WRITTEN STATEMENT FOR THE RECORD

OF

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OVERSIGHT HEARING ON
WILDFIRE ON THE NATIONAL FORESTS:
AN UPDATE ON THE 2002 WILDLAND FIRE SEASON

BEFORE THE
COMMITTEE ON RESOURCES
SUBCOMMITTEE ON FORESTS AND FOREST HEALTH

UNITED STATES HOUSE OF REPRESENTATIVES

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INTRODUCTION

My name is Dr. Thomas M. Bonnicksen. I am a forest ecologist and professor in the Department of Forest Science at Texas A&M University. I have conducted research on the history and restoration of America's native forests for more than thirty years. I have written over 100 scientific and technical papers and I recently published a book titled ***America's Ancient Forests: from the Ice Age to the Age of Discovery*** (Copyright January 2000, John Wiley & Sons, Inc., 594 pages). The book documents the 18,000-year history of North America's native forests. A biographical summary is provided at the end of this written statement.

OUTLINE

My written statement emphasizes the following six points:

1. Forests are deteriorating.
2. Wildfires are growing worse.
3. National Fire Plan is not working.
4. Prescribed fire is not the answer.
5. Restoration forestry will solve the problem.
6. Success requires help from the private sector.

1. DETERIORATING FORESTS

Our forests are shrinking at an alarming rate, especially in the South. Historically, native forests covered 45% of the lower 48 states. Since the late 1800s, about 12% of our forests have been scraped away for cities and farms, and losses are continuing as urban expansion accelerates.

Forests also are rapidly deteriorating from within. Few forests retain their historic beauty and diversity. They are growing older and thicker, some reaching astronomical densities of 2,000 to 20,000 trees per acre. A forest can stagnate for many decades or even centuries under such crowded conditions. Consequently, plant and animal species that require open conditions are disappearing, streams are drying as thickets of trees use up water, and insects and disease are reaching epidemic proportions. Tree mortality in the United States increased 24% between 1986 and 1991, and forest growth declined by 2% during the same period. Competition for water, nutrients, and sunlight among densely packed trees explains some of the decline. Invasive non-native species also are causing serious damage to native forests.

In addition, complete forest types are disappearing as shade tolerant species take over forests that fire used to keep open. In particular, white pine forests in New England no longer cover large areas, and few trees reach the size of those that existed at the time of European settlement. In addition, oaks are declining throughout the East because the forests are too thick for them to regenerate. Sugar maple and red maple are taking over many of these forests, including northern hardwood forests. Similarly, in the South shade tolerant hardwoods are replacing pine trees throughout their range. Likewise, the vast longleaf pine savannas that dominated much of the South are nearly gone. This loss is especially tragic because pine savannas had the highest species richness of any forest type in North America.
In the Inland West, juniper is spreading within piñon-juniper woodlands and replacing grasslands in the Colorado Plateau and southern Rocky Mountain regions of northern Arizona and northern New Mexico. Because of increases in the density of pine and other conifers, aspen forests in Arizona and New Mexico decreased by 46%, and they are rapidly disappearing as a distinct forest type throughout their range. Rocky Mountain Douglas-fir trees are replacing ponderosa pine forests in much of the West while white fir is replacing Douglas-fir in the Southwest. Similarly, shade-tolerant spruce and fir are replacing lodgepole pine forests in the Rocky Mountains. Finally, white pine blister rust, mountain pine beetles, and the lack of

fire to create openings for regeneration, have reduced western white pine forests to only 10% of their original area. Shade tolerant trees such as western redcedar, western hemlock, and grand fir are replacing what little remains of this once magnificent forest.

Native forests also are being replaced in California and the Pacific Northwest. For instance, shade-tolerant white fir trees are replacing mixed-conifer forests in the San Bernardino Mountains of southern California and giant sequoia forests in the Sierra Nevada. Similarly, Douglas-fir forests are being replaced by shade-tolerant western hemlock in the Pacific Northwest and by white fir in northern California.

2. WILDFIRES GROW WORSE

Monster fires are devouring trees and houses with unprecedented ferocity this year because our forests are so thick. Excess fuel causes these fires, not weather. Forests cannot burn without fuel no matter how hot, dry, and windy the weather.

Less well known, but equally important, our forest are no longer patchy. Fire seldom spread over vast areas in historic forests because meadows, and patches of young trees and open patches of old trees were difficult to burn and forced fires to drop to the ground. Without them, fires are free to grow into the ravenous beasts we know today.

During the last few weeks, the Rodeo-Chediski fire in Arizona consumed 468,638 acres of forest and destroyed 467 homes before being contained. The Hayman Fire in Colorado was also huge. This is just the beginning of a bad year in a string of bad years. The fire season has two months to go and already the number of acres burned is nearly triple the 10-year average.

