CENTER *for* BIOLOGICAL DIVERSITY

THE JOHN MUIR PROJECT of EARTH ISLAND INSTITUTE

January 11, 2016

Jeanne Higgins, Forest Supervisor
Stanislaus National Forest

Dear Ms. Higgins,

On behalf of the John Muir Project of Earth Island Institute (JMP) and the Center for Biological Diversity (CBD), we are submitting these comments on the Draft EIS (DEIS) for the proposed "Rim Reforestation" (Project). Based on the foregoing, we recommend either the No Action alternative, or a greatly modified version of Alternative 4 that would implement only the noxious weed eradication component of that alternative.

Misleading Characterization of Natural Conifer Regeneration

On pp. 254-255, the DEIS admits that there are currently 870 naturally-regenerating conifer seedlings per acre, on average, in high-severity fire areas, plus 185 oak seedlings/sprouts per acre. The DEIS then asserts (p. 254) that 70% of the plots in high-severity fire areas had no natural conifer regeneration, and uses this statement to suggest that there are large areas within high-severity fire patches that have no conifer regeneration, and throughout the DEIS the Forest Service hyperbolically suggests that such areas will not regenerate conifers for hundreds of years (but provides no citation to any data source to support this wild exaggeration). This is a highly misleading and inaccurate characterization of the landscape in the Rim fire area within high-severity fire patches for two reasons. First, on p. 254, the DEIS admits that post-fire logging under the Rim fire "recovery" logging project has reduced natural conifer regeneration by 74% in the Rim fire area, and the Final EIS and Record of Decision for the Rim fire "recovery" project state that nearly all of the post-fire logging is targeted in high-severity fire areas. Therefore, the figures reported in the table on p. 255 of the DEIS, with regard to the 18,736 acres of high-severity fire, are heavily influenced by post-fire logging. The DEIS fails to provide figures for natural conifer regeneration in high-severity fire areas that have not been subjected to post-fire logging. Thus, much of the high-severity fire areas that are currently lacking conifer regeneration are in substantial part the result of the Forest Service's recent management actions, rather than high-severity fire itself. Second, the Forest Service's misleading claim about natural conifer regeneration in high-severity fire areas is the result of the Forest Service using a tiny plot size—a mere 1/50th of an acre (DEIS, p. 231)—which essentially guarantees that many/most plots will not contain any conifer seedlings, given the clumped distribution of natural conifer regeneration. For perspective, with plot sizes so small, even in a mature conifer forest with about 30 trees per acre (such as some of the open-canopy, mature forests described in the DEIS), most plots of this size, arranged on a grid as the Forest Service did, would contain no trees, leading to the same erroneous claim of large treeless areas.

Dr. Hanson, in 2014 and 2015, conducted linear transects through the interior (i.e., farthest into the high-severity fire patches, and greatest distance from low/moderate-severity patch edges) of two of the largest high-severity fire patches in the Rim fire (the patch surrounding Ascension Mountain, and the patch south of Niagara Creek), with plots 2.5 times larger than those used by the Forest Service, and plots spaced by 200 meters. Only unlogged areas in these high-severity fire patches were included in these surveys. Dr. Hanson's findings are presented below.

Transect/ Plot	Conifer seedlings/ acre	Pine proportion in regen	Dist (ft) into interior of high-sev patch	Dist (ft) from nearest low/moderate-sev inclusion for plots >300 ft into patch
1/a	560	11%	85	---
1/b	60	0%	538	1156
1/c	140	14%	982	758
1/d	220	27%	1592	177
1/e	120	50%	2147	345
1/f	0	---	1996	489
1/g	120	100%	2006	95
2/a	20	100%	575	532
2/b	100	40%	1047	1080
2/c	60	100%	1408	808
2/d	60	67%	1536	617
2/e	0	---	1573	900
2/f	80	100%	1297	913
2/g	80	25%	962	588
2/h	0	---	762	384
2/i	220	18%	712	40
3/a	540	7%	1431	1120
3/b	440	14%	2026	538
4/a	200	90%	2876	28
4/b	0	---	1934	246
4/c	40	50%	1333	913
4/d	100	20%	611	995
4/e	760	5%	44	---
5/a	3680	10%	76	---
5/b	1000	44%	138	230
5/c	200	60%	391	397
5/d	1220	85%	808	125
5/e	40	100%	410	263
5/f	160	100%	181	565

As the data above show, even though the transects ran through the deepest interior portions of two of the largest high-severity fire patches (with high-severity defined as in Miller and Thode 2007, i.e, RdNBR >640), 90% of the plots contained natural conifer regeneration, with plot sizes 2.5 times larger than those used by the Forest Service, and without the influence of post-fire logging. Moreover, the proportion of the natural conifer regeneration comprised of pine species (ponderosa, Jeffrey, and sugar pine) less than 250 feet into the high-severity fire patches was only 32%, while it was 47% 250-1000 feet into high-severity fire patches, and 59% over 1000 feet into high-severity fire patches. Further, for the transects conducted in 2015 (transects 3, 4, and 5), in all plots the tallest (fastest growing) conifers were consistently pines in plots with both pines and non-pine conifers.

Failure to Analyze MIS Species, and CESF Bird Species in Decline

The Project DEIS fails to include any analysis of adverse impacts to several Sierra Nevada Management Indicator Species that would be impacted by the proposal, including Yellow Warblers, Mountain Quail, Fox Sparrows, and Hairy Woodpeckers. This omission is serious, given that they species were chosen to represent larger groups of species with similar habitat requirements, and act as bellwethers for the health of those larger groups of species. The Forest Service's failure to analyze adverse impacts to these species violates NEPA.

Similarly, the DEIS fails to satisfy NEPA's hard look requirement by failing to analyze adverse impacts to bird species associated with complex early seral forest (CESF) habitat created by high-severity fire in forests, in light of the fact that these species are disproportionately in decline in the Sierra Nevada relative to birds associated with unburned mature forest (Hanson 2014), and in light of the proposal to remove additional thousands of acres of this habitat, including during nesting season when chicks—whether of shrub-nesting or cavity-nesting bird species—cannot fly away, creating a compounded adverse impact and an ecological trap scenario (Hanson 2014).

Failure to Take a Hard Look at Impacts to Black-backed Woodpeckers

The Black-backed Woodpecker (BBWO) effects and cumulative effects analysis in the DEIS do not take a hard look under NEPA, and are not complete or accurate, for the following reasons:

1: The DEIS misrepresents cumulative effects to BBWO by failing to include acres of suitable BBWO habitat already removed in Rim post-fire logging project, thereby reporting much higher BBWO habitat (and pair) retention on Stanislaus National Forest lands in the Rim fire than is actual, and thereby improperly minimizes adverse cumulative impacts to BBWOs. Specifically, the DEIS (p. 441) states that there are 10,326 acres of BBWO suitable habitat on the Stanislaus National Forest within the Rim fire, and that 2,260 acres of this, or about 22%, would be affected by the proposed action, claiming that over three-quarters of the BBWO pairs would be retained on the Stanislaus National Forest (see DEIS, p. 444). The DEIS further claims, in the Cumulative Effects section, that "cumulatively" 94% of the BBWO pairs would be retained by the Proposed Action, when suitable habitat in Yosemite National Park is included, based on the DEIS's assessment of 17,487 acres of suitable BBWO habitat in Yosemite National Park (DEIS, p. 441). In the summary of the Cumulative Effects analysis, the DEIS claims that the 2,260 acres of suitable habitat that would be removed by the Proposed Action represent a total cumulative impact to BBWOs of only 8% loss of suitable habitat, out of a total of 27,813 acres in the Rim fire. However, the 2014 Rim Fire "Recovery" Final EIS (p. 416) states clearly that the Rim fire created 51,182 acres of suitable habitat, including the more than 17,000 acres in Yosemite National Park, 6,061 acres on private lands, and 27,617 acres on the Stanislaus National Forest. The Rim Fire "Recovery" FEIS (p. 420) states that the 2014 Rim fire roadside hazard tree Environmental Assessment resulted in the removal of 2,370 acres of suitable BBWO habitat, roadside hazard tree felling in Yosemite National Park resulted in loss of 43 acres of BBWO habitat, and all 6,061 acres of suitable BBWO habitat on private lands have been lost to post-fire logging. Therefore, the 8,066 acres of suitable BBWO habitat that would remain on the Stanislaus National Forest after the Proposed Action is implemented (DEIS, p. 444) does not represent 78% cumulative retention of BBWO suitable habitat on Stanislaus National Forest lands in the Rim fire but, rather, represents only 29% cumulative retention of BBWO habitat on the Stanislaus National Forest, and the total cumulative retention of BBWO habitat, when all lands are included, is not 92%, as the DEIS claims (p. 445) but, rather, is only 8,066 acres (Stanislaus National Forest) plus 17,487 acres (Yosemite National Park)—i.e., only 25,553 acres out of the 51,182 acres (49.9%) of suitable BBWO habitat created by the Rim fire. This failure to honestly and fully analyze the cumulative effects of the Proposed Action to BBWOs, and the sleight of hand employed to create the appearance of very high levels of BBWO habitat/pair retention and very low cumulative losses of BBWO habitat/pairs, violates NEPA's hard look standard, and does so to such a profound degree that the DEIS must be withdrawn, reanalyzed, and re-submitted for public comment so the public can properly comment on and vet an actual, accurate, and complete analysis of cumulative effects to BBWOs. If the Forest Service moves forward with this seriously flawed EIS on the Rim fire reforestation Project, both the reforestation EIS and the 2014 Rim Fire "Recovery" EIS will then be in violation of NEPA for failure to divulge cumulative effects to BBWOs, given that neither divulged the full combined impact of the 2014 decisions (the roadside EA, and the "Recovery" FEIS) and the "reforestation" EIS, plus loss of BBWO habitat on private lands, and the Forest Service plans to continue to implement the 2014 Rim Fire "Recovery" EIS and Record of Decision in 2016 and beyond. Nowhere can the actual, complete cumulative effects analysis be found, including in the Cumulative Effects appendix of the Rim fire reforestation DEIS (App. B) and, because the reforestation DEIS analyzes impacts to BBWOs in the context of a flawed and incomplete assessment of BBWO cumulative habitat losses, none of the effects/impacts determinations are valid.

