Statement of

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Chairman McInnis, distinguished members of the committee, it is a privilege to have the opportunity to present my testimony to you today.

The 2003 wildfires in Southern California were tragic in respect to losses of life, their impacts communities, and how they affected the forested ecosystems in this region.

In the future, I look forward to the day when a hearing such as this can be held to discuss successes relative to wildland fire and ecosystem restoration. Certainly more work must be done in this area but it would be useful to have a forum where positive aspects of wildland fire could be presented.

I will present a discussion of wildland fire in chaparral, coastal sage scrub, and forests in the southern California region. This will include the benefits and risks associated with the different methods used to reduce fire hazards and the effectiveness of post-wildfire mitigation methods. I finish with a discussion on the urban-wildland intermix.

Chaparral and Coastal Sage Scrub

Chaparral and coastal sage scrub are the vegetation types that were most affected by the 2003 southern California wildfires. Approximately 90-95 percent of the area burned was in these two shrubland vegetation types. The remaining area was in coniferous forests.

It is important to distinguish between shrublands and forests in regard to the 2003 wildfires. Chaparral and coastal sage scrub are vegetation types that are adapted to high intensity crown fires at intervals of approximately 25-50 years. They produce extensive live fuel beds as they develop and almost always burn as high intensity crown fires when successfully ignited. Under extreme fire weather, such as when the Santa Ana winds occur, the resulting fire behavior is phenomenal with flame lengths over 75 feet and rates of spread greater than 6 feet/second. This type of fire behavior is not uncharacteristic or uncommon, it is simply how these vegetation types burn under extreme weather conditions. After such fires, native vegetation will recover relatively quickly by resprouting and from the germination of a soil stored seed bank. I have conducted 22 research chaparral prescribed fires in northern California since 1995 and the vegetation in the areas burned 7-8 years ago is approximately one-half to two-thirds of what it was before burning. These ecosystems can respond quickly after high severity wildfires.

After wildfire, there is a real management concern concerning erosion impacts. Erosion is a natural part of this ecosystem, just as fire is. Immediately after fire, dry ravel erosion increases greatly as surface barriers to soil movement are removed. Dry ravel moves downslope under gravity and fills in stream channels. Early post-fire rains can promote on-slope rill networks, enabling large amounts of water and soil to move rapidly off of steep burned slopes.

Erosion tends to be high for the first few years after fire, and then gradually decreased with time, normally returning to prefire levels in 5-10 years as the increases in plant cover and root biomass help stabilize surface material.

In response to the need to protect downstream structures and resources after fire, managers began to explore ways of establishing rapid vegetation cover on burned hill slopes. Starting in the 1930's, Los Angeles county foresters first tried to seed native shrubs, then later experimented with herbaceous species such as mustards and grasses. By the 1940's, managers were routinely using annual ryegrass (*Lolium multiforum*) in an attempt to stabilize slopes after fire.

Evaluation of seeding effectiveness was based primarily on the level of grass cover established, with little attention given to any effects on native vegetation recovery. At this time, little or no attempts to quantify the success of this practice at reducing erosion were attempted.

Questions about the impact of seeding with annual grasses on natural vegetation recovery in chaparral and coastal sage scrub have been raised for years. Some research has observed a negative relationship between ryegrass cover and native herb cover. Lower species richness has been reported for ryegrass seeded plots. Reseeding of non-native species after fire in chaparral does not affect the long term, post-fire recovery of native shrubs.

Seeding also has the potential to increase fire frequency in chaparral and coastal sage scrub as flammable, exotic grasses provide a continuous fuel structure in a very short time period. If these systems burn frequently, a vegetation type conversion from shrublans to grasslands can occur and this can further exacerbate erosion problems because grasses provide little soil stabilization on steep slopes.

The most likely scenario for maximum effectiveness of post-fire seeding at reducing erosion would be one where rainfall is of low intensity and regularly spaced in the fall and early winter, allowing good grass cover to establish before heavy rains. However, this weather pattern does not appear to be a reliable or frequently occurring scenario on southern California chaparral sites.

In years of even moderately favorable weather conditions, seeded grasses appear to compete with the natural post-fire herbaceous flora rather than enhancing total plant cover. This competition decreases both species richness and percent cover of the native, herbaceous species. Research on the long-term effects of reseeding on the chaparral seedbanks continues but it seems seed banks are also affected by introduced annuals.

New methods to reduce erosion such as aerial straw mulching, polyacrylamide, and aerial mulching have never been rigorously field tested. The lack of information argues for a standardized program of treatment effectiveness monitoring, as pointed out in a recent General Accounting Office report on this subject.