Since 1990, wildfires charred over 41 million acres, destroyed more than 4500 homes, and cost about $5.5 billion to fight. These fires burned significantly hotter than would have been the case in historic native forests. The forest fire menace is growing more serious each year and we are not using what we know to prevent it.

3. NATIONAL FIRE PLAN IS NOT WORKING

In November of 2000, the General Accounting Office reported that tens of millions of acres of forest are at "moderate to high risk from catastrophic wildfire and need to be treated." In response to this and other reports, and the disastrous fires of 2000, agencies in the Departments of Agriculture and Interior created the National Fire Plan. The 10-year Cohesive Strategy to carry out the plan includes firefighting, rehabilitation of burns, hazardous fuel reduction, and community assistance.

The National Fire Plan is not working because it tries to do too much with too little money. Although all the plan's goals are important, hazardous fuel reduction is the key to success. However, only $400 million, or 13.8%, of the fiscal year 2001 budget of $2.88 billion was spent on fuel reduction. The fiscal year 2002 budget only includes $395.2 million for fuel reduction. There is no chance whatever that this funding level will achieve adequate fuel reduction to prevent fires like those that burned in 2000 or 2002.

The problem is even more serious because fuel reduction takes place in scattered locations and at a very small scale. Although helpful, in most cases the area treated is too small to be effective. Unfortunately, there is simply not enough money to do anything else and still achieve the other goals in the Plan.

It is difficult to get reliable data to determine what it actually costs to do prescribed burning, and mechanical and hand treatments, to reduce forest fuels. The best data I found come from California National Forests and a few other places. Prescribed burning costs range from $200 per acre to $800 per acre. However, it costs much less to burn forests with little fuel, which is rarely the case. Mechanical treatments cost between $350 and $460 per acre. Hand treatments cost $525 to $1300 per acre.

Approximately 73 million acres need treatment. Assuming that in most of these forests the same area burned once each 15 years on average, that means that each year about 4.9 million acres of seriously overstocked forest will have to receive an initial treatment. Subsequent maintenance treatments also must be done on a 15-year cycle since fuels will continue to accumulate. In short, the fuel reduction process will last forever. Likewise, the cost of treatments will last forever even though maintenance treatments are less expensive than initial treatments.

So, what would it cost to do the job right? Using average costs, and assuming that most if not all forests will require mechanical or hand treatment before prescribed burning, and assuming that prescribed burning will be feasible on all acreage, the total cost for the initial treatment would be $59.9 billion, or about $4 billion per year for 15 years. At the current rate of funding for hazardous fuel reduction, it would take 150 years to complete the initial treatments. Even if it cost only a quarter of this a year it would still take nearly 40 years. By then fuel accumulations on the areas treated first would be almost as bad as they are today. In other words, the National Fire Plan would waste billions of dollars and local communities would still be vulnerable to wildfires.

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4. PRESCRIBED FIRE IS NOT THE ANSWER

Prescribed fire would come closer than any tool toward mimicking the effects of the historic Indian and lightning fires that shaped most of America's native forests. However, there are good reasons why it is declining in use rather than expanding. Most importantly, the fuel problem is so severe that we can no longer depend on prescribed fire to repair the damage caused by over a century of fire exclusion. Prescribed fire is ineffective and unsafe in such forests. It is ineffective because any fire that is hot enough to kill trees over three inches in diameter, which is too small to eliminate most fire hazards, has a high probability of becoming uncontrollable.

The danger of escaped fires, such as the tragic Los Alamos fire, also poses a serious constraint on prescribed burning because of the hazards to human life and property. On average, a prescribed fire is likely to escape control for each 20,000 acres burned. That means there could be as many as 243 escaped fires a year given the number of acres burned to carry out the National Fire Plan. This is unacceptable since there are nearly 94,000 homes at risk in just the Sierra Nevada. It is unknown how many homes are at risk throughout the West. Not only that, there are very limited opportunities when all of the factors such as fuel loading, fuel moisture, existence of defensible perimeters, temperature, and wind are at levels that make it relatively safe to conduct a prescribed burn.

Finally, prescribed fire can also be destructive in forests that are not too thick to burn. Dense piles of litter that built up for more than a century now surround large old trees in many forests. Burning this litter, even with a very light fire, sends enough heat into the soil to kill the largest trees by cooking their roots. This is unnatural and it is already happening to thousands of valuable old trees in the Sierra Nevada as well as in Southwestern ponderosa pine forests.

