Dear Senator Wyden;

18 January 2008

In light of the legislation you are considering, I wanted to make you all aware of a potentially flawed assumption about fire regimes, particularly as it applies to lower elevation ponderosa pine and also secondarily to Douglas fir and western larch.

As for my expertise, I am an ecologist who has been studying fire ecology for more than three decades. I am the author/editor of 34 books including of Wildfire: A Century of Failed Forest Policy, as well as Yellowstone: the Fires of Change. In particular, for the past few years I have been traveling around the country looking at the circumstances behind the larger blazes in the West. I have probably visited more big and famous fires than anyone else I know and that gives me some regional perspective, as well as ecological perspective. on fires.

Most ecologists agree that stand replacement fires are the norm for mid-high elevation forests. That is, fire suppression which is thought to have influenced low elevation forest types, has not significantly altered moister forest types. That would include west side Doug fir forests, as well as higher elevation fir, spruce, and other conifer forests that dominate the Cascades, Blue Mountains and so forth. Thinning to reduce fire hazard or risk in these forests is a waste of time since when forests are ready to burn, they burn with vigor that thinning does not influence. More on that later.

However, there is a growing controversy about interpretation of fire history and the influence of fire suppression surrounding even the lower elevation drier forests.

Most of the research on ponderosa pine fire dynamics has been influenced by the so called "southwest US" model. This model has held that fires in ponderosa pine, in particular, burned very frequently and seldom experienced stand replacement or high intensity blazes. As such, many believe that fire suppression has caused these forest types, and subsequent fires in them, to be outside of the historic range of variability.

I wanted to make you aware that new research that is increasingly questioning this assumption.

For one, large blazes we are experiencing today are likely more the consequence of climatic conditions than fuels--in all forest types. And changes in fire behavior and intensity that deviate from past fire regimes such as they are understood, may be more a consequence of climatic change than anything to do with fire suppression or forestry practices--not that these are inconsequential, but that climate and fire weather (wind, drought and low humidity) may be the big driver in all large blazes.

This has big implications for what is the appropriate management response.

Secondarily recent research--and we are talking about only the past 5-6 years--has begun to question whether even the model of high frequently/low intensity blazes as typically ascribed to ponderosa pine forests is accurate.(See http://jfsp.nifc.gov/conferenceproc/Ma-01Kaufmannetal.pdf) Many of the assumptions about fire behavior and fire regimes are based on older research that is now being challenged.

An excellent recent paper on this entire subject appeared just a few months ago in the J of Biography. I suspect most of you have not read it.

**William L. Baker, Thomas T. Veblen, Rosemary L. Sherriff (2007) February 2007
Fire, fuels and restoration of ponderosa pine-Douglas fir forests in the Rocky Mountains, USA Journal of Biogeography 34 (2), 251–269.

I am going to quote from the abstract here:

"Forest restoration in ponderosa pine and mixed ponderosa pine–Douglas fir forests in the US Rocky Mountains has been highly influenced by a historical model of frequent, low-severity surface fires developed for the ponderosa pine forests of the Southwestern USA. A restoration model, based on this low-severity fire model, focuses on thinning and prescribed burning to restore historical forest structure. However, in the US Rocky Mountains, research on fire history and forest structure, and early historical reports, suggest the low-severity model may only apply in limited geographical areas."

Another study in Payette River drainage on the Boise NF in Idaho also found historic evidence for stand replacement blazes in ponderosa pine forests and the influence of climatic conditions as the overriding factor in fire variability. (http://www.nature.com/nature/journal/v432/n7013/full/nature03058.htmlas)

Another study in South Dakota concluded that dense forest recruitment in the Black Hills was more a factor of climatic conditions than fire history--though higher precipitation that promoted ponderosa pine growth also lent to fewer fires. (ttp://www.rmtrr.org/data/Brown_2006_Ecol-87_2500-2510.pdf)

And Paul Hessburg, a research scientist with the FS in Wenatchee Washington recently published a paper where he looked at the forests of the Cascades and found similar evidence for mixed and high severity fires. He concludes in his paper "However, evidence for low severity fires as the primary influence, or abundance of park-like patches, was lacking in both the dry, and mixed confer forests. The relatively low abundance of old park-like or similar forest patches, high abundance of young and intermediate patches, and wide spread evidence of partial and stand replacement fire suggests that viable fire severity and non-equilibrium patch dynamics were primarily at work." (In Landscape Ecology: 2007, Re-examining fire severity relations in pre-management era mixed conifer forests: inferences from landscape patterns of forest structure.)

