are at high risk to catastrophic wildfire in that region alone.
2. Congress should provide adequate resources to the agencies to maximize treatments. A simple extrapolation of recent rates of increase in crown fire damage suggests that within the next decade acres burned could easily double whereas costs for fire suppression and compensation could approach four billion dollars annually.
3. Wherever possible, Congress and the land management agencies should support the collaboration of forest communities to design ecologically based restoration treatments. This includes: producing high quality, timely environmental review documents; elevating the production of the review documents to a top priority; assisting communities to develop economically viable opportunities for restoration products; and assisting to develop new employment opportunities in restoration.
4. Support the development of science-based restoration treatments.

To move forests from their current degraded conditions to healthy, diverse, and productive ecosystems requires knowledge. Our lack of understanding of how naturally functioning ponderosa pine forests function and the ecological and social implications of changed forest conditions has led to the current situation we now face with regard to catastrophic fire, endangered species and the social and economic upset of forest communities.

The Ecological Restoration Institute at Northern Arizona University and its collaborators are generating significant knowledge about pine forest restoration and working to get that information into the hands of communities and land managers that can apply it on the ground. With each treatment we learn more and can incorporate that knowledge into the next set of treatments. However, the time for clinical trials is over. Restoration based forest health treatments are proving to be so beneficial in contrast to no action that we must move forward rapidly and at large scales.

Thank you very much for asking me to appear before the Subcommittee.

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