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United States Senate Committee on Energy and Natural Resources
Field Hearing on Wildfires and Forest Health

Senator Mark Udall presiding

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Current conditions of forests in Colorado threaten public safety, property, and health of important natural resources. Beginning in the mid-1990s and extending into 2012, a series of major fires in ponderosa pine/Douglas-fir forests of the Colorado Front Range damaged watersheds, and a thousand or more houses and a dozen or more human lives have been lost. During the last decade, mountain pine beetle damage to lodgepole pine forests has added serious public safety dangers and new forest health issues in higher elevation forests.

Severe watershed damage and the loss of two lives caused by the 1996 Buffalo Creek fire prompted the beginning of a series of agency, political, and public responses to forest health and wildfire issues in the Front Range. Subsequent major Front Range fires included Hi Meadows and Bobcat Gulch in 2000, and Schoonover, Big Elk, and Hayman in 2002. Long before the 2012 fire season, a series of efforts culminated in the 2006 Front Range Roundtable report that described the nature and magnitude of Front Range forest and wildfire issues, and outlined a series of steps needed to mitigate wildfire threats and restore forests to a healthier condition.

My testimony is based in large part upon research conducted in my lab on fire history and ecology of historical Front Range forests prior to Euro-American settlement, in concert with research conducted by colleagues. My testimony is also based upon my extensive participation in the Front Range Roundtable deliberations and implementation of recommendations. I was one of two presenters of the Roundtable report at its rollout in 2006 for Gov. Bill Owens, The Nature Conservancy, and other participants.

Lodgepole pine and beetle kill issues are important, and threats posed by falling trees and wildfire loom as a concern across much of the state. Nonetheless, people have died, astonishing numbers of houses have burned, and watersheds are at risk not in lodgepole pine forests, but rather in lower montane ponderosa pine/Douglas-fir forests in the Front Range and beyond. We cannot help but note that all the major Colorado fires in the last two decades and thus far this year have occurred not in beetle-killed lodgepole pine, but in these lower elevation, heavily populated forests. Having led a recent review of fuel treatment efforts across the country for the national Joint Fire Science Program, it became clear to me that Front Range ponderosa pine/Douglas-fir forests have perhaps the worst forest and fuel conditions in the country, especially given the extensive urban interface throughout this vegetation zone. Adding in drought, the current destructive fire patterns strongly reinforce this assessment.

As you might recall from our over-flight and discussions following the Hayman fire 10 years ago, and from extensive analyses conducted by the Front Range Roundtable, these ponderosa pine/Douglas-fir forests are in extremely poor condition as a result of past human impacts, namely logging, grazing, and fire suppression. And now, climate patterns are not working in our favor and appear to support a true shift in climatic conditions that will affect many of our forests adversely.

Background information. I've pulled together some numbers for Front Range ponderosa pine/Douglas-fir forests, based in large part on our understanding of historical conditions and processes studied at Cheesman Lake in the South Platte watershed before that historical forest was destroyed by the Hayman fire. And I have included information from the Roundtable report that addressed the Front Range more broadly. I presented this summary at the 10th anniversary meeting of the Hayman Fire June 21-22.

- Historically, significant fires occurred in ponderosa pine/Douglas-fir forests one to three times per century. These fires were mixed in severity across the burned area. In some places the fires were relatively cool and burned mostly on the ground. In other areas trees were thinned by fire, and some places burned intensely as crown fires killing all trees. Collectively, patches of crown fires created openings amounting to slightly over 20% of the ponderosa pine/Douglas-fir forest area during each century. The numerous openings created by theses fires were generally between 1 and 200 acres in size and occasionally somewhat larger, but there was no evidence of openings 1000 acres or larger. Most of the newly created openings became reforested within several decades, though in some instances they persisted for well over 100 years. As a result of these fires, forests remained irregular and patchy, assuring that subsequent crown fires were not large because few areas of dense forest were very large.
- About 800,000 acres of ponderosa pine/Douglas-fir forests exist in the Front Range. Except for the recent major fires, wildfire has been largely eliminated as a factor shaping forest structure. Most forests have become uniformly dense over large areas, with very few open areas or areas of low forest density. If historical fire behavior had been allowed to continue, we could have expected about 180,000 acres converted into temporary openings by natural stand-replacing crown fires over the last 100 years. Somewhere between 1,000 and 2,500 openings of various sizes might have resulted. Most other areas would have been thinned by fire. Forests would have remained ecologically sustainable and would not have been vulnerable to uncharacteristically large crown fires as we've experienced in the last two decades.
- In three recent fire years alone (1996, 2000, and 2002), six extreme crown fires in Front Range ponderosa pine/Douglas-fir forests created six openings ranging from 3,000 to 60,000 acres. Roughly 85-90,000 acres of crown fire in just six openings represents about half of the expected amount of crown fire that should have been distributed across hundreds to thousands of small patches spread throughout the ponderosa pine/Douglas-fir zone over 100 years. Furthermore, natural thinning of forests by wildfire has been largely eliminated. Short of conversion to shopping centers or covered by volcanic ash, it is hard to imagine a forest system in more difficulty.

