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for the Preservation of Wild Nature

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I am a wildlife biologist and principal scientist with the Wild Nature Institute, a non-profit scientific research and advocacy organization. I have a Bachelor's degree in Biology from Duke University and a Master's degree in Wildlife Science from the Oregon State University. My colleagues and I have conducted and published numerous peer-reviewed studies examining occupancy rates, habitat selection, space use, and diet of California spotted owls in post-fire landscapes of the Sierra Nevada. In fact, I have published more scientific papers on ecological relationships between spotted owls and forest fire than any other scientist in the world. The following is a list of my published studies on spotted owl ecology:

a. Odion, DC, Hanson CT, DellaSala DA, Baker WL, Bond ML 2014. Effects of fire and commercial thinning on future habitat of the Northern Spotted Owl. Open Journal of Ecology 7:37-51.

b. Bond ML, Lee DL, Siegel RB, Tingley MW 2013. Diet and home-range size of California spotted owls in a burned forest. Western Birds 4:114-126.

c. Lee DE, Bond ML, Borchert MI, Tanner R. 2013. Influence of fire on site occupancy of spotted owls in the San Bernardino and San Jacinto Mountains of southern California. Journal of Wildlife Management 77:1327-1341.

d. Lee DE, Bond ML, Siegel RB. 2012. Dynamics of California Spotted Owl breeding-season site occupancy in burned forests. The Condor 114:792-802.

e. Bond ML, Lee DE, Siegel RB 2010. Winter movements by California spotted owls in a burned landscape. Western Birds 41:174-180.

f. Bond ML, Lee DE, Siegel RB, Ward, JP Jr 2009. Habitat selection and use by California spotted owls in a post-fire landscape. Journal of Wildlife Management 73:1116-1124.

g. Bond ML, Gutiérrez RJ, Seamans ME 2004. Modeling nesting habitat selection of California spotted owls (*Strix occidentalis occidentalis*) in the central Sierra Nevada using standard forest inventory metrics. Forest Science 50:773-780.

h. Bond ML, Gutiérrez RJ, Franklin AB, LaHaye WS, May CA, Seamans ME 2002. Short-term effects of wildfires on spotted owl survival, site fidelity, mate fidelity, and reproduction. Wildlife Society Bulletin 30:1022-1028.

Thank you for the opportunity to provide comments on the scoping letter for the King Fire "Restoration" Project, which will harvest timber on 13,940 acres of burned forest habitat (King Fire Proposed Action, Table 2 on page 6). I put the word "restoration" in quotes because it is my belief, based on the best published scientific data, that post-fire logging is not in any way restoration. It is, purely and simply, destruction of important Complex Early Seral Forest habitat that is natural and critical to forest ecosystems of the Sierra Nevada, and the Project will harm the many species that thrive within this habitat (DellaSalla et al. 2014).

A decade ago, it was understandable that the U.S. Forest Service would presume that post-fire logging would not harm spotted owls. Early studies on spotted owl habitat relations and correlations to reproductive success were conducted in unburned areas where the 'non-suitable' owl habitat was typically a result of logging rather than fire. As spotted owls are usually associated with older, dense forests, it was assumed that the effects of higher-severity wildfires were similar to logged clearcuts, resulting in a total loss of owl habitat. Fire, however, is a fundamentally different type of disturbance than logging. Enough research has now been conducted disproving the assumption that post-fire logging of dense forests burned at high intensity will not harm spotted owls. While high-intensity fire likely reduces habitat suitability for nesting and roosting because it lowers canopy cover, two studies found that spotted owls utilize and show a preference for intensely burned forests for foraging when the burned stands occurred close to the nest and core roost sites (Clark 2007 [Figure 6.2], Bond et al. 2009). These studies have been available to the U.S. Forest Service for years, yet the agency continues to propose harmful post-fire logging in spotted owl potentially suitable foraging habitat for spotted owls. I strongly oppose the Proposed Action and urge the U.S. Forest Service to refrain from logging any burned trees that are not a direct hazard to humans (e.g., leaning trees directly adjacent to well-traveled roads). My reasoning is explained below.

Much of the data I describe herein are from the recently submitted petition to the U.S. Fish and Wildlife Service to list the California spotted owl as a threatened or endangered species under the Endangered Species Act. I was a co-author of the petition, and it summarized well the science showing that spotted owls utilize burned forests and that post-fire logging is harming this declining subspecies. The studies I describe below are also attached to this comment letter.