Prescribed fire is an essential tool, but it is still expensive, costing about $1.5 billion a year to treat the required acreage in the National Fire Plan. In addition, the unsightly pall of wood smoke hanging over mountains and valleys, burning eyes, health hazards, and air pollution restrictions also will prevent widespread and frequent burning even as maintenance treatments. For example, Colorado had to restrict prescribed burning because Denver must reduce power generation to comply with Federal laws whenever wood smoke hangs over the city. There are also too few trained personnel available to conduct the burns. Therefore, it is unlikely that we will ever be able to add 4.9 million acres of prescribed burns a year to the acreage already being burned for slash removal and other purposes.

5. RESTORATION FORESTRY WILL SOLVE THE PROBLEM

Restoration forestry provides the best hope for returning health to our native forests because it uses their ecological history as a model for management. The native forests that European explorers found provide excellent models because of their beauty, diversity, and abundance of wildlife. Most historic forests also were resistant to monster fires.

Restoration forestry is defined as ***restoring ecologically and economically sustainable native forests that are or, after reasonable restoration, will be representative of prehistoric or historic landscapes significant in history and culture that also serve a society's contemporary need for forest products and services***.

The goal of restoration forestry is to ***restore and sustain, to the extent practicable, a historic forest to a condition that simulates or resembles the structure and function of a reference native forest. The term ''reference native forest'' means the way a whole forest appeared spreading over a landscape, with all of its diversity, at or about the time it was first seen by explorers.*** A reference native forest does not represent a particular point in time. It represents a period of time and the variations in forest structure that were characteristic of that period.

The pre-European, and post-Native American, settlement forest provides the most scientifically sound reference forest for the United States. Such a reference native forest is inherently sustainable and diverse, it represents thousands of years of ecological development and human use, and it existed during a period with similar variations in climate.

The pre-European settlement forest mosaic is the key to restoration forestry and the solution to the wildfire problem. Unlike the popular idealized image of historic forests, which depicts old trees spread like a blanket over the landscape, a real historic forest was patchy. It looked more like a quilt than a blanket. It was a mosaic of patches. Each patch consisted of a group of trees of about the same age, some young patches, some old patches, or meadows depending on how many years passed since fire created a new opening where they could grow.

The variety of patches in historic forests helped to contain hot fires. Most patches of young trees, and old trees with little underneath did not burn well and served as firebreaks. Still, chance led to fires skipping some patches. So, fuel built up and the next fire burned a few of them while doing little harm to the rest of the forest. Thus, most historic forests developed an ingenious pattern of little firebreaks that kept them immune from monster fires. Science recently confirmed the effectiveness of this historic pattern.

Today, the patchiness of our forests is gone, so they have lost their immunity to monster fires. Fires now spread across vast areas because we let all patches grow thick, and there are few younger and open patches left to slow the flames. That is what is happening throughout the West.

This is even more serious because monster fires create even bigger monsters. Huge blocks of seedlings that grow on burned areas become older and thicker at the same time. When it burns again, fire spreads farther and creates an even bigger block of fuel for the next fire. This cycle of monster fires has begun. Today, the average fire is nearly double the size it was in the last two decades and it may double again.

Restoration forestry can dramatically reduce monster fires by simulating the dynamic character of historic native forests. This means maintaining the historic range of variation in patches of fire resistant open older and younger trees within the forest mosaic. Thus, restoring historic native forests will reduce threats to local communities from wildfire by providing a system of fire resistant patches that act as firebreaks strategically dispersed throughout the forest mosaic. In short, restored forests would look and behave in much the same way as historic forests. They also would be healthy, diverse, sustainable, attractive, and nearly immune from monster fires.

6. SUCCESS REQUIRES PRIVATE SECTOR HELP

Unlike the fire resistant forest envisioned in the National Fire Plan, the goal of restoration is to restore and maintain an ecologically and economically sustainable historic forest. Thus, restoration focuses on whole forests and everything that lives in them, not just their resistance to fire. In contrast, the fire resistant forest is not natural, and it does not look natural. A restored forest looks and behaves naturally, and it has all the benefits of diversity and sustainability inherent in the original native forest. Not only is the restored forest ecologically superior, it also is just as safe as a fire resistant forest.

In addition, the fire resistant forest has a fatal flaw. No one will pay the enormous cost. An unending stream of tax money is required to sustain a fire resistant forest. That means spending about $59.9 billion for the first 15 years and about $30.8 billion for each of the following 15-year maintenance cycles. The exorbitant cost in public funds needed to create and maintain these fire resistant forests ensures failure.

Even concentrating mile-wide fuelbreaks around communities to save money will not work. Surrounding communities with fuelbreaks, and ignoring the area in between them, guarantees that our forests will be sacrificed to monster fires. This is a defacto “let-it-burn” policy. So, the question is do we want restored forests or an unending cycle of monster fires and blackened landscapes.

It would take a minimum of public funds to restore a fire resistant historic forest, and it would come close to supporting itself indefinitely. The reason the restored forest is economically viable is that it involves a long-term partnership with the private sector.