Today, even though the best scientific information on the effects of post-fire seeding of exotic grasses tells us there are few or no positive affects, some agencies continue to promote the practice in southern California. This is slowly changing.

I believe federal and state managers should focus chaparral fuel treatments in the urban-wildland intermix. These treatments have been proven to be effective during wildfires in southern California. An example is the 1995 West Ridge prescribed fire in the San Bernardino National Forest. This chaparral prescribed fire was done below the town of Idyllwild. Two years later, the Bee wildfire burned uphill towards Idyllwild and was successfully suppressed because of the impacts of the previous burning.

Mixed Conifer, Ponderosa and Jeffrey Pine Forests

The ponderosa pine, mixed conifer, and Jeffrey pine forests that burned in 2003 are not adapted to large, high intensity fires. Most of these forests area denser and more spatially uniform, have many more small trees and fewer large trees, and have much greater quantities of surface fuels than did their presettlement counterparts. Causes include fire suppression, past livestock grazing and timber harvests, and possibly changes in climate. The results include a general deterioration in forest ecosystem integrity and an increased probability of large, high-severity wildfires. Such conditions are prevalent nationally, especially in forests that once experienced short-interval (< 15 years), low to moderate-severity fire regimes.

The tree mortality that occurred in many forested areas prior to the southern California wildfires is extraordinary. I visited this region several times before the 2003 fires and in some areas, the mortality was the most severe that I have ever witnessed. The mortality is the result of several factors including past management activities that allowed more trees to become established over the last 100 years, a multi-year drought, stress from smog that is transported to this areas from the Los Angeles basin, and the impacts of native bark beetles. Past management actions set the stage for a dramatic change in this forested ecosystem. I should note that the past drought has been severe and trees have died at the lower forest-shrub ecotone and this has not been witnessed in the last 70-100 years. Still, droughts are part of the natural ecosystem stresses that have and will continue to affect California. I think one of the central messages that should be learned from the forests of southern California is an active management philosophy is needed in these forested ecosystems.

Before beginning my discussion of the different methods that can be used to reduce fire hazards in these forests, I want to spend a moment on what I believe is the critical issue, the definition of desired future conditions for our diverse ecosystems. Once this is done we can then decide what management tools are appropriate to achieve and maintain the desired conditions. I believe the debate on whether we should use silviculture to manage our national forests is unproductive, the real issue is the definition of desired future conditions and how are we going to get there, and once there, how they will be maintained.

When discussing fuel hazards in coniferous forests we must examine four different fuel systems:

1) Ground fuels (leaf litter and decomposed organic materials on the soil surface)
2) Surface fuels (dead and down woody materials, herbaceous fuels, live shrubs)
3) Ladder fuels (small trees and shrubs that can provide vertical continuity to move a fire into tree crowns)
4) Crown fuels (vertical and horizontal distribution of tree crowns)

Each area of the country is unique but in most forest types that historically had frequent, low-moderate intensity fire regimes, such as most of those in the mountains of southern California, the most critical fuel complex from a fire hazard standpoint is the surface fuels, followed by the ladder fuels, and then the crown fuels. Ground fuels are relatively compact (low surface area to volume ratio) and contribute little to flaming combustion or fireline intensity.

If one is designing a fuels treatment strategy it must focus on surface fuels. Commercial and pre-commercial thinning operations can reduce ladder fuels and crown fuels but without combining these treatments with surface fuel reductions, the overall program will not reduce potential fire behavior. In fact, operations that lop and scatter the slash fuels produced after thinning operations will increase fire hazards for a decade or more until decomposition reduces fuel loads. Mechanical removal of ladder and crown fuels will reduce the probability of crown fires in an area but if surface fuels are not reduced, a high severity surface fire can be produced and it will kill the majority of the remaining trees by scorching (production of lethal thermal injuries to all exposed leaf and meristem tissues). Only when these treatments are coupled with a surface fuel treatment will this result in a reduction in potential fire behavior. One of the most effective surface fuel treatments is prescribed burning which can be used with or without prior mechanical treatments to produce the overall objective. A limitation of mechanical treatments is the need of road networks which are not available in all areas, especially in the mountains of southern California. Whatever treatment is selected, it must target the surface fuel layer, followed by ladder fuels, and then the crown fuels. Surface fuel reduction cannot be an afterthought of fuel treatments in these forests, it must be the central objective.