I co-authored a study (Bond et al. 2009) that quantified habitat selection in forests that recently experienced significant amounts of moderate- and high-severity fire. Habitat

selection estimates how much owls used forest that burned at a particular severity compared with the availability of that burn severity. We radio-tracked seven California spotted owls occupying the McNally Fire in the Sequoia National Forest throughout the breeding season four years after fire. Very little (< 3 percent) of the combined foraging ranges of these owls was post-fire logged, so there were essentially no confounding effects of logging with high-intensity fire. Furthermore, all owls had unburned, low, moderate, and highly burned patches of forest in their foraging ranges from which to choose, so we could quantify whether owls selected or avoided any of these burn intensities. This was the first study to specifically examine foraging habitat selection by spotted owls in burned forests that were not subjected to substantial post-fire logging. Spotted owls used all burn severities for foraging, but the probability of an owl using a site for foraging was strongest in severely burned forests, after accounting for distance from nest. Spotted owls used unburned mature/old forest for foraging less than would be expected based upon availability, where post-fire habitat was available for foraging.

We also measured vegetation within owl foraging ranges and found that high-intensity burned sites had the greatest herb and shrub cover and basal area of snags. This result suggests that snags, herb, and shrub cover are important components of a post-fire forest that supports foraging habitat for spotted owls. We documented that when it is available to them, foraging owls appear to select high-severity burned forests not subjected to significant post-fire logging. Possible explanations for the selection of intensely burned forests for foraging may be increased accessibility or abundance of prey with fire-caused growth in shrubs and forbs. Spotted owls are perch-and-pounce predators, and thus must have an adequate supply of trees (such as snags) upon which to perch and wait for prey. Because intensely burned, non-salvage-logged forests can offer suitable habitat for foraging spotted owls, Bond et al. (2009) recommended "that burned forests within 1.5 km of nests or roosts of California spotted owls not be salvage-logged until long-term effects of fire on spotted owls and their prey are understood more fully."

Also using radio-telemetry, Clark (2007) found similar selection by northern spotted owls for mature/old forest areas that burned at high-severity fire and were not subsequently salvage logged (see, e.g., Figure 6.2 of Clark 2007).

Many California spotted owl sites have continued to be occupied and reproductively successful after fires burned portions of their home ranges, including portions of the core area, at least over a moderate time scale (1 year post-fire [Bond et al. 2002], from 5 to 7 years after fire [Lee et al. 2012], and up to 16 years post-fire [Roberts et al. 2011]). Other research indicates that the structural legacies created by high-intensity fire provide benefits to spotted owls for much longer periods of time post-fire. For example, North et al. (1999) noted in a study of foraging habitat selection by northern spotted owls, "In our study area, stands with high use by owls typically included many 'legacies' (large trees and snags) that survived a fire or windstorm that destroyed much of the previous stand. The survival of just a few dominant and co-dominant trees from the original old-growth stand increased structural heterogeneity and produced more height class diversity in the

regenerating stands." The authors went on to note: "Large snags were created when tree tops were snapped in early-century windstorms or rot-resistant tree species were killed by fire. The carry-over of these large structures into the regenerating stands may have produced sufficient foraging habitat for the owl even though other attributes of the stand were typical of younger forests."

In a large-scale occupancy study in managed forests throughout the Sierra Nevada, of which I am also a co-author (Lee et al. 2012), we examined 11 years of U.S. Forest Service breeding-season survey data from 41 California spotted owl sites burned in 6 forest fires and 145 sites in long-unburned areas. This represented all available data for fires in spotted owl habitat where pre-fire and post-fire occupancy data had been gathered, during that time period. We found no significant effects of fire on probabilities of local extinction and colonization at burned versus unburned sites over the period of study (2001–2007), after accounting for annual and site-specific variation in detectability. Mean occupancy was actually slightly higher at burned sites (80 percent) than in unburned forest (76 percent), but the difference was not statistically significant. Post-fire logging occurred on 8 of the 41 burned sites; 7 of the 8 sites were occupied immediately after the fire but none were occupied after post-fire logging, suggesting salvage logging adversely impacted occupancy rates of the burned sites.

Fire has affected proportionately more spotted owl sites in the San Bernardino National Forest of southern California than any other national forest in the range of the subspecies. This region is at the edge of the subspecies' range, and is subject to widespread high-intensity fire resulting from extreme fire weather in Santa Ana winds. Using occupancy survey data from 2003 to 2011 for all-detections and pairs-only data, another study I co-authored (Lee et al. 2013) estimated annual extinction and colonization probabilities at 71 burned and 97 long-unburned breeding-season sites before and after fire, while controlling for confounding effects of non-fire-related temporal variation and among-site differences in habitat characteristics. We found no statistically significant effects of fire on occupancy dynamics in this population.