There are other recent studies confirming the same basic conclusion--the historic range of variability in ponderosa pine forests may not be as simple as often implied. Thus management prescriptions based upon this model MAY BE FLAWED.

Bear in mind that many fire history reconstructions are full of errors. For instance, one review by William Baker from the U of Wyoming that I urge you to review found that of all ponderosa pine fire history studies, HALF were based on reviewing fire scars from only 1-2 trees--a sample size of questionable value. (Baker, W. L., and D. Ehle. 2001. Uncertainty in surface fire history: The case of ponderosa pine forests in Western United States. Canadian Journal of Forestry 31:1205-1226.) These fire history studies were then used to characterize fire regimes over entire regions.

There are other problems with past fire studies enumerated as well, not the least of which is the expectation that ponderosa pine always experienced frequent fires, thus researchers tended to find confirmation of that assumption and did not seriously critique the study methods used to reach such conclusions.

That does not mean that generalization about ponderosa pine fire regimes in the region are scientifically suspect, but at the least, one needs to review all past studies with caution and see if current characterizations of fire regimes in the area are accurate or suffer from many of the flaws outlined in the Baker paper.

I suspect that PNW and Rocky Mountains forests, particularly mixed ponderosa pine and Douglas fir/western larch forests are not as out of whack as assumed. And at the very least, what was the past condition may not be relevant to the present situation of global warming which is changing climatic conditions.

In addition there is increasing evidence that climatic conditions are the drivers of most large fires in the West. In particular spring melting and warm temperatures appears to influence fire activity. See Westerling et al. Warming and Earlier Spring Increase Wildfires. Also see Western U.S. Forest Wildfire Activity 18 AUGUST 2006 VOL 313 SCIENCE www.sciencemag.org <http://www.sciencemag.org/> and Kitzberger et al. 2006 Contingent Pacific–Atlantic Ocean influence on multicentury wildfire synchrony over western North America. www.pnas.orgcgidoi10.1073pnas.0606078104 <http://www.pnas.orgcgidoi10.1073pnas.0606078104/> . Gedalof et al. 2005 Ecological Applications, 15(1), 2005, pp. 154–174 Atmospheric, climatic, and ecological controls on extreme wildfire years in the

Northwestern United States. I could send you many additional references of new accumulating evidence for climatic influences on wildfires.

There are two major consequences of climatic controls on fires. The first is that the vast majority of all fires go out without burning a substantial amount of acres. That's because under most conditions, forests just don't burn all that well. These small fires seldom burn more than a hundred acres.

However, when the weather/climatic conditions are severe, almost everything will burn. The vast majority of all acreage burned in any season occurs in a few very large blazes, typically burning 50,000 acres or more, with a few reaching into the hundreds of thousands of acres. This is an important point. Our management policies, including thinning projects, are directed towards stopping or reducing the few very large fires, not the normal run of the mill fires.

However, these blazes are driven by low humidity, high temperatures, extended drought and most importantly wind. Humans cant' control these factors. Notice that I did not mention fuels. It appears that under these circumstances, fires will roar through all fuels types, and even very lightly stocked stands will burn. Note that in the Biscuit Fire of 2002 very lightly stocked Jeffrey pine stands burned. These stands are naturally thinner than what you could find even in a very aggressive thinning program. Thinning might work to slow or half fires under less than severe conditions. However, under less than severe conditions, aggressive fire fighting can usually stop a blaze anyway. It is under severe conditions when fire fighting is ineffective that thinning is also ineffective.

