Additional Questions for the Record

Dr. John D. Bailey, College of Forestry, Oregon State University

The Honorable John Shimkus

1) **Over the last three decades, the amount of timber harvested from federal lands has declined significantly while the number and extent of fires on these lands has increased significantly. Is this a coincidence or does thinning of forests actually reduce the risk of wildfires?**

Answer: It is not a coincidence that reduced removal of timber/fuel would be related directly to an increase in subsequent wildfires. Fuel accumulation is one side of the fire behavior triangle (with topography and weather), and we have more acres with high accumulations of fuels than ever in their evolutionary history, and those acres are more connected than they have ever been throughout much of the West. This accumulation issue is accented by recent climatic patterns that have created longer fire seasons and drier fuels, thereby increasing the probability of having ignitions that grow into large fires.

That said, not all timber harvesting practices reduce the accumulation of fine surface fuels that support most fire spread, so timber harvest alone, including thinning, without wise fuel management will not solve this problem. We need thoughtful, sustained, active management of our natural resources that view the hillsides as fuels – more than just timber or wildlife habitat, scenery, watersheds, recreational areas, or carbon. Our forests and associated landscapes are all these things, at the same time, and they are fuel …and they will burn! With today's science, information and tools/technology, professional foresters can easily manage our landscapes sustainably to provide for all these things while minimizing the risk of wildfire losses. Prescribed fire and "wildland fire use" will be an integral part of that solution.

The Honorable Debbie Dingell

1) **Most recently, with the release of the Climate Science Special Report in August, scientists from 13 federal agencies all conclude and reaffirmed that we are feeling the effects of climate change right now. Forest fires were specifically addressed in this report and to quote the report directly: "The incidence of large forest fires in the western United States and Alaska has increased since the early 1980s and is projected to further increase in those regions as the climate warms with profound changes to certain ecosystems."**
   a. Professor Bailey, do you agree with this assessment?

Answer: Yes

   b. Professor Bailey, can you describe how climate change has exacerbated the prevalence and destruction of wildfires since the 1980s? And will more wildfires worsen the extent of climate change over time?

Answer: Like the first question, we can draw first and foremost on the physical reality that wildland fire is regulated by the interaction of fuels, topography and weather. The weather (climate) of the last three decades has clearly been warmer, and the National Interagency Fire Center has clear records about the beginning/ending of fire seasons for that time period, and therefore their total length. Fire seasons are now 30-60 days longer in much of the West relative to previous decades. This increases the length of time (weeks) during which ignitions can happen (lightning or humans) as well as the time intervals when they can grow quickly to sizes beyond which they can be contained. It also increases the number of days or weeks of severe fire weather conditions: high temperatures, low humidity, and high/gusty winds. Under these conditions, fires spread quickly and burn the crowns of trees as well as the ground surface, killing most or all of the vegetation, and doing the most damage to soil, water and habitat resources associated with our forests. A couple dozen additional large fires each year, each with a couple extra days of extreme fire behavior, results in some large landscape changes. Paired with the accumulation of fuel across western landscapes, this explains the large increase in the number of acres experiencing severe wildfire. There are individual case studies (actual wildfires) as well as modeling exercises that document and confirm this physical reality.

There is much less literature to my knowledge about the positive feedback between wildland fires and climate change, and it is all modeling exercises of some sort with ranges of input data and assumptions. Despite that, it is clear that "megafires" (those of tens of thousands of acres) return massive amounts of carbon quickly to the atmosphere that the weeks before had been sequestered on a hillside. Also, following severe wildfire, the residual dead carbon composed of standing and downed dead wood begins the long process of decomposing and returning to the atmosphere rather than being bound in living organisms. Both of those factors "add" carbon dioxide and methane to the atmosphere in the near term (decades) and could accelerate climate change. However, forests also sequester carbon as they grow and regrow following fire, such that light, low-severity surface fire releases only a small pulse of carbon to the atmosphere that is then quickly recaptured over the next year(s) by the surviving trees. Many of our western forests evolved with regular low- and mixed-severity fire, are adapted to such fire, and sequester and sustain the maximum amount of carbon under a fire regime with such frequent low-severity fire. This is because relatively small areas burn at high severity, avoiding the large amounts of carbon to the atmosphere for long periods. This difference in fire behavior therefore also speaks to the need for sustainable, active management of our nation's resources with acknowledgement that they are fuels, and that fire is part of their past, their present and their future – it is only a matter of when and how they will burn.