Ann B. Kneeland, OSB #99297
P.O. Box 10294
Eugene, OR 97440
Tel. (541) 514-9720
Fax. (800) 539-5944
ann@kneelandlaw.net

Chris Winter OSB # 98435
Ralph O. Bloemers OSB #98417
Cascade Resources Advocacy Group
917 SW Oak St., Suite 417
Portland, OR. 97204
Tel. (503) 525-2725
Fax. (503) 296-5454
chris@crag.org
ralph@crag.org

Attorneys for Plaintiffs

UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF OREGON

LEAGUE OF WILDERNESS DEFENDERS-BLUE MOUNTAINS BIODIVERSITY PROJECT, an Oregon non-profit corporation, CASCADIA WILDLANDS PROJECT, an Oregon non-profit corporation, SIERRA CLUB, a California non-profit corporation, Petitioners, and LESLIE A.C. WELDON, in her capacity as Forest Supervisor of the Deschutes National Forest, UNITED STATES FOREST SERVICE, an administrative agency of the United States Department of Agriculture, Respondents.	Civ. Case No. 07-06283-HO DECLARATION OF DR. CHAD HANSON

1. My name is Chad T. Hanson. I have a Ph.D. in Ecology (2007) from the University of California at Davis, with a research focus on forest and fire ecology. I have authored or co-authored several scientific studies on this subject, which have contributed to the published literature. The subjects of my research have included: mechanical thinning and fire severity; wildlife response to wildland fire; fire history; and post-fire conifer survival. My curriculum vitae is included below. I have been asked by Plaintiffs to provide expert commentary on the Five Buttes logging project.

2. The Five Buttes logging project would allow intensive mechanical thinning across 7,798 acres of conifer forest, including 2,023 acres of Northern spotted owl habitat. The reduction in forest canopy cover would be so severe that, according to the project documents, the suitable spotted owl habitat proposed for logging would not become suitable again for 30-50 years. The stated purpose of the project is to, through intensive logging which includes substantial removal of mature and old growth trees, reduce the risk of severe wildland fire effects, which the project documents suggest is necessary to benefit and protect spotted owls. These claims lack a scientific basis, and are starkly contradicted by existing scientific studies, as I outline below.

3. Where a project goal is to effectively reduce the potential for high severity fire in conifer forests, it is not necessary to remove mature trees in order to accomplish this goal. Recent studies have found that precommercial thinning of sapling and pole-sized trees (subcanopy trees 10 inches in diameter and smaller) can effectively reduce fire severity (see, e.g., Omi and Martinson 2002, Perry et al. 2004). Such prescriptions would likely tend to remove relatively little of the total standing biomass, but they would remove most of the subcanopy foliar fuel.

4. Further, mechanical thinning (i.e., wherein a substantial portion of the standing biomass is removed, including some mature trees, and canopy cover is significantly reduced) will often

tend to increase, not decrease, fire severity, due to accelerated brush growth due to increased sun exposure, increased midflame windspeeds, slash debris, and drying of surface fuels (Hanson and Odion 2006, Platt et al. 2006, Raymond and Peterson 2005). Raymond and Peterson (2005) was conducted in southwestern Oregon within the Biscuit fire area. The mechanically thinned areas that burned in the Biscuit fire had significantly higher fire severity than the unthinned areas. This study is sometimes mis-cited by the Forest Service for the proposition that areas mechanically thinned, and then followed by prescribed fire, will have lower fire severity. In fact, the areas that were thinned and prescribed burned in the Raymond and Peterson (2005) study did <u>not</u> burn in the Biscuit fire. The post-thinning burning occurred under controlled conditions and is not representative of wildland fire effects. In Hanson and Odion (2006), the mechanically thinned sites burned at significantly higher severity than the adjacent unthinned areas, using a paired t-test. Only one mechanically-thinned site in Hanson and Odion (2006) had similar fire severity to the adjacent unthinned area. In this case, the thinning was followed by mastication of small-diameter fuels just months prior to the occurrence of the Power Fire in 2004. This site had approximately the same fire mortality as the adjacent unthinned site, however, the combined mortality of the thinned area (fire mortality plus mortality from trees felled and removed by thinning) was higher than the fire-related mortality in the adjacent untreated area. As Platt et al. (2006) found:

> Compared with the original conditions, a closed canopy would result in a 10 percent reduction in the area of high or extreme fireline intensity. In contrast, an open canopy [from fuel treatments] has the opposite effect, increasing the area exposed to high or extreme fireline intensity by 36 percent. Though it may appear counterintuitive, when all else is equal open canopies lead to reduced fuel moisture and increased midflame windspeed, which increase potential fireline intensity.

The Forest Service commonly assumes that the greater and more intensive the removal of trees and biomass, the greater the reduction in potential fire severity will be. This is based upon faulty modeling assumptions, not empirical scientific data. In reality, when it comes to thinning for the purpose of reducing fire severity, less is more. In addition, thinning effects decline rapidly. There may be a reduction in potential fire severity in the first couple of years after thinning, assuming all slash has been removed, but over time, the effectiveness goes down quickly. By opening up the forest canopy and removing competition at the ground level, thinning stimulates the growth of small trees, shrubs, and other plants that constitute combustible fine fuels and which carry and drive fires. Thus one must thin and/or burn frequently to keep fuel loads low after thinning, creating substantial additional expenses and potential impacts. So, between opening up the forest to greater drying and creating conditions for more fine fuels growth, mechanical thinning tends to be counter-productive to the goal of reducing potential fire severity.