In mostly mixed-conifer forests of the western Sierra Nevada, my colleague and I conducted a study using U.S. Forest Service survey data that found high California spotted owl occupancy at one year post-fire (before post-fire logging) in the 257,314-acre Rim Fire of 2013 on the Stanislaus National Forest. One-year post-fire occupancy probability of historical territories (territories occupied in one or more years over the past two decades or so) was 92 percent. We also found that, in these post-fire territories of the Rim Fire which had not yet been subjected to post-fire logging, pair occupancy was not lower in territories with mostly high-intensity fire effects (occupancy in such territories was still over 90 percent).

Similar results have been documented in other subspecies of spotted owl. Jenness et al. (2004) published a peer-reviewed paper examining pre- and post-fire occupancy and reproduction of a sample of 64 Mexican spotted owl sites in mixed-conifer, pine, and

pine-oak forests in four national forests in New Mexico and Arizona. The authors selected owl sites in fires that burned from 1993–1996, and compared levels of occupancy [single, pair, failed reproduction, successful reproduction] in 33 burned and 31 unburned sites, including 29 paired burned and unburned sites within 12 km of each other, in 1997. Post-fire occupancy rates were not significantly different between burned and unburned sites, and did not statistically differ with time since fire. The percent of high-intensity fire in a burned territory had no significant influence on whether the site was occupied. Post-fire logging was relatively minor in most of the fires (Coronado and Gila national forests, personal communication with M. Bond). A recent study by Ganey et al. (2014) showed radio-marked Mexican spotted owls traveled considerable distances to utilize burned habitat during the winter, likely because of greater prey biomass in the burned wintering area as compared to the nest core area.

Clark et al. (2013) examined how post-fire logging affected occupancy dynamics of northern spotted owls in the Timbered Rock Fire and an unburned area in southwestern Oregon. They found colonization probabilities declined over time at both burned and unburned sites, but extinction probabilities were greater after post-fire logging. Clark et al. (2013), on p. 15, concluded the following:

> Our results also indicated a negative impact of salvage logging on site occupancy by spotted owls. We recommend restricting salvage logging after fires on public lands within 2.2 km of spotted owl territories (the median home range size in this portion of the spotted owl's range) to limit the negative impacts of salvage logging.

Only one study has examined the effects of fire on survival rates of marked spotted owls in the absence of post-fire logging, also co-authored by me (Bond et al. 2002). We found no effect of fire on short-term (1 year) survival. We examined short-term post-fire survival of 21 banded spotted owls in 4 demography study areas encompassing all 3 subspecies (including the San Bernardino Study Area for the California spotted owl). Our field biologists re-sighted bands and determined reproductive status of owls before and after fire in mixed-conifer and mixed-evergreen forests of northwestern California, the San Bernardino Mountains of southern California, the Tularosa Mountains of New Mexico, and in pine-oak forests on the Coconino Plateau in Arizona. All nest and roost areas were burned, and no post-fire logging had occurred before owls were surveyed the year after fire. We found that survival rates were the same in burned and unburned territories. All pairs were faithful to their pre-fire territory and mate.

Post-fire logging such as that proposed in the King Fire Project is harming spotted owls, and spotted owls are declining partly as a result of such logging based upon the best available scientific evidence:

- Lee et al. (2012) studied 6 representative fires, covering 11 years of breeding season data, and spanning the southern Sierra Nevada to the northern Sierra Nevada. We reported that mixed-severity fire, averaging 32 percent high-severity

fire effects in a 400-ha core area around nests or roost sites, did not reduce occupancy of California spotted owls in the Sierra Nevada and, in fact, occupancy in mixed-severity fire areas was slightly higher than in unburned mature forest, and even territories with > 50 percent high-severity fire remained occupied (at levels of occupancy comparable to unburned forests). This, however, was not the case in post-fire logged sites, as every site that was salvage logged lost occupancy, even though they were occupied after the fire but before the salvage logging. Specifically, post-fire logging occurred on at least 8 of the 41 burned sites; 7 of the 8 sites were occupied immediately after the fire but none were occupied after post-fire logging.