Keep in mind that opening up a forest by thinning can actually have the opposite effect than intended. Removal of trees can increase the likelihood of a large blaze, and result in higher mortality of trees, especially during severe fire weather conditions by increasing solar insulation that dries fine fuels, and increasing wind penetration. See Hanson and Odion 2006. Fire severity in mechanically thinned forests versus unthinned forests of the Sierra Nevada, CA.

A further problem with thinning is that thinning, even where proponents suggest it is effective, will readily admit that effectiveness declines rapidly over time. Once you open the canopy up and remove competing vegetation, you encourage rapid new growth of shrubs and small trees, which are the fuels that carry a blaze. So thinning is not a one time cost, but rather an on-going long term cost that will require frequent follow up treatments. If you are not willing to continuously rethin the forest (and/or allow natural fires to burn), you have to ask how likely is it for any particular patch of timber to burn, in any particular year. Probability is actually quite low.

However, it is my view that thinning is not an effective means of reducing fire hazard under extreme fire conditions. Note that I qualify by saying extreme. Most of the evidence suggesting thinning is effective is from fires that were burning under less than extreme conditions at the time when the fire front reached the thinned sites. And for every study/observation suggesting that thinning halted or slowed fires, there are other anecdotal observations and/or studies finding that thinning were not effective in halting big fires. Typically what I find is that wind is the big factor. If wind is roaring along at 50 mph or more, no thinning is effective. If there is little or light wind than thinning may work. But again it is exactly under the conditions when there are high winds that big blazes are created and driven—so these are the fires we are concerned about.

Some recent research sheds light on how much climatic factors affects fires. A study by Penelope Morgan and colleagues at the U of Idaho found that between 1900 and 2003 there were eleven years with large acreages burned. This includes the 1910 Burn which raced across 3.5 million acres—the largest fire we have seen in the region—and well before there was any fire suppression to create "unnatural" fuel loadings. (See Morgan et al. 2004 Climate drivers of fire & fuel in the Northern Rockies: Past, Present & Future)

A characteristic of all these years were drought, particularly early spring melting of snow pack. Furthermore, six out of the eleven years occurred prior to 1934, long before anyone would claim that the FS or anyone else had seriously affected fuel loadings by fire suppression. By contrast, the years between the 1940s and 1990s were consistently moister than the fire years in the early part of the century as well as in recent years. This overlaps almost perfectly the time when we presume to have initiated successful fire suppression. What may, in fact, have occurred is that moist conditions made it difficult for fires to grow large, giving the impression that fire suppression was effective. Also moister conditions may have assisted growth and establishment of trees—leading to denser forest stands—not as a consequence of fire suppression, but due to higher moisture, particularly in the spring and summers.

Now due to global climate change, we are seeing a shift back to a drier, warmer climate which is responsible for the larger blazes we are seeing. In a way, the occurrence of large blazes like the Biscuit Fire is perfectly normal—not an aberration. It is Nature's way of adjusting to the new climatic realities. Given these realities we can not hope to fire proof our forests. Rather the only reasonable response is for home owners and communities to take greater responsibility for reducing fire risk. Many studies have shown that fire proofing a home with metal roofs, removal of brush around a home's perimeter, etc. is far more effective for fire proofing a community than trying to thin the forest. Additionally land use zoning that keeps people from constructing homes in harm's way is also important.

A further problem with trying to fire proof the forest by thinning is the creation of disturbance from logging operations can have many negative ecological effects including the spread of weeds to sedimentation from logging roads to the removal of large woody debris from the site. Logging is not a benign activity. Active restoration fueled by logging dollars and logging practices may in the end be worse than just allowing passive restoration to occur. (See my book on Wildfires for a good overview and refresher on the ecological differences between logging and fire). Any presumed benefit from restoration must be weighed against the impacts associated with logging--and all impacts must be accounted--and they frequently are ignored.

George Wuerthner

Ecological Projects Director

Foundation for Deep Ecology

wuerthner@earthlink.net <mailto:wuerthner@earthlink.net>