One of the great challenges of producing a fire hazard reduction program for the forests in southern California is the lack of infrastructure in this area. The closest sawmill to this area is in the southern Sierra Nevada. This is outside the economic range of most materials that should be removed to reduce fire hazards in this region. Presently, the National Forests in this area are chipping dead trees on site and dispersing the chips locally over the forest floor. This is an improvement in terms of fire hazard reduction but it is a very slow, expensive alternative. The large chipper that worked in the forest around Lake Arrowhead this summer cost $580/hour to operate. In addition to this machine and its operator, tree fallers and skidder operators were needed to move the dead materials to the large chipper. I watched this machine operate this summer and it could only chip approximately 1-2 acres per day in areas where tree mortality was heavy. There is a real need to have a local mill in this region that could efficiently process materials removed to improve forest health.

Another critical question is the definition of desired future conditions for the forests in this region. One forested ecosystem exists that can be compared to those found in southern California, this is the Sierra San Pedro Martir (SSPM) in northwestern Mexico. This forest is composed of mixed conifer forests and shrublands of the Californian floristic province that occur nowhere else in Mexico. The SSPM is unique within the California floristic province in that its forests were never harvested and a policy of large-scale fire suppression did not begin until 1970. I have been conducting research in this area since 1998 and it can provide information that can assist in the production of desired future conditions in the forests of southern California. There is a great amount of spatial heterogeneity in the forests of the SSPM. Average surface fuel loads are small (6 tons/acre). Over the last 4 years, the forests of the SSPM have experienced a similar drought to that experienced in the forests of southern California. I have a set of forest inventory plots in this region and snag density increased from 1.7/acre to 2.6/acre over the last 3 years. This is a large mortality event for this region but is orders of magnitude smaller than what occurred in southern California. One of the goals of forest management should be to produce resilient forest structures that can incorporate natural disturbances such as fire, insects, diseases, and drought without catastrophe (tree mortality outside desired conditions). Forest management plans should be flexible to allow managers enough space to propose creative field-based solutions to address our current fire problems. There is presently mistrust in many sectors of federal forest management and this has impeded the ability to allow flexibility. A vigorous system of adaptive management at large spatial scales would reduce these barriers.

California has huge challenges to overcome in terms of wildland fire. The state has a Mediterranean climate (dry hot summers) and almost all of its vegetation is fire adapted. The exclusion of fire and past management practices has produced ecosystems that are not sustainable. California also has the largest population in the nation and the number of people moving into the urban-wildland intermix is increasing. The USFS has been attempting to produce a plan to manage the National Forests of the Sierra Nevada since 1990 and wildland fire has been one of the central issues. After 13 years of debate, we still don’t have a final plan. The ecosystems in southern and northeastern California have similar management challenges.

Since fire hazard reduction has never been the main objective of USFS land management, we have no large-scale research to support such a management philosophy. There simply are no places to go in California to get information on the trade-offs (economic, social, ecological) of large-scale management treatments designed to reduce fire hazards and improve forest health. I have become aware of a new bill in Congress, H.R. 2696 (Fire Institute Bill) that attempts to fill this need. It proposes 3 new Fire Institutes that would “promote the use of adaptive ecosystem management to reduce the risk of wildfires and improve forest health.” The new institutes would be funded for 5 years and would be created with the consultation of the Secretary of Agriculture. I fully support this idea because of the real need for increased information but am distressed that California is not one of the states that would receive such an institute. There is no state in our nation that has more complex fire and forest health issues than California.

Urban-Wildland Intermix

Land management agencies throughout the country are increasingly aware of the difficulties of managing in the urban-wildland intermix. This is a very complicated landscape with homes, subdivisions, and towns all mixed into or adjoining wildland areas. The number of people who choose to live in this area continues to increase and many wildland fire agencies such as the California Department of Forestry and Fire Protection believe this is the area where their fuels treatments should be focused.

I believe this area requires partnerships between home owners and the public or private organizations that have responsibility for the adjoining wildlands. Strategic fuel reduction zones can be created in the urban wildland intermix to allow for more effective and safe suppression activities when wildfires are moving from the wildlands toward homes or from the homes into the wildlands.

Private home owners share responsibility in this area. Homes must be built with combustion resistant roofs and siding materials. Defensible space must be created around each structure to increase the probability that it will survive a wildfire. Fine fuels and needles must be removed annually from roofs and around houses to reduce the chance of spot fire ignition during wildfires. To reduce losses in this area, a shared partnership must occur between the private land owner and the manager of the adjoining wildlands. Currently most of the debate is focusing on what large land managers must do to reduce risk but an equal amount of responsibility rests on the private side of the intermix. Counties and states must take action to ensure that individual home owners reduce their potential for catastrophic fire.

Thank you for the opportunity to speak to you today.