- In the Moonlight fire of 2007 on the Plumas National Forest, while a larger number of spotted owl PACs remained in the system due to historical occupancy, at the time of the Moonlight Fire there were only 9 California spotted owl sites occupied by pairs (much of the area had been logged in previous years/decades), based upon occupancy data provided by the Plumas National Forest. All 9 sites lost occupancy by the pairs following extensive post-fire logging on adjacent private timberlands (and, later, on national forest lands), which began in the summer of 2007, just days and weeks after the fire occurred, indicating that post-fire logging, not fire, was the cause of lost occupancy (DellaSala et al. 2010). This demonstrates that PACs alone are not sufficient to sustain spotted owls (which have home ranges many times larger than mere ~120 ha PACs). This is broadly consistent with the findings of Clark et al. (2013), who found that post-fire salvage logging in high-severity fire areas significantly increased territory extinction of northern spotted owls in southwestern Oregon. The available scientific data indicate that post-fire logging on both public and private lands is a major threat to California spotted owl occupancy and populations.

- Bond et al. (2009) quantified habitat selection, which is how much owls used forest that burned at a particular severity compared with the availability of that burn severity. The probability of an owl using a site for foraging was significantly greater in burned—especially severely burned—forests than unburned forest. Bond et al. (2009) also measured vegetation and found that high-intensity burned sites had the greatest herb and shrub cover and basal area of snags. This result suggests that snags, herb, and shrub cover are important components of a post-fire forest that supports foraging habitat for spotted owls, as these features provide excellent habitat for the owl's small mammal prey base.

The King Fire area is within a region that is a remarkable checkerboard of private and public lands. The private lands have been heavily logged in the recent past, and these lands will surely be post-fire logged. This will provide ample opportunity to study the effects of post-fire logging on the spotted owls in the Eldorado Demography Study Area—there is no need for the U.S. Forest Service to add to the already substantial post-

fire logging that will be occurring on the alternating sections of private lands. Further, there has been a documented decline of spotted owls in the Eldorado Study Area (Tempel et al. 2014) through which the King Fire burned. This decline was not attributable to fire but rather habitat loss and fragmentation from logging of green forests and the checkerboard land ownership. Very few (12) spotted owl territories had experienced fire in the nearly two decades of research in this study area, and even fewer sites were extinct post-fire and thus available for colonization (Tempel et al. 2014). As such, data were too sparse to determine effects of fires on spotted owl occupancy, as evidenced by the lack of an estimable standard error in Tempel et al. (2014). The decline of the owls and its underlying cause of green-forest logging must be discussed in the forthcoming Environmental Impact Statement (EIS) if the Eldorado National Forest elects to proceed with this Project. The EIS must also discuss and analyze all the relevant scientific literature I have provided in this letter.

I strongly disagree with any post-fire logging of burned trees on national forest lands that are not directly threatening busy thoroughfares, as these trees provide critical habitat for many native species (DellaSalla et al. 2014). However, at the very minimum I recommend the following, based on the best available science:

(1) Conduct comprehensive, protocol-level occupancy surveys of every historical spotted owl PAC. This includes at least 6 visits in each site if conducted over one year. Better yet, conduct surveys for at least 2 or more years following the fire before any logging is conducted, as unoccupied sites can become colonized (Lee et al. 2012);

(2) Properly classify and quantify suitable owl habitat, including mature and old forest with many perch trees that has burned at high intensity as suitable foraging habitat (Bond et al. 2009);

(3) Specifically quantify and describe to the public how much burned forest will be removed and where it is located in relation to PACs;

(4) Do not conduct any logging within 1,500 meters of known spotted owl core areas (Bond et al. 2009), whether occupied or not (because unoccupied sites can be later colonized) with the exception of true public hazards along busy, well-traveled roads;

(5) Notwithstanding Recommendation 4, I urge the U.S. Forest Service to not log any suitable owl nesting, roosting, or foraging habitat (this includes burned forest) given the natural territory-shifting that may occur after fire, and given that the Mexican spotted owl study showed owls will move to new burned areas away from their nest cores to take advantage of greater prey biomass. A no-logging alternative should be thoroughly analyzed in the forthcoming EIS using the best available scientific data.

Thank you again for the opportunity to provide comments. The California spotted owl is declining in this very region (Tempel and Gutiérrez 2013). This is a time for extreme caution with regard to management of habitat for this imperiled subspecies. I hope the Eldorado National Forest will reconsider its proposal to post-fire harvest important

burned-forest habitat not only for spotted owls, but for black-backed woodpeckers and many other fire-following plants and animals.

Please do not hesitate to contact me with any questions at monica@wildnatureinstitute.org.

Sincerely,

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Arusha, Tanzania and Hanover, New Hampshire, USA

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