2: The DEIS misrepresents NatureServe conservation threat ranking information and improperly minimizes impacts to BBWOs in this respect. The DEIS (p. 439) cites to an outdated IUCN assessment which does not take into account the fact that the California/Oregon population of BBWOs is a genetically distinct subspecies, which has a far smaller population than the global population assumed by IUCN. Similarly, the DEIS cites to outdated information regarding NatureServe's global ranking and national ranking for BBWO, once again avoiding recognition of the isolated, and much smaller, subspecies in CA/OR that would be affected by the Proposed Action. Due in great part to the actions of the Forest Service, in California the black-backed woodpecker is now ranked as "S2" or "Imperiled" (https://map.dfg.ca.gov/rarefind/view/QuickElementListView.html). This ranking is defined by NatureServe as follows: "Imperiled: Imperiled in the . . . state/province because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the . . . state/province." (see http://explorer.natureserve.org/nsranks.htm).

3: On p. 440 the DEIS mentions that Siegel et al. (2015) indicates that BBWO populations have decreased in recent years in burned forests, but omits mention of the steep recent population decline in unburned forests which, when combined with the acknowledgement of an apparent decline in burned forests in the Sierra Nevada, creates a situation wherein proposed logging of BBWO habitat results in a much larger, compounded impact than the DEIS admits.

Specifically, new information indicates that Black-backed Woodpecker populations are declining generally in the Sierra Nevada. Appendix A of Roberts et al. (2015), which was conducted for the Forest Service by Point Blue Conservation, found that a "sharp decrease" in BBWO populations is occurring in unburned forests throughout the Sierra Nevada in recent years (see Roberts et al. 2015, p. 39), and concluded that the data indicate a "strong change in green forest occupancy" appears to be occurring (Roberts et al. 2015, p. 40, and Figure A.1 on page 42). Roberts et al. (2015), Appendix A (pp. 39-42), hypothesized that BBWOs that previously occurred in unburned forest may have been increasingly moving into burned forest in recent years, as the last three years have had above-average fire amounts. Given this, for populations to be stable overall (in the face of declining populations in unburned forest), occupancy would have to increase substantially in burned forest recently. However, this is not the case; in a separate study conducted for the Forest Service by the Institute for Bird Populations specifically in burned forest, the authors found that occupancy in 2013 and 2014 were the lowest since the study began in 2009, and 2014 was the lowest year of all (page 2 of Siegel et al. 2015). Neither Roberts et al. (2015) nor Siegel et al. (2015) assessed their results in light of the other, so neither had the complete picture in terms of current BBWO population trends in the Sierra Nevada. The current declines are consistent with projections of Odion and Hanson (2013), given the amount of BBWO habitat that has been logged in recent fires (about 50%, or more, in the 2013 fires: Rim fire, American fire, and Aspen fire, e.g.).

4: The DEIS contains an inadequate analysis of effects and cumulative effects of logging in BBWO habitat in nesting season, contrary to recommendations of the BBWO Conservation Strategy (Bond et al. 2012), and the one-sentence acknowledgement that BBWOs could be directly killed by this (p. 443) and the extremely brief mention that the proposed action does not conform to the recommendations of the BBWO Conservation Strategy (p. 448) are nowhere near adequate to address the serious impacts and cumulative effects of this proposal on BBWO populations, and the potential direct killing of chicks in the nest that cannot yet fly, under NEPA's hard look standard.

The DEIS's Analysis of Mule Deer Fails to Meet NEPA's Hard Look Standard

The DEIS's analysis of impacts to mule deer utterly fails to divulge that mule deer preferentially select unmanaged complex early seral forest (CESF) habitat for foraging (Bond 2015), and fails to include any analysis of the adverse effect of the Proposed Action on CESF, given that the entire purpose of the proposal is to remove CESF and replace it as quickly as possible with mature conifer forest. Current data indicate that fire creates higher quality food for mule deer, and tends to increase reproductive rates and populations, while post-fire removal of snags and shrub habitat reduces mule deer use of areas (Bond 2015). While mature conifer forest provides certain types of habitat for mule deer, the removal of thousands of acres of the CESF habitat that they select to find the food they need to survive is a significant adverse impact and cumulative effect (Bond 2015), and the DEIS violates NEPA by avoiding disclosure of such habitat loss. Rather than doing a candid assessment of impacts, including adverse effects, to mule deer, the DEIS instead acts as a promoter of the Proposed Action, choosing to omit content about negative environmental effects to this species from both planned removal of the snag component of CESF as well as an even larger removal of the shrub component of CESF.

<u>The DEIS's Analysis of California Spotted Owls Fails to Meet NEPA's Hard Look Standard</u>

The DEIS's assessment of impacts to California spotted owls is inadequate under NEPA. First, the DEIS (p. 371) relies upon Eyes (2014), which has been shown to have misrepresented the data and conclusions about the relationship between owls and high-severity fire patches by improperly classifying certain CESF areas that the owls were using as low/moderate-severity areas. When this error was corrected, it became clear that the owls were in fact using high-severity fire areas more than expected based upon availability (Bond and Hanson 2014 [the California spotted owl ESA listing Petition], p. 69 and Appendix A). Moreover, Eyes (2014) misrepresented Clark (2007) by claiming that spotted owls avoided high-severity fire areas when, in fact, the owls used high-severity fire areas in dense, mature forest more than expected based upon availability and avoided post-fire logged areas (Bond and Hanson 2014, p. 69).

Second, the DEIS (p. 369) admits that California spotted owls are declining in forests where logging (including mechanical thinning and post-fire logging) occurs, but then claims that the cause of the decline is unknown, implying that mechanical thinning, and post-fire logging and associated shrub removal are not factors in this decline. This position is directly contradicted by the current science presented in Bond and Hanson (2014) (at pp. 24-58 and 88-102) and in the US Fish and Wildlife Service's recent 90-day determination on the Bond and Hanson (2014) ESA listing Petition for the California spotted owl. On 9/18/15, the U.S. Fish and Wildlife Service issued a determination that, based upon the Petition by Bond and Hanson (2014) (attached), listing the California Spotted Owl under the Endangered Species Act "may be warranted". Here are a few highlights from USFWS's recent 90-day determination:

1: With regard to Factor A (threat to the species due to habitat loss/destruction), FWS (p. 2) listed "thinning, and post fire salvage logging" as primary threats. In the context of concluding that removal of post-fire habitat is a threat to the owls, FWS noted that post-fire habitat is important/beneficial to spotted owls, concluding the following:

"Recent research has focused on use of burned forests by CSO and has concluded that unlogged burned areas may be important to reproductive success and continued occupancy."

FWS identifies logging (which includes post-fire logging, thinning, and clearcutting) as the major source of the owl's population decline, concluding the following:

"The petitioner cites over 150 references, a number of which are related to all timber harvest types, decreased use by CSO and data driven measurement of curtailment of the range and/or reduction in reproducing owl pairs."

2: With regard to Factor D (inadequacy of existing protections), FWS (p. 4) agreed with the Petition that the Forest Service's "2004 Framework" forest plan, and more recent forest plan revisions, represent a threat to the California Spotted Owl, noting the following as the reasons for their conclusion:

"2004a USDA. This amendment to the 2001 US Forest Service Forest Plans (USDA 2001) allowed increased or new timber harvest, thinning, fuels reduction, post fire logging, etc. in areas previously managed for CSO. USDA 2013b. Management in the Lake Tahoe Basin Management Unit allows clear cut timber harvest and removal of larger diameter trees (>30" dbh) in CSO habitat and previously occupied nest areas."

3: With regard to Factor E (other issues), FWS (pp. 4-5) agreed with the Petition that California Spotted Owl populations are indeed now declining, and notes that the population is now so small that it has an "impoverished gene pool". FWS further agrees with the Petition that California Spotted Owl habitat loss and fragmentation caused by logging "can exacerbate" the threats to the owls from climate change.

