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Chairman Walden, Ranking Member Udall, and Members of the Subcommittee,

I have been studying the relationship between bark beetle outbreaks and forest fires in Colorado for over eight years. I am currently a research scientist at the University of Colorado and continue to be actively involved in this line of research.

There is an emerging body of scientific literature regarding the relationship between bark beetle outbreaks and forest fires. Some of the findings of this research contradict popular belief and intuitive notions. In the following pages I address three of these findings that have come out of my research as well as the research of others. First, high-elevation forests in Colorado (i. e. subalpine forests dominated by lodgepole pine, Engelmann spruce, and subalpine fir) are naturally dense and their density is not an artifact of fire suppression or any other human activity. Second, bark beetles are native in these ecosystems, major outbreaks of spruce beetle have occurred in Colorado forests in previous centuries, and such outbreaks are not a result of fire suppression or other human modification of forest structure. Third, the best available science indicates that outbreaks of mountain pine beetle and spruce beetle have either no effect on fires in Colorado, or have only a minor effect.

Natural forest density

There is a widespread notion that fire suppression has drastically changed the density and health of most forests across the US. But, in fact, not all forests have been affected by fire suppression in the same way and actually only a small fraction of all forests in the western US have become unnaturally dense as a result of fire suppression. There is essentially no scientific support for the view that fire suppression has altered the density of high elevation forests in Colorado or that it has fundamentally changed fire in these ecosystems. In contrast, there is abundant, consistent, and convincing scientific evidence that Colorado's high-elevation forest have always burned infrequently (on the order of many decades or centuries) and at high intensity. The length of the effective fire suppression period (approximately 50-80 years) is short relative to the natural fire return interval. A corollary of this is that fire suppression has not significantly altered the natural frequency of fires or the density of most lodgepole pine and spruce-fir forests. Dense stands of lodgepole pine and spruce-fir are natural and are not an artifact of fire suppression. Instead, high tree density is a natural attribute of these forests and has been for centuries.

Native beetles

Insect outbreaks are a natural occurrence in most forest types in Colorado. High-elevation forests in Colorado are affected by two main types of bark beetles: mountain pine beetle and spruce beetle. Both of these insects are native to these forests and have been affecting them for centuries. Major outbreaks of spruce beetle have occurred in the 1940s in western Colorado and there is abundant dendroecological (tree-ring) evidence that such major outbreaks have also occurred in previous centuries, prior to Euro-American settlement of this area, prior to Colorado becoming a state, and prior to any major human modification of these forests. Indeed, major outbreaks of spruce bark beetle are a normal part of the ecology of these forests and there is no scientific evidence that current outbreaks are occurring as a result of our modification of these forests.

The effect of bark beetles on fires

There is a long-held and widespread notion that outbreaks of bark beetles increase subsequent fires. In spite of this belief, there is actually no scientific evidence that bark beetles have made fires substantially more frequent, large, or severe in Colorado. In fact, there is a growing body of scientific research that shows that bark beetles have very little influence on forest fires.

My colleagues and I have specifically researched the effects of spruce bark beetles and mountain pine beetles on fires. Despite our initial expectations that outbreaks of bark beetles would greatly increase fires, we have found no such evidence. Instead, a number of independent studies consistently show that outbreaks have no or very little influence on fires in the high-elevation forests of Colorado.

Following a 1940s outbreak of spruce beetle in western Colorado there was much public concern about fire. Although such concern may be intuitive, current scientific knowledge does not support the assumed link between bark beetle outbreaks and forests fires. My colleagues and I studied fires following this outbreak and found that there was actually no increase in fire in the approximately 60 years following this outbreak: fires were no more frequent or extensive than in forests that were unaffected by the outbreak. In fact, there was no major fire in forests affected by this outbreak until the extreme drought of 2002, when many forests burned in Colorado, regardless of whether or not they were affected by beetle. During this extreme drought, the 1940s outbreak had only a very minor influence on the 2002 fires.

My colleagues and I also conducted research on the relationship between recent fires and ongoing outbreaks of spruce beetle and mountain pine beetle that began in the late 1990s in Colorado. Despite our initial expectations, our research (which has been subject to a rigorous scientific peer-review process) indicated that these outbreaks had no detectable influence on the extent or severity of fires in 2002. Other research that has directly examined the link between beetles and fire has likewise found that bark beetles have either no effect or only a very small effect on fires.

If bark beetles leave so many dead-standing trees, how could they not greatly increase fires? Bark beetles do not have a major effect on fires in these forests because fires in these forests are not limited primarily by fuels but primarily by drought; and under extremely dry conditions both live and dead fuels can carry a fire. In these forests, extensive fires are highly dependent on infrequent, severe droughts. Simply put, during any given year, there is no shortage of fuel in these forests. If the weather is dry enough, these forests are likely to burn and if the weather is not dry enough, these forests are unlikely to burn, largely irrespective of the effect of beetles.

Concluding remarks

The emerging body of scientific research on bark beetles and fires in Colorado indicates a number of important points. The best available science indicates that 1) Colorado's high-elevation forests have always been dense and have not been significantly altered by fire suppression. 2) Bark beetles are native to these forests and major outbreaks of spruce bark beetles are natural and to be expected. And 3) rigorous scientific research indicates that bark beetles have either no effect or only a minor effect on fires in Colorado's high-elevation forests.