People who make their living from forests have the expertise and desire to participate in reducing threats from wildfire, and they have the equipment and processing facilities. They are also highly educated, skillful, creative, and responsible professionals who can be trusted to help with this important job. Their help would dramatically reduce the use of appropriated funds so that restoration occurs on a meaningful scale. It would also provide society with essential goods and services and create much-needed jobs in rural communities.

Like the fire resistant forest, the restored forest requires hands-on management. However, restoration involves more than just thinning and burning. It requires cutting trees of all sizes. However, the decision to remove or leave an individual tree, regardless of size, depends on what is necessary to restore and maintain an ecologically and economically sustainable historic forest. In other words, restoration forestry is a different kind of forestry. It requires mimicking nature rather than engineering a forest to maximize the production of wood. Nevertheless, the amount of wood produced must still be sufficient to support the effort.

Restoration requires removing patches of trees of certain ages and sizes in about the same number as would have been killed historically by fire, wind, insects, disease, and other disturbances. The removal of trees from one patch provides an opening that allows a younger patch to begin developing in its place. Even so, the number of patches removed would usually be less than what would have been lost historically to accommodate unpreventable losses from natural disturbances. Thus, the forest landscape continually changes while the proportion of older and younger forests in the mosaic varies within a relatively stable range.

Historically, the size of patches differed by forest type. Pacific Douglas-fir forests had large patches and mixed-conifer and ponderosa pine forests had small patches. Larger patches also tended to be relatively long and narrow with an uphill orientation. That means that restoration forestry also strives to simulate the size, shape, and orientation of patches on the landscape that historical disturbances created in particular forest types.

In addition, lethal fires and other major disturbances usually killed all of the trees in a small patch but they rarely did so in a large patch. That means leaving behind stringers of living trees and scattered individuals in large patches during restoration. Similarly, some dead trees remained standing after a historic fire passed and others lay in heaps on the ground. These dead trees helped to replenish soil nutrients and provide homes for wildlife. Therefore, restoration involves leaving behind adequate amounts of standing and fallen dead trees so that they are part of the restored forest just as they were part of the historic forest.

The systematic removal of patches of trees to create new patches is the secret to ecological and economic success. Not only do the trees provide revenue and wood, but they do so in a predictable and sustained manner. Still, the frequency and effects of historical disturbances would determine the number and size of trees cut. Even so, the supply of raw material would be consistent and continuous. Restoration is a long-term commitment to both forests and the people who manage them. This will encourage the private sector to invest in the plant, equipment, and personnel needed to help us restore our native forests and solve the wildfire problem.

BIOGRAPHICAL SUMMARY

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Dr. Bonnicksen earned a B.S. in forestry (with minors in wildlife and range), an M.S. in forest ecology, and Ph.D. in forest policy from the University of California-Berkeley. He is currently a professor of forest science and a former Department Head at Texas A&M University. He joined the faculty at Texas A&M after working as a professor of forestry at the University of Wisconsin-Madison. His work over more than 30 years emphasizes restoring and sustaining North America's historic native forests.

Dr. Bonnicksen received many awards. Most recently, the Bush Presidential Library Foundation honored him with the Bush Excellence in Public Service Award. He is the second recipient of this honor. The first recipient was former Soviet leader Mikhail Gorbachev.

Dr. Bonnicksen is cofounder of the International Society for Ecological Restoration and a former member of its board of directors. He also held posts as president, chair, and vice-chair of several other organizations, including the Bay Area Chapter of the Sierra Club and the Southwest Wisconsin Chapter of the Society of American Foresters. Governor Reagan also appointed him to serve four years as a member of the California State Park and Recreation Commission. While serving on the commission, he wrote the legislation that guides the classification and management of California's state park system. Most recently, he developed the concept and drafted legislation to create a system of national historic forests. Congressman Mike Simpson (2nd District of Idaho) introduced the Act in June 2001. Dr.

Bonnicksen also is a former US National Park Service ranger.

Dr. Bonnicksen testified before Congressional committees on numerous occasions. He also served on several Congressional and state advisory committees, most recently as a member of the U.S. Senate's California Forest EIS Review Committee and the U.S. House of Representatives' Forest Health Science Panel.

Dr. Bonnicksen published 101 scientific and technical papers, articles, book chapters, and other publications, 6 computer programs, and two multimedia CDs. He recently published a book with John Wiley & Sons, Inc., titled *America's Ancient Forests: from the Ice Age to the Age of Discovery*. The book documents an 18,000-year history of North America's native forests. It includes the role of Native Americans in the development of these forests and descriptions of explorers who saw them first. In addition, he served as a scriptwriter and on-camera expert for a one-hour PBS television special titled *Forest Wars*. He also appeared on CSPAN.