Third, though the DEIS (p. 373) admits that California spotted owls often select high-severity fire areas, defined by high density of snags and high shrub cover (Bond et al. 2009), due to an enhanced small mammal prey base, the DEIS (pp. 374-377) completely fails to include analysis of the degree of impacts to this habitat from proposed removal of both the snag component and the shrub component of CESF, as well as from mechanical thinning, across thousands of acres within the biological home ranges of spotted owls in the Rim fire. As the Bond and Hanson (2014) Petition establishes in detail (at pp. 91-103 and appendices), post-fire logging and associated shrub removal and artificial tree plantation establishment are significant threats to spotted owls, as is mechanical thinning.

Due to these errors and omissions, the DEIS must be withdrawn and reanalyzed, and a new DEIS issued for public comment on this issue.

The 2004 Framework Has Been Rendered Inadequate and Obsolete by Significant New Information, and a Supplemental Environmental Impact Statement (SEIS), or a Sierra Nevada-wide Cumulative Effects EIS, Must Be Prepared Before Further Logging Projects May Proceed

The 2004 Framework forest plan was based upon several key assumptions and conclusions about forest ecology and management that have now been refuted or strongly challenged (and the weight of scientific evidence now indicates a different conclusion) by significant new scientific information, which requires a fundamental reevaluation of the plan under NEPA through a supplemental EIS. These issues are bioregional in nature, and are not particular to the analysis area in the project documents; thus, the cumulative effects analysis in the project documents cannot adequately analyze the impacts and cumulative effects of these issues, and a Sierra

Nevada-wide EIS must be prepared to address this information and its implications for wildlife species that range throughout the Sierra Nevada mountains.

In addition, project-level supplementation would be required for any Environmental Assessment or Environmental Impact Statement that is issued pursuant to the 2004 Framework, and that is based upon the Framework's prescriptions and management assumptions/direction, as this project is.

Below we describe specific issues in this regard, and identify the key new scientific sources pertaining to each issue. For each issue, we first identify the affected assumption/conclusion from the 2004 Framework, and then list or cite and discuss the new scientific sources that now undermine these assumptions/conclusions. Where we have included the scientific references, we have included annotations ***(in parentheses, in bold, italicized font following the citation)***, where necessary, to describe central findings that may not be immediately apparent.

Issue #1—Fire/Fuel Condition Class

2004 Framework Assumptions/Conclusions:

The 2004 Framework EIS (p. 28) stated that one of the main purposes of the 2004 Framework was to "chang[e] a substantial acreage from Fuel Condition Class 2 or 3 to Condition Class 1". Condition Class was described as representing the number of normal fire return intervals that had been missed due to past suppression of fires by government agencies, with higher Condition Classes indicating higher levels of fuel accumulation and higher potential for high-severity fire, or fire patches in which most or all trees are killed (EIS, p. 126).

The EIS concluded that, due to fuel accumulation from fire suppression, and resulting Condition Class 2 and 3 areas dominating the landscape, "fires that affect significant portions of the landscape, which once varied considerably in severity, are now almost exclusively high-severity, large, stand-replacing fires." However, the EIS did not offer any data source to support this statement.

New Scientific Information:

The studies empirically investigating this question have consistently found that forest areas that have missed the largest number of fire return intervals in California's forests are burning predominantly at low/moderate-severity levels, and are not experiencing higher fire severity than areas that have missed fewer fire return intervals:

Miller JD, Skinner CN, Safford HD, Knapp EE, Ramirez CM. 2012a. Trends and causes of severity, size, and number of fires in northwestern California, USA. Ecological Applications 22, 184-203.

Odion, D.C., E.J. Frost, J.R. Strittholt, H. Jiang, D.A. DellaSala, and M.A. Moritz. 2004. Patterns of fire severity and forest conditions in the Klamath Mountains, northwestern California. Conservation Biology 18: 927-936.

Odion, D.C., and C.T. Hanson. 2006. Fire severity in conifer forests of the Sierra Nevada, California. Ecosystems 9: 1177-1189.

Odion, D.C., and C.T. Hanson. 2008. Fire severity in the Sierra Nevada revisited: conclusions robust to further analysis. Ecosystems 11: 12-15.

Odion, D. C., M. A. Moritz, and D. A. DellaSala. 2010. Alternative community states maintained by fire in the Klamath Mountains, USA. Journal of Ecology, doi: 10.1111/j.1365-2745.2009.01597.x.

van Wagtendonk, J.W., K.A. van Wagtendonk, and A.E. Thode. 2012. Factors associated with the severity of intersecting fires in Yosemite National Park, California, USA. Fire Ecology 8: 11-32.

Below is a more detailed discussion of these studies:

Six empirical studies have been conducted in California's forests to assess the longstanding forest management assumption that the most fire-suppressed forests (i.e., the forests that have missed the largest number of fire return intervals) burn "almost exclusively high-severity", as the 2004 Sierra Nevada Forest Plan Amendment Final EIS (Vol. 1, p. 124) presumed. These studies found that the most long-unburned (most fire-suppressed) forests burned mostly at low/moderate-severity, and did not have higher proportions of high-severity fire than less fire-suppressed forests. Forests that were not fire suppressed (those that had not missed fire cycles, i.e., Condition Class 1, or "Fire Return Interval Departure" class 1) generally had levels of high-severity fire similar to, or higher than, those in the most fire-suppressed forests.

1)

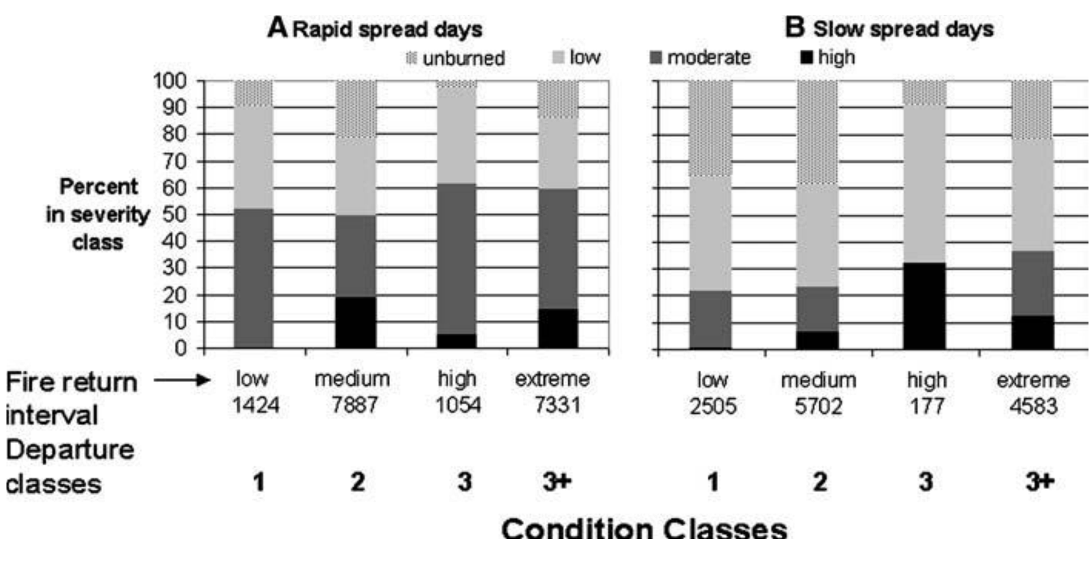


Figure 5 from Odion and Hanson (2006) (*Ecosystems*), based upon the three largest fires 1999-2005, which comprised most of the total acres of wildland fire in the Sierra Nevada during that time period (using fire severity data from Burned Area Emergency Rehabilitation (BAER) aerial overflight mapping), showing that the most long-unburned, fire-suppressed forests (Condition "Class 3+", corresponding to areas that had missed more than 5 fire return intervals, and generally had not previously burned for about a century or more) experienced predominantly low/moderate-severity fire.

2)

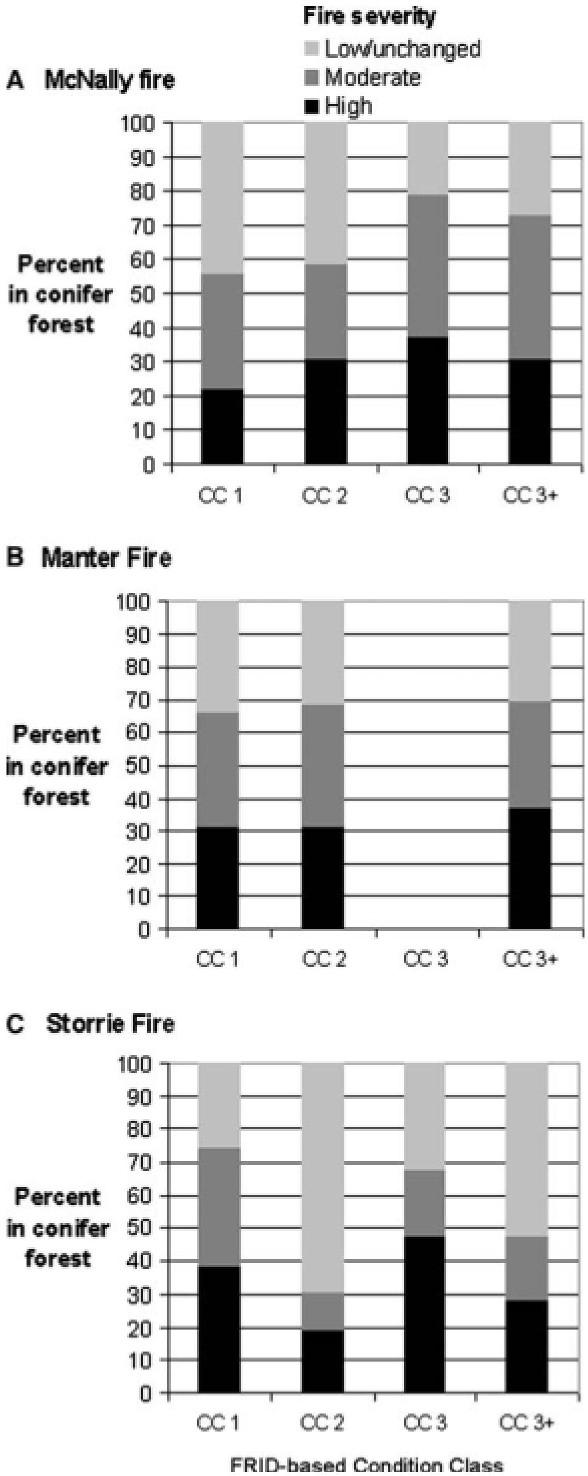


Figure 1 from Odion and Hanson (2008) (*Ecosystems*) (using fire severity data from satellite imagery for the same three fires analyzed in Odion and Hanson 2006), showing that the most long-unburned, fire-suppressed forests (no fire for a century or more) burned mostly at low/moderate-severity, and had levels of high-severity fire similar to less fire-suppressed forests (in one case, even less than Condition Class 1).

3) van Wagtendonk et al. (2012) (*Fire Ecology*), analyzing 28 fires from 1973-2011 in Yosemite National Park, found the following:

> "The proportion burned in each fire severity class was not significantly associated with fire return interval departure class…[L]ow severity made up the greatest proportion within all three departure classes, while high severity was the least in each departure class (Figure 4)."

> The most long-unburned, fire-suppressed forests—those that had missed 4 or more fire return intervals (in most cases, areas that had not burned since at least 1930)—had only about 10% high-severity fire (Fig. 4 of van Wagtendonk e al. 2012).

4) Odion et al. (2004) (*Conservation Biology*), conducted in a 98,814-hectare area burned in 1987 in the California Klamath region, found that the most fire-suppressed forests in this area (areas that had not burned since at least 1920) burned at significantly *lower* severity levels, likely due to a reduction in combustible native shrubs as forests mature and canopy cover increases:

> "The hypothesis that fire severity is greater where previous fire has been long absent was refuted by our study…The amount of high-severity fire in long-unburned closed forests was the lowest of any proportion of the landscape and differed from that in the landscape as a whole ($Z = -2.62$, $n = 66$, $p = 0.004$)."

5) Odion et al. (2010) (*Journal of Ecology*), empirically tested the hypothesis articulated in Odion et al. (2004)—i.e., that the *reduction* in fire severity with increasing time-since-fire was due to a reduction in combustible native shrubs as forests mature and canopy cover increases—and found the data to be consistent with this hypothesis.

6) Miller et al. (2012a) (*Ecological Applications*), analyzing all fires over 400 hectares 1987-2008 in the California Klamath region, found low proportions of high-severity fire (generally 5-13%) in long-unburned forests, and the proportion of high-severity fire effects in long-unburned forests was either the same as, or *lower than*, the high-severity fire proportion in more recently burned forests (see Table 3 of Miller et al. 2012a).

Recently, Steel et al. (2015) (Ecosphere 6: Article 8) reported modeling results that predicted a modest increase in fire severity with increasing time since fire (e.g., 12% high-severity fire at 10 years after fire up to 20% high-severity fire at 75 years post-fire). Thus, even the most long-unburned forests (>75 years since the last fire) were predicted to have mostly low/moderate-severity fire effects, contrary to the assumption upon which the 2004 Framework was based. Moreover, even the modest predicted increase in fire severity reported by Steel et al. (2015) must be viewed with great caution in light of the fact that it was based upon almost no data for mixed-conifer stands that had experienced fire less than 75 years previously (see Fig. 4 of Steel et al. 2015).

<u>Issue #2—"Ecological Collapse" Due to High-intensity Fire</u>

2004 Framework Assumptions/Conclusions:

With regard to the effects of wildland fire in Condition Class 2 and 3 areas, the 2004 Framework EIS made the following conclusion:

> "Condition Classes 2 and 3 are the targets for treatment. Condition Class 2 is composed of lands where fire regimes have been altered from their historic ranges, creating a moderate risk of losing key ecosystem components as a result of wildfire. The vegetative composition, structure, and diversity of lands in Condition Class 3 have been significantly altered due to multiple missing fire return intervals. These lands 'verge on the greatest *risk of ecological collapse*.'"

2004 Framework EIS, p. 126 (emphasis added). The EIS did not cite to any scientific source to support this statement. The EIS (p. 126) stated that approximately 4 million acres of forest were in Condition Class 2, and about 3 million acres were in Condition Class 3.

New Scientific Information:

High-intensity fire patches, including large patches, in large fires are natural in Sierra Nevada mixed-conifer forests, and create very biodiverse, ecologically important, and unique habitat (often called "snag forest habitat"), which often has higher species richness and diversity than unburned old forest. Natural conifer forest regeneration occurs following high-intensity fire. Miller et al. (2012b) found that the current high-intensity fire rotation in Sierra Nevada montane conifer forests is 801 years; thus, within any 20-year period, for instance, only about 2.5% of the landscape is snag forest habitat ***even if*** none of it is subjected to post-fire salvage logging and artificial replanting. In contrast, the old-growth stands dominated by the largest trees, and multi-level canopy cover, CWHR class 6, comprise 1,120,000 acres—more than 10% of the forested area in the Sierra Nevada (2001 Sierra Nevada Forest Plan Amendment Final EIS, Table 4.4.2.1f). Historical mixed-conifer forests were frequently dominated by white fir and incense-cedar, and often had dense understories.

Baker, W.L. 2014. Historical forest structure and fire in Sierran mixed-conifer forests reconstructed from General Land Office survey data. Ecosphere 5: Article 79. ***(Using an enormous U.S. government field survey data set from the 1800s, it was determined that historical ponderosa pine and mixed-conifer forests of the Sierra Nevada were much denser than previously assumed, and were dominated by mixed-intensity fire, while 13-26% were open forests with low-intensity fire. These forests were highly variable in species composition too, historically, with many areas dominated by fir/cedar forests, and others dominated by pine, but with substantial fir/cedar components. High-intensity fire comprised 31-39% of fire effects historically, and high-intensity fire patches hundreds of acres in size were common, with some high-intensity fire patches reaching over 20,000 acres in size. High-intensity fire in historical forests occurred on average about every three centuries, which is much more frequent than the rate of high-intensity fire in these forests currently. Moreover, high-intensity fires occurred, in any given area, about once every 281-354 years—much more frequently than current rates).***

Bekker, M. F. and Taylor, A. H. 2010. Fire disturbance, forest structure, and stand dynamics in montane forest of the southern Cascades, Thousand Lakes Wilderness, California, USA. Ecoscience 17: 59-72. ***(In mixed-conifer forests of the southern Cascades in the Sierra Nevada management region, reconstructed fire severity within the study area was dominated by high-severity fire effects, including high-severity fire patches over 2,000 acres in size [Tables I and II]).***

Buchalski, M.R., J.B. Fontaine, P.A. Heady III, J.P. Hayes, and W.F. Frick. 2013. Bat response to differing fire severity in mixed-conifer forest, California, USA. PLOS ONE 8: e57884. ***(In mixed-conifer forests of the southern Sierra Nevada, rare myotis bats were found at greater levels in unmanaged high-severity fire areas of the McNally fire than in lower fire severity areas or unburned forest.)***

Burnett, R.D., P. Taillie, and N. Seavy. 2010. Plumas Lassen Study 2009 Annual Report. U.S. Forest Service, Pacific Southwest Region, Vallejo, CA. ***(Bird species richness was approximately the same between high-severity fire areas and unburned mature/old forest at 8 years post-fire in the Storrie fire, and total bird abundance was greatest in the high-severity fire areas of the Storrie fire [Figure 4]. Nest density of cavity-nesting species increased with higher proportions of high-severity fire, and was highest at 100% [Figure 8]. The authors noted that "[o]nce the amount of the plot that was high severity was over 60% the density of cavity nests increased substantially", and concluded that "more total species were detected in the Moonlight fire which covers a much smaller geographic area and had far fewer sampling locations than the [unburned] green forest.")***

Cocking MI, Varner JM, Knapp EE. 2014. Long-term effects of fire severity on oak-conifer dynamics in the southern Cascades. Ecological Applications 24: 94-107. ***(High-intensity fire areas are vitally important to maintain and restore black oaks in mixed-conifer forests.)***

Crotteau JS, Varner JM, Ritchie M. 2013. Post-fire regeneration across a fire severity gradient in the southern Cascades. Forest Ecology and Management 287: 103-112. ***(The authors found 710 conifer seedlings/saplings per hectare naturally regenerating in large high-severity fire patches. And, while Collins and Roller (2013) reported relatively little natural conifer regeneration in many high-severity fire areas, this is misleading in light of the fact that nearly half of the area surveyed had been subjected to intensive post-fire logging, which damages soils and removes or destroys natural seed sources, and most of the other areas had been clearcut prior to the fires (which we discovered using pre-fire remote sensing data), or were naturally non-conifer forest, e.g., black oak. The results of Collins et al. (2010 [Table 5]), who found and reported substantial natural conifer regeneration—especially ponderosa/Jeffrey pine and sugar pine—in high-intensity fire patches, excluded salvage logged areas, unlike Collins and Roller (2013). Collins et al. (2010) state that "some areas within each of these fires experienced post-fire management, ranging from post fire salvage logging, tree release and weed management. These areas were removed from analysis." (emphasis added). Specifically, Collins et al. (2010 [Table 5]) found 158 ponderosa pine and sugar pine conifers per acre regenerating in high-intensity fire patches in the Storrie fire—68% of the total natural conifer regeneration by***

species. Extensive natural conifer regeneration surveys deeper into the Storrie fire, at seven years post-fire, revealed abundant natural conifer regeneration, especially pine (Hanson 2007b [Tables 1 through 4, and Appendix A]). In addition, over 95% of the conifer regeneration in Collins et al. (2010) and Collins and Roller (2013) was under 0.1 cm in diameter at breast height (Collins et al. 2010); the plots used to determine the density of conifers of this size covered only 9 square meters of area per plot, and many high-intensity fire patches in the study only had 3-5 plots for an entire high-intensity fire patch (Collins and Roller 2013). This means that, even if 200-300 naturally-regenerating conifers per hectare actually existed in a given high-intensity fire patch, the methods used by Collins and Roller (2013) would be very unlikely to detect conifers, as a matter of basic math and probability.)

DellaSala, D.A., M.L. Bond, C.T. Hanson, R.L. Hutto, and D.C. Odion. 2014. Complex early seral forests of the Sierra Nevada: what are they and how can they be managed for ecological integrity? Natural Areas Journal 34: 310-324. ***(High-intensity fire creates a post-fire habitat that is one of the rarest, most biodiverse, and most threatened of all forest habitat types: "complex early seral forest" (CESF). The authors recommend monitoring and conservation programs to recover and maintain this ecologically-vital habitat on the landscape.)***

Donato, D.C., J.B. Fontaine, W.D. Robinson, J.B. Kauffman, and B.E. Law. 2009. Vegetation response to a short interval between high-severity wildfires in a mixed-evergreen forest. Journal of Ecology 97: 142-154. ***(The high-severity re-burn [high-severity fire occurring 15 years after a previous high-severity fire] had the highest plant species richness and total plant cover, relative to high-severity fire alone [no re-burn] and unburned mature/old forest; and the high-severity fire re-burn area had over 1,000 seedlings/saplings per hectare of natural conifer regeneration.)***

Hanson, C.T. 2014. Conservation concerns for Sierra Nevada birds associated with high-severity fire. Western Birds 45: 204-212. ***(A significantly greater proportion of forest birds associated with the habitat created by high-severity fire are experiencing population declines relative to forest birds associated with unburned forest in the Sierra Nevada.)***

Hanson, C.T., and D.C. Odion. Historical forest conditions within the range of the Pacific Fisher and Spotted Owl in the central and southern Sierra Nevada, California, USA. Natural Areas Journal (in press). ***(Based upon early 20th century U.S. Forest Service field surveys, historical ponderosa pine and mixed-conifer forests of the western slope of the central and southern Sierra Nevada had a mixed-intensity fire regime, averaging 26% high-intensity fire effects in the study areas—and ranging from none in one location to 67% in another. Forests varied widely in terms of density and species composition, with some open, pine-dominated forests and many dense, pine and fir/cedar-dominated areas. Moreover, the high-intensity fire rotation interval was 222 years—much more frequent than current rates of about 800 years.)***

Hodge, W.C. 1906. Forest conditions in the Sierras, 1906. U.S. Forest Service. Eldorado National Forest, Supervisor's Office, Placerville, CA. ***(Historically in mixed-conifer and***

ponderosa pine forests of the western Sierra Nevada, density ranged generally from about 100 to 1000 trees per acre, and stands were often comprised mostly of white fir and incense-cedar, and were dominated by smaller trees.) (This report constitutes new information under NEPA because it was not re-discovered until recently).

Miller, J.D., B.M. Collins, J.A. Lutz, S.L. Stephens, J.W. van Wagtendonk, and D.A. Yasuda. 2012b. Differences in wildfires among ecoregions and land management agencies in the Sierra Nevada region, California, USA. Ecosphere 3: Article 80. ***(Current high-severity fire rotation interval in the Sierra Nevada management region overall is over 800 years. The authors recommended increasing high-severity fire amounts [i.e., decreasing rotation intervals] in the Cascades-Modoc region and on the western slope of the Sierra Nevada (which together comprise most of the forest in the Sierra Nevada management region), where the current high-severity fire rotation is 859 to 4650 years [Table 3]. The authors noted that "high-severity rotations may be too long in most Cascade-Modoc and westside NF locations, especially in comparison to Yosemite…" These areas, in which the authors concluded that there is far too little high-severity fire, comprise 75% of the forests in the Sierra Nevada management region [Table 3].)***

Nagel, T.A. and Taylor, A.H. 2005. Fire and persistence of montane chaparral in mixed conifer forest landscapes in the northern Sierra Nevada, Lake Tahoe Basin, California, USA. J. Torrey Bot. Soc.132: 442-457. ***(The authors found that large high-severity fire patches were a natural part of 19th century fire regimes in mixed-conifer and eastside pine forests of the Lake Tahoe Basin, and montane chaparral created by high-severity fire has declined by 62% since the 19th century due to reduced high-severity fire occurrence. The authors expressed concern about harm to biodiversity due to loss of ecologically rich montane chaparral.)***

Odion D.C., Hanson C.T., Arsenault A., Baker W.L., DellaSala D.A., Hutto R.L., Klenner W., Moritz M.A., Sherriff R.L., Veblen T.T., Williams M.A. 2014. Examining historical and current mixed-severity fire regimes in ponderosa pine and mixed-conifer forests of western North America. PLoS ONE 9: e87852. ***(In the largest and most comprehensive analysis ever conducted regarding the historical occurrence of high-intensity fire, the authors found that ponderosa pine and mixed-conifer forests in every region of western North America had mixed-intensity fire regimes, which included substantial occurrence of high-intensity fire. The authors also found, using multiple lines of evidence, including over a hundred historical sources and fire history reconstructions, and an extensive forest age-class analysis, that we now have unnaturally low levels of high-intensity fire in these forest types in all regions, since the beginning of fire suppression policies in the early 20th century.)***

Powers, E.M., J.D. Marshall, J. Zhang, and L. Wei. 2013. Post-fire management regimes affect carbon sequestration and storage in a Sierra Nevada mixed conifer forest. Forest Ecology and Management 291: 268-277. ***(In Sierra Nevada mixed conifer forests, the highest total aboveground carbon storage was found to occur in mature/old forest that experienced 100% tree mortality in wildland fire, and was not salvage logged or artificially replanted, relative to lightly burned old forest and salvage logged areas [Fig. 1b]).***

Shatford, J.P.A., D.E. Hibbs, and K.J. Puettmann. 2007. Conifer regeneration after forest fire in the Klamath-Siskiyous: how much, how soon? Journal of Forestry April/May 2007, pp. 139-146.

Siegel, R.B., M.W. Tingley, and R.L. Wilkerson. 2011. Black-backed Woodpecker MIS surveys on Sierra Nevada national forests: 2010 Annual Report. A report in fulfillment of U.S. Forest Service Agreement No. 08-CS-11052005-201, Modification #2; U.S. Forest Service Pacific Southwest Region, Vallejo, CA. ***("Many more species occur at high burn severity sites starting several years post-fire, however, and these include the majority of ground and shrub nesters as well as many cavity nesters. Secondary cavity nesters, such as swallows, bluebirds, and wrens, are particularly associated with severe burns, but only after nest cavities have been created, presumably by the pioneering cavity excavating species such as the Black-backed Woodpecker. Consequently, fires that create preferred conditions for Black-backed Woodpeckers in the early post-fire years will likely result in increased nesting sites for secondary cavity nesters in successive years.")***

Swanson, M.E., J.F. Franklin, R.L. Beschta, C.M. Crisafulli, D.A. DellaSala, R.L. Hutto, D. Lindenmayer, and F.J. Swanson. 2010. The forgotten stage of forest succession: early-successional ecosystems on forest sites. Frontiers Ecology & Environment 2010; doi:10.1890/090157. ***(A literature review concluding that some of the highest levels of native biodiversity found in temperate conifer forest types occur in complex early successional habitat created by stand-initiating [high severity] fire.)***

USFS (United States Forest Service). 1910-1912. Timber Survey Field Notes, 1910-1912, U.S. Forest Service, Stanislaus National Forest. Record Number 095-93-045, National Archives and Records Administration—Pacific Region, San Bruno, California, USA. ***(Surveys were conducted within unlogged forest to evaluate timber production potential in 16.2-ha (40-acre) plots within each 259.1-ha (640-acre) section in ponderosa pine and mixed-conifer forest on the westside of the Stanislaus National Forest, using one or more 1.62-ha transect per plot. Surveyors noted that surveys for individual tree size, density and species were not conducted in areas that had experienced high-severity fire sufficiently recently such that the regenerating areas did not yet contain significant merchantable sawtimber. Surveyors noted that the dominant vegetation cover across the majority of many 259.1-ha sections was montane chaparral and young conifer regeneration following high-severity fire. For example (from a typical township in the data set): a) T1S, R18E, Section 9 ("Severe fire went through [this section] years ago and killed most of the trees and land was reverted to brush", noting "several large dense sapling stands" and noting that merchantable timber existed on only four of sixteen 16.2-ha plots in the section); b) T1S, R18E, Section 14 ("Fires have killed most of timber and most of section has reverted to brush"); c) T1S, R18E, Section 15 (same); d) T1S, R18E, Section 23 ("Most of timber on section has been killed by fires which occurred many years ago"); T1S, R18E, Section 21 ("Old fires killed most of timber on this section and most of area is now brushland". Moreover, with regard to understory density, the USFS 1911 Stanislaus data set (USFS 1910-1912) recorded average sapling density on 72 ponderosa pine forest sections (and some mixedconifer) (each section one square mile in size), with an average density of 102***

saplings per acre (252 per hectare) in sections noted as having no previous logging. This is not consistent with the assumption of very low densities of saplings historically. In addition, the 1911 Stanislaus data set also recorded percent shrub cover on 57 sections (each one square mile) in ponderosa pine forests (and some mixed-conifer), with an average of 28% shrub cover in unlogged sections within forested areas with merchantable timber. In a total of 35 sections, surveyors recorded the proportion of the one-square-mile section comprised by montane chaparral areas (which often included natural conifer regeneration in the seedling, sapling, and/or pole-sized successional stage) with no merchantable timber. These montane chaparral areas represented 12,200 acres out of a total of 22,400 acres, or about 54%. As discussed above, in many of these montane chaparral areas, the visible signs of past high-severity fire were still evident, and surveyors specifically recorded large high-severity fire patches. The total area covered by the surveys was vastly larger than the small subset analyzed in Scholl and Taylor 2010 and Collins et al. 2011.) (This report constitutes new information under NEPA because it was not discovered/revealed until recently).

Issue #3—Spotted Owl PACs "Lost" Due to High-Intensity Fire

2004 Framework Assumptions/Conclusions:

The 2004 Framework FEIS (p. 143-144) claimed that 4.5 California spotted owl Protected Activity Centers (PACs) were "lost" to higher-intensity fire since 1999 (providing a list of the 18 PACs), and claimed that an average of 4.5 PACs were being "lost" to fire each year. The 2004 Framework Record of Decision (ROD), on page 6, echoed this claim about losses of spotted owls to fire, and concluded that increased logging intensity was necessary in order to combat the threat of fire: "[G]iven that valuable [spotted owl] habitat is at high risk of being lost to wildfire, I cannot conclude that maintaining higher levels of canopy closure and stand density everywhere is the right thing to do."

New Scientific Information:

On August 1, 2004, the Associated Press published two investigative news stories on this claim of "lost" PACs, and found that: a) these PACs were generally still occupied by spotted owls; and b) the lead U.S. Forest Service wildlife biologist had been countermanded when he informed the Forest Service that the assertions about owl PACs being lost to fire were inaccurate (see attached news stories). Further, in 2009, scientists discovered, in a radiotelemetry study, that, while California spotted owls choose unburned or low/moderate-severity fire areas for nesting and roosting, the owls *preferentially select* high-severity fire areas (that have not been salvage logged) for foraging (Bond et al. 2009). Roberts (2008) found that spotted owl reproduction rates were 60% higher in mixed-severity fire areas (not salvage logged) than in unburned forest. Moreover, Lee et al. (2012) found that mixed-severity wildland fire (with an average of 32% high-severity fire effects) does not reduce California spotted owl occupancy in Sierra Nevada forests (indeed, a number of the PACs that the 2004 Framework FEIS claimed to be "lost" remain occupied), but post-fire logging appears to reduce spotted owl occupancy considerably. Moreover, new science concludes that logging within the home range of spotted owls reduces occupancy.

On 9/18/15, the U.S. Fish and Wildlife Service issued a determination that, based upon the Petition by Bond and Hanson (2014) (attached), listing the California Spotted Owl under the Endangered Species Act “may be warranted”. Here are a few highlights from USFWS's recent 90-day determination:

1: With regard to Factor A (threat to the species due to habitat loss/destruction), FWS (p. 2) listed "thinning, and post fire salvage logging" as primary threats. In the context of concluding that removal of post-fire habitat is a threat to the owls, FWS noted that post-fire habitat is important/beneficial to spotted owls, concluding the following:

"Recent research has focused on use of burned forests by CSO and has concluded that unlogged burned areas may be important to reproductive success and continued occupancy."

FWS identifies logging (which includes post-fire logging, thinning, and clearcutting) as the major source of the owl's population decline, concluding the following:

"The petitioner cites over 150 references, a number of which are related to all timber harvest types, decreased use by CSO and data driven measurement of curtailment of the range and/or reduction in reproducing owl pairs."

2: With regard to Factor D (inadequacy of existing protections), FWS (p. 4) agreed with JMP and WNI that the Forest Service's "2004 Framework" forest plan, and more recent forest plan revisions, represent a threat to the California Spotted Owl, noting the following as the reasons for their conclusion:

"2004a USDA. This amendment to the 2001 US Forest Service Forest Plans (USDA 2001) allowed increased or new timber harvest, thinning, fuels reduction, post fire logging, etc. in areas previously managed for CSO. USDA 2013b. Management in the Lake Tahoe Basin Management Unit allows clear cut timber harvest and removal of larger diameter trees (>30" dbh) in CSO habitat and previously occupied nest areas."

3: With regard to Factor E (other issues), FWS (pp. 4-5) agreed with JMP and WNI that California Spotted Owl populations are indeed now declining, and notes that the population is now so small that it has an "impoverished gene pool". FWS further agrees with JMP and WNI that California Spotted Owl habitat loss and fragmentation caused by logging "can exacerbate" the threats to the owls from climate change.

Below is a summary of other recent, significant new information with regard to spotted owls:

Bond, M. L., D. E. Lee, R. B. Siegel, & J. P. Ward, Jr. 2009a. Habitat use and selection by California Spotted Owls in a postfire landscape. Journal of Wildlife Management 73: 1116-1124. ***(In a radiotelemetry study, California spotted owls preferentially selected high-severity fire areas, which had not been salvage logged, for foraging.)***

Bond, M.L., D.E. Lee, R.B. Siegel, and M.W. Tingley. 2013. Diet and home-range size of California spotted owls in a burned forest. Western Birds 44: 114-126 ***(Home range size of spotted owls in the McNally fire was similar to, or smaller than, home ranges in unburned forests in the Sierra Nevada, indicating high territory fitness in post-fire habitat; owls in burned forest had a diet rich in small mammals, including pocket gophers.)***

Ganey, J.L., S.C. Kyle, T.A. Rawlinson, D.L. Apprill, and J.P. Ward, Jr. 2014. Relative abundance of small mammals in nest core areas and burned wintering areas of Mexican spotted owls in the Sacramento Mountains, New Mexico. The Wilson Journal of Ornithology 126: 47-52. ***(Mexican spotted owls tended to leave unburned old forest nest cores, traveling up to 14 kilometers to spend the winter in mixed-intensity fire areas, where the small mammal prey base was 2 to 6 times greater than in the unburned old forest nest cores).***

Lee, D.E., and M.L. Bond. 2015. Occupancy of California spotted owl sites following a large fire in the Sierra Nevada, California. The Condor 117 (in press). ***(California spotted owl occupancy in the large (approximately 257,000 acres), intense Rim fire of 2013, at one year post-fire—before logging—was 92%, which is substantially higher than average annual occupancy in unburned mature/old forest, and pair occupancy was not reduced even when most of the territory experienced high-intensity fire).***