5. In addition, some of the Forest Service's assumptions regarding "historic range of variability" are faulty with regard to this project. In the Five Buttes area much of the forest at mid-high elevation is lodgepole pine and spruce-fir. Lower elevations have more ponderosa pine. The kind of forest type greatly influences its characteristic fire regime, thus the degree of potential deviation from historic conditions. Lodgepole pine is a forest type that burns infrequently with long intervals between fires and typically has high severity stand replacement blazes, in which most or all of the trees are killed. This is the natural fire regime for lodgepole pine forests in the Pacific states (see, e.g., SNEP 1996). The Forest Service appears to assume, incorrectly, that stand replacement blazes are somehow unnatural or undesirable, when in fact, it is the dominant ecological process in lodgepole pine forests. Other forest types dominated by fir and spruce are considered to be mixed to high severity fire regimes. Ponderosa pine forests have

relatively less high severity fire naturally, but even these forests had some occurrence of high severity fire historically, driven by periodic high fire weather conditions (Hanson 2007).

6. The assumption of the Five Buttes project Final EIS that wildland fire is a threat to spotted owls is also without scientific merit. Mixed-severity fire, which include a mosaic pattern of low severity (most trees survive fire), moderate severity, and high severity (most trees killed by fire) effects, is natural in the conifer forests of the Cascades (Beatty and Taylor 2001, Olson et al. 2004), such as those in the Five Buttes project area. Northern spotted owls evolved with mixed severity fire, including patches of open, brushy habitat created by high severity fire (Olson et al. 2004). Two studies have tested the assumption that substantial patches of open, brushy habitat created by higher severity wildland fire is detrimental to Northern spotted owls. Both studies found precisely the opposite. They concluded that, based upon demographic data of banded spotted owls and habitat characteristics within their territories, Northern spotted owl territories were optimal for spotted owl survival and reproduction when roughly 40-60% of the territory was in habitat types created by higher severity wildland fire, which include open conditions brush patches, and large downed logs (Franklin et al. 2000, Olson et al. 2004). These fire-created habitat attributes are not, ecologically, mimicked by logging (Franklin et al. 2000, SNEP 1996). Territories that were homogenously closed-canopy mature and old growth forest—i.e., suitable spotted owl habitat—were associated with declining owl populations, as were territories wherein little or no closed-canopy mature and old growth forest existed (Franklin et al. 2000, Olson et al. 2004). The reason for this is that the habitat conditions created by higher severity fire are optimal for the reproduction of preferred spotted owl prey species. A mixture of suitable spotted owl habitat, and habitat suitable for spotted owl prey, provides the habitat conditions that are, overall, most beneficial to spotted owl survival and reproduction (Franklin et

al. 2000, Olson et al. 2004). Thus, not only is it incorrect to simply state or assume that wildland fire effects are a threat to spotted owls, it must be recognized that the lack of habitat conditions created by patches of higher severity fire are a threat to spotted owls.

7. Wildland fire is still heavily suppressed in western U.S. forests, including the forests of the Cascades, relative to the historic (pre-settlement) annual average extent of burning. The average area of forest that burned historically was several times higher than current annual burning levels, resulting in a huge “fire deficit” according to U.S. Forest Service research (Medler 2006). The habitat created by patches of high severity fire is among the most ecologically-important, biodiverse, and rare of any forest habitat types in western U.S. forests (Noss et al. 2006), and many native wildlife species depend upon these areas for survival (Hutto 1995, Noss et al. 2006). These species depend, variously, upon: the native beetle larvae which are laid under the bark of the fire-killed trees (woodpeckers); standing fire-killed trees for nest cavities (excavators and secondary cavity-nesters); the abundance of flying insects in heavily burned patches (e.g., aerial insectivores), which are attracted to the many flowering plants which proliferate following wildland fire; large downed logs (small mammals, reptiles, amphibians, and invertebrates); seed beds following fire (granivores); shrub patches facilitated by fire (many taxa of native wildlife) (see, e.g, Hanson 2007, Hutto 1995, Smucker et al. 2005, Smith 2000).

Wildland fire is not an ecological threat to forest ecosystems of the Cascades, contrary to the assumptions made by the Forest Service here. Indeed, the lack of wildland fire is among the greatest ecological threats currently, as the species associated with the habitat conditions created by wildland fire tend to be in decline in this era of continued fire suppression and fire deficit.

Under penalty of perjury, I declare the foregoing to the true and correct to the best of my knowledge.

Chad T. Hanson, Ph.D.

10/18/07

Date

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Curriculum Vitae of Chad T. Hanson, Ph.D.

P.O. Box 697, Cedar Ridge, CA 95924 (530) 273-9290

EDUCATION

University of California at Davis, Ph.D., Ecology, June 2007

Completed a Ph.D. in Ecology, with 3.97 GPA, focusing research on forest and fire ecology in the Sierra Nevada.

University of Oregon School of Law, Juris Doctorate, May 1995

Specialized in natural resources law

Meritorious Brief Award in Best Brief Competition

Hired by the Law School's Legal Research and Writing Program at end of first year of law school

Created and wrote course texts for the Legal Research and Writing Program for two years

University of California at Los Angeles, Bachelor of Science, 1990

Individual major in Nutritional Biopsychology through the Honors Department

Designed and implemented original research on blood sugar levels and reading comprehension

Awarded the President's Undergraduate Research Fellowship for outstanding research design

RESEARCH PUBLICATIONS

Hanson, C.T., M.P. North, and D.C. Odion. 2007. Historic occurrence of high severity fire in the central and northern Sierra Nevada (in review).

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