These numbers and analyses leave little doubt that fuel conditions in ponderosa pine/Douglas-fir forests pose unrelenting threats not only to an important ecosystem, but especially to human life, property, and watersheds. And we are all aware of the dramatic new evidence of current fire behavior illustrating the stunning magnitude of this problem.

Worsened by climate. Changes in climatic patterns appear increasingly real. I've often noted that some of our ecosystems are `out of whack' as a result of past management activities. It now appears that all of our vegetation life zones are out of whack to some degree. A massive mountain pine beetle epidemic from Colorado to British Columbia, more frequent severe drought, and extensive fires in forests and shrublands – evidence is mounting that climate is triggering extensive changes in our natural resource systems. Calamitous ecological trajectories punctuated by abrupt disturbances are displacing normal ecological change and may well be forerunners of shifting life zones, with important ecosystems experiencing highly uncharacteristic and intense agents of change.

Current situation. Based upon existing research and extensive public and private land experience, we have a sound understanding of what needs to be done to mitigate fuel hazards to protect watersheds, lives, and properties. Most of this information has been summarized in the 2006 Front Range Roundtable report, and continuing work by Roundtable member agencies and organizations such as The Nature Conservancy is both adding scientific understanding and increasing the size of treated areas having less fuel and better ecological condition. While new research needs are becoming clear based upon assessing initial treatment responses and looming climate effects, the scientific basis exists for extensive improvement in fuel and forest health conditions over the next few years.

Nonetheless, despite hard work by dedicated managers, far too little has been done to provide adequate protection from wildland fires in Front Range ponderosa pine/Douglas-fir forests, and forest ecological condition remains poor. Consider the sheer magnitude of the work needed. Effective treatment requires massive removal of forest biomass, whether mechanically or using prescribed burning. Costs of treating forests range from a few hundred dollars per acre in areas suitable for prescribed burning, to two thousand or more per acre where biomass has to be removed by logging, chipping, or other procedures. Often a combination of treatments is needed. Furthermore, many areas are hard to treat because of topography or proximity to urban development. This both increases treatment expense and requires widespread public acceptance of treatment activities and outcomes. Thus far it has been difficult to find adequate value in the removed biomass to significantly offset the cost of treating forests and bringing them into better fuel and ecological condition.

Historical forests looked far different from current forests. While public reaction to treatment outcomes mimicking historical forests has been positive, public reaction has not been tested for the scale of treatment work needed to resolve the fuel and ecological problem of Front Range ponderosa pine/Douglas-fir forests, particularly where work is needed in the wildland/urban interface. Furthermore, neither agency nor industry capacity seems adequate for the scale of work needed.

Please consider two recommendations. First, we must place far more attention on fuel treatment in the lower-elevation ponderosa pine/Douglas-fir forests of the Front Range. Our professional managers know what to do (with a caveat below), but they lack resources to do the work. We must find the public, political, and agency will to address this problem at a meaningful scale. Thus far that will is lacking.

Second, at a time of growing concerns, we have a research funding shortfall. We are facing considerable uncertainty regarding how climate shifts mesh with our existing fuel and vegetation management guidelines. The Rocky Mountain Research Station, US Geological Survey, and universities have limited capacity to do the needed research work.

The forest health problems we face clearly affect our human lives and sense of safety and well-being. The effort needed to address these problems is bigger than we are accustomed to, yet somehow we must find a way to bring people, government, and politics into play to solve these problems.

This concludes my testimony.

Merrill R. Kaufmann