Lee, D.E., M.L. Bond, and R.B. Siegel. 2012. Dynamics of breeding-season site occupancy of the California spotted owl in burned forests. The Condor 114: 792-802. ***(Mixed-severity wildland fire, averaging 32% high-severity fire effects, did not decrease California spotted owl territory occupancy, and probability of territory extinction was lower in mixed-severity fire areas than in unburned mature/old forest. Post-fire salvage logging largely eliminated occupancy in areas that were occupied by owls after mixed-severity fire, but before salvage logging. Tempel et al. 2015 (Ecosphere 6: Article 261) conducted a modeling study to estimate the effects of fire and thinning on California spotted owl territory fitness and occupancy, claiming that fire had a more pronounced negative effect on owls than thinning. However, there are several major errors and flaws in Tempel et al. (2015), including: 1) the authors only based the effects of thinning on its influence on canopy cover and large live trees, and excluded effects on other key structural attributes important to spotted owl nesting/roosting habitat, such as small/medium-sized trees, snags, downed logs and shrubs; 2) the authors inexplicably avoided using current empirical data on the effects of thinning on California spotted owls (43% loss of occupancy over several years in thinned area, from Stephens et al. 2014, as discussed below); 3) the authors inexplicably avoided using the largest current empirical dataset on the effects of mixed-intensity fire on California spotted owl occupancy, found in Lee et al. (2012) (no reduction in occupancy from mixed-intensity fire, and slight, non-significant numerical increase in occupancy relative to unburned forests), and instead chose to use a much smaller post-fire dataset, from Tempel et al. (2014b) (Ecological Applications 24: 2089-2106), which reported a reduction in owl occupancy but was based on territories that had been extensively post-fire logged after the Star fire of 2001 (see discussion of this in Bond and Hanson 2014 (the California spotted owl ESA Petition); and 4) the authors acknowledged that their modeling may underestimate the adverse effects of thinning, and may mischaracterize the effects of fire, and further acknowledged that their results are "confounded by the effects of [post-***

fire] salvage logging." Thus, the results do not represent a credible or scientifically-based assessment of thinning versus fire with regard to owl populations.)

Moors, A. 2012&2013. Occupancy and reproductive success of Mexican spotted owls in the Chiricahua Mountains. Annual reports to the Coronado National Forest, Arizona for 2012 and 2013 field seasons. ***(After a 223,000-acre fire, Mexican spotted owl occupancy increased. Reproduction also increased, particularly in the territories that had the highest levels of high-intensity fire).***

Roberts, S.L. 2008. The effects of fire on California spotted owls and their mammalian prey in the central Sierra Nevada, California. Ph.D. Dissertation, University of California at Davis. ***(California spotted owl reproduction was 60% higher in a mixed-severity fire area [no salvage logging] than in unburned mature/old forest.)***

Seamans, M.E., and R.J. Gutiérrez. 2007. Habitat selection in a changing environment: the relationship between habitat alteration and spotted owl territory occupancy and breeding dispersal. The Condor 109: 566-576. ***(The authors found that commercial logging of as little as 20 hectares, or about 50 acres, in spotted owl home ranges significantly reduced occupancy.)***

Issue #4—Spotted Owl Population Trend

2004 Framework Assumptions/Conclusions:

The 2004 Framework FEIS (pp. 141-142) stated that, using the most current methods, at that time, of determining California spotted owl population trend, the data indicate "a stable population" for all of the Sierra Nevada spotted owl study areas. On December 23, 2014, ecologists Monica Bond and Chad Hanson submitted a Petition to U.S. Fish and Wildlife Service to list the California spotted owl under the Endangered Species Act due to threats from commercial thinning and post-fire logging on both private and National Forest lands (http://www.wildnatureinstitute.org/uploads/5/5/7/7/5577192/cso_fesa_petition_dec_22_2014.pdf).

New Scientific Information:

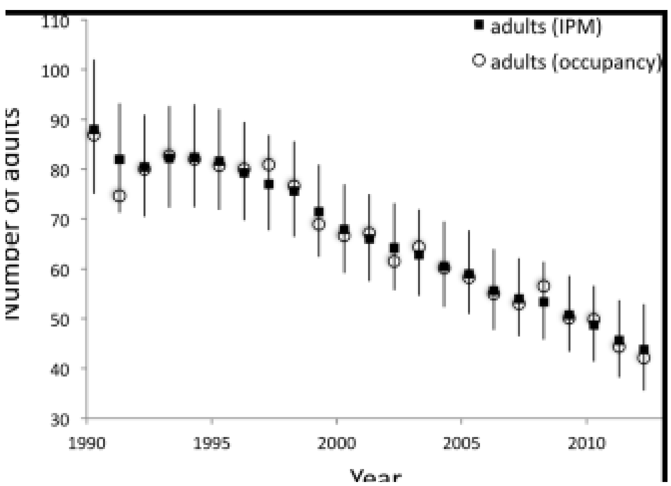
Conner, M.M., J.J. Keane, C.V. Gallagher, G. Jehle, T.E. Munton, P.A. Shaklee, and R.A. Gerrard. 2013. Realized population change for long-term monitoring: California spotted owl case study. Journal of Wildlife Management 77: 1449-1458. ***(Using a more robust statistical analysis approach than the methods used previously, the authors found that California spotted owl populations are, and have been, declining in the Sierra Nevada, based upon results from the Lassen, Sierra, and Sequoia/Kings-Canyon study areas. The Sequoia/Kings-Canyon study area was the only one with an upward population trajectory, and is the only study area in protected forests, with an active mixed-intensity fire regime, and no mechanical thinning or post-fire salvage logging. The USFS study areas (Lassen and Sierra) have had extensive fire suppression, mechanical thinning, and post-fire logging.)***

Stephens, S.L., S.W. Bigelow, R.D. Burnett, B.M. Collins, C.V. Gallagher, J. Keane, D.A. Kelt, M.P. North, L.J. Roberts, P.A. Stine, and D.H. Van Vuren. 2014. California Spotted Owl, songbird, and small mammal responses to landscape fuel treatments. BioScience (in press). ***(Areas logged through mechanical thinning and group selection on national forest lands in the northern Sierra Nevada experienced an alarming 43% decline in California spotted owl populations within just a few years).***

Tempel, DJ. 2014. California spotted owl population dynamics in the central Sierra Nevada: an assessment using multiple types of data. PhD Dissertation, University of Minnesota, St. Paul, MN.

Tempel, D.J., and R.J. Gutiérrez. 2013. Relation between occupancy and abundance for a territorial species, the California spotted owl. Conservation Biology 27: 1087-1095. ***(In the remaining Sierra Nevada study area for the California spotted owl—the Eldorado study area—the authors found that spotted owl territories have been, and are, declining significantly. This study area is characterized by extensive fire suppression, mechanical thinning, and post-fire logging.)***

Tempel, D.J., M.Z. Peery, and R.J. Gutiérrez. 2014a. Using integrated population models to improve conservation monitoring: California spotted owls as a case study. Ecological Modelling 289: 86-95.



Issue #5—Black-backed Woodpecker Habitat Needs and Population Threats

2004 Framework Assumptions/Conclusions:

The 2004 Framework FEIS did not recognize any significant conservation threats to the Black-backed Woodpecker, and the 2004 Framework ROD (p. 52) allowed post-fire clearcutting in 90% of any given fire area, and allowed up to 100% of high-severity fire areas to be subjected to post-fire clearcutting by requiring retention of only 10% of the total fire area unlogged (i.e., the 10% retention can be in low-severity fire areas).

New Scientific Information:

Black-backed Woodpeckers rely upon large patches (generally at least 200 acres per pair) of recently killed trees (typically less than 8 years post-mortality) with very high densities of medium and large snags (usually at least 80-100 per acre), and any significant level of post-fire salvage logging largely eliminates nesting and foraging potential. Moreover, Hanson et al. (2012) (the Black-backed Woodpecker federal Endangered Species Act listing petition) found that there are likely less than 700 pairs of Black-backed Woodpeckers in the Sierra Nevada, and they are substantially threatened by ongoing fire suppression, post-fire salvage logging, mechanical thinning "fuel reduction" logging projects, and possibly climate change. On April 8, 2013, the U.S. Fish and Wildlife Service determined that the Sierra Nevada and eastern Oregon Cascades population of this species may be warranted for listing under the ESA. In addition, in the fall of 2012, the Forest Service determined that there is a significant concern about the conservation of Black-backed Woodpecker populations, in light of new scientific information indicating that current populations may be dangerously low and that populations are at risk from continued habitat loss due to fire suppression, post-fire logging, and mechanical thinning, recommending some key conservation measures to mitigate impacts to the population (Bond et al. 2012).

Bond, M.L., R.B. Siegel, and D.L. Craig. 2012. A Conservation Strategy for the Black-backed Woodpecker (*Picoides arcticus*) in California—Version 1.0. The Institute for Bird Populations, Point Reyes Station, California, For: U.S. Forest Service, Pacific Southwest Region, Vallejo, CA. ***(Conservation recommendations include: a) identify the areas of the highest densities of larger snags after fire, and do not salvage log such areas (Recommendation 1.1); b) in areas where post-fire salvage logging does occur, do not create salvage logging patches larger than 2.5 hectares in order to maintain some habitat connectivity and reduce adverse impacts on occupancy (Recommendation 1.3); c) maintain dense, mature forest conditions in unburned forests adjacent to recent fire areas in order to facilitate additional snag recruitment (from beetles radiating outward from the fire) several years post-fire, which can increase the longevity of Black-backed Woodpecker occupancy in fire areas (Recommendation 1.4); d) do not conduct post-fire salvage logging during nesting season, May 1 through July 31 (Recommendation 1.5)); and e) maintain dense, mature/old unburned forests in order to facilitate high quality Black-backed Woodpecker habitat when such areas experience wildland fire (Recommendation 3.1).***

Burnett, R.D., P. Taillie, and N. Seavy. 2011. Plumas Lassen Study 2010 Annual Report. U.S. Forest Service, Pacific Southwest Region, Vallejo, CA. ***(Black-backed Woodpecker nesting was eliminated by post-fire salvage. See Figure 11 [showing nest density on national forest lands not yet subjected to salvage logging versus private lands that had been salvage logged.)***

Burnett, R.D., M. Preston, and N. Seavy. 2012. Plumas Lassen Study 2011 Annual Report. U.S. Forest Service, Pacific Southwest Region, Vallejo, CA. ***(Black-backed Woodpecker potential occupancy rapidly approaches zero when less than 40-80 snags per acre occur, or are retained (Burnett et al. 2012, Fig. 8 [occupancy dropping towards zero when there are***

fewer than 4-8 snags per 11.3-meter radius plot—i.e., less than 4-8 snags per 1/10th-acre, or less than 40-80 snags per acre.)

Hanson, C. T. and M. P. North. 2008. Postfire woodpecker foraging in salvage-logged and unlogged forests of the Sierra Nevada. Condor 110: 777–782. ***(Black-backed Woodpeckers selected dense, old forests that experienced high-severity fire, and avoided salvage logged areas [see Tables 1 and 2].)***

Hutto, R. L. 2008. The ecological importance of severe wildfires: Some like it hot. Ecological Applications 18:1827–1834. ***(Figure 4a, showing about 50% loss of Black-backed Woodpecker post-fire occupancy due to moderate <u>pre</u>-fire logging [consistent with mechanical thinning] in areas that later experienced wildland fire.)***

Odion, D.C., and Hanson, C.T. 2013. Projecting impacts of fire management on a biodiversity indicator in the Sierra Nevada and Cascades, USA: the Black-backed Woodpecker. The Open Forest Science Journal 6: 14-23. ***(High-severity fire, which creates primary habitat for Black-backed Woodpeckers, has declined >fourfold since the early 20th century in the Sierra Nevada and eastern Oregon Cascades due to fire suppression. Further, the current rate of high-severity fire in mature/old forest (which creates primary, or high suitability, habitat for this species) in the Sierra Nevada and eastern Oregon Cascades is so low, and recent high-severity fire in mature/old forest comprises such a tiny percentage of the overall forested landscape currently (0.66%, or about 1/150th of the landscape), that even if high-severity fire in mature/old forest was increased by several times, it would only amount to a very small proportional reduction in mature/old forest, while getting Black-backed Woodpecker habitat closer to its historical, natural levels. Conversely, the combined effect of a moderate version of current forest management—prefire thinning of 20% of the mature/old forest (in order to enhance fire suppression) over the next 27 years, combined with post-fire logging of one-third of the primary Black-backed Woodpecker habitat, would reduce primary Black-backed Woodpecker habitat to an alarmingly low 0.20% (1/500th) of the forested landscape, seriously threatening the viability of Black-backed Woodpecker populations.)***

Odion D.C., Hanson C.T., Arsenault A., Baker W.L., DellaSala D.A., Hutto R.L., Klenner W., Moritz M.A., Sherriff R.L., Veblen T.T., Williams M.A. 2014. Examining historical and current mixed-severity fire regimes in ponderosa pine and mixed-conifer forests of western North America. PLoS ONE 9: e87852. ***(High-severity fire has declined fourfold in the Sierra Nevada since the early 20th century, due to fire suppression.)***

Rota, C.T. 2013. Not all forests are disturbed equally: population dynamics and resource selection of Black-backed Woodpeckers in the Black Hills, South Dakota. Ph.D. Dissertation, University of Missouri-Columbia, MO. (***Rota (2013) finds that Black-backed Woodpeckers only maintain stable or increasing populations (i.e., viable populations) in recent wildland fire areas occurring within dense mature/older forest (which have very high densities of large wood-boring beetle larvae due to the very high densities of medium/large fire-killed trees). And, while Black-backeds are occasionally found in unburned forest or prescribed burn areas, unburned "beetle-kill" forests (unburned forest areas with high levels of tree***

mortality from small pine beetles) and lower-intensity prescribed burns have declining populations of Black-backed Woodpeckers (with the exception of a tiny percentage of beetle-kill areas). The study shows that unburned beetle-kill forests do not support viable populations, but very high snag-density beetle-kill areas tend to slow the population decline of Black-backed Woodpeckers in between occurrences of wildland fire. Population decline rates are alarmingly fast in low-intensity prescribed burn areas, indicating that such areas do not provide suitable habitat. Black-backed Woodpeckers are highly specialized and adapted to prey upon wood-boring beetle larvae found predominantly in recent higher-severity wildland fire areas. Moreover, while Black-backed Woodpeckers are naturally camouflaged against the charred bark of fire-killed trees, they are more conspicuous in unburned forests, or low-severity burned forests, and are much more vulnerable to predation by raptors in such areas. For this reason, even when a Black-backed Woodpecker pair does successfully reproduce in unburned forest or low-severity fire areas, both juveniles and adults have much lower survival rates than in higher-severity wildland fire areas.)

Saab, V.A., R.E. Russell, and J.G. Dudley. 2009. Nest-site selection by cavity-nesting birds in relation to postfire salvage logging. Forest Ecology and Management 257: 151–159. ***(Black-backed Woodpeckers select areas with about 325 medium and large snags per hectare [about 132 per acre], and nest-site occupancy potential dropped to near zero when snag density was below about 270 per hectare, or about 109 per acre [see Fig. 2A, showing 270 snags per hectare as the lower boundary of the 95% confidence interval].)***

Seavy, N.E., R.D. Burnett, and P.J. Taille. 2012. Black-backed woodpecker nest-tree preference in burned forests of the Sierra Nevada, California. Wildlife Society Bulletin 36: 722-728. ***(Black-backed Woodpeckers selected sites with an average of 13.3 snags per 11.3-meter radius plot [i.e., 0.1-acre plot], or about 133 snags per acre.)***

Siegel, R.B., M.W. Tingley, and R.L. Wilkerson. 2011. Black-backed Woodpecker MIS surveys on Sierra Nevada national forests: 2010 Annual Report. A report in fulfillment of U.S. Forest Service Agreement No. 08-CS-11052005-201, Modification #2; U.S. Forest Service Pacific Southwest Region, Vallejo, CA. ***(Black-backed woodpecker occupancy declines dramatically by 5-7 years post-fire relative to 1-2 years post-fire, and approaches zero by 10 years post-fire [Fig. 15a].)***

Siegel, R.B., M.W. Tingley, R.L. Wilkerson, M.L. Bond, and C.A. Howell. 2013. Assessing home range size and habitat needs of Black-backed Woodpeckers in California: Report for the 2011 and 2012 field seasons. Institute for Bird Populations. ***(Black-backed woodpeckers strongly select large patches of higher-severity fire with high densities of medium and large snags, generally at least 100 to 200 hectares (roughly 250 to 500 acres) per pair, and post-fire salvage logging eliminates Black-backed woodpecker foraging habitat [see Fig. 13, showing almost complete avoidance of salvage logged areas]. Suitable foraging habitat was found to have more than 17-20 square meters per hectare of recent snag basal area [pp. 45, 68-70], and suitable nesting habitat was found to average 43 square meters per hectare of recent snag basal area and range from 18 to 85 square meters to hectare [p. 59, Table 13]. Moreover, Appendix 2, Fig. 2 indicates that the Sierra Nevada population of***

Black-backed Woodpeckers is genetically distinct from the Oregon Cascades population, though additional work needs to be conducted to determine just how distinct the two populations are. Siegel et al. 2013 also found that the small number of Black-backed Woodpeckers with mostly unburned forest home ranges had home ranges far larger than those in burned forest, and that the birds in unburned forest were traveling more than twice as far as those in burned forest in order to obtain lesser food than those in burned forests, indicating that such areas do not represent suitable, viable habitat for this species.)

Tarbill, G.L. 2010. Nest site selection and influence of woodpeckers on recovery in a burned forest of the Sierra Nevada. Master's Thesis, California State University, Sacramento. ***(In post-fire eastside pine and mixed-conifer forests of the northern Sierra Nevada, Black-backed woodpeckers strongly selected stands with very high densities of medium and large snags, with well over 200 such snags per hectare on average at nest sites [Table 2], and nesting potential was optimized at 250 or more per hectare, dropping to very low levels below 100 to 200 per hectare [Fig. 5b].)***

USFWS. 2013. 90-day Finding on a Petition to List Two Populations of Black-backed Woodpecker as Threatened or Endangered. U.S. Fish and Wildlife Service, Washington, D.C., April 9, 2013. ***(USFWS (2013), on page 14, "conclude[d] that the information provided in the petition or in our files present substantial scientific or commercial information indicating that the petitioned action may be warranted for the Oregon Cascades-California and Black Hills populations of the black-backed woodpecker due to the present or threatened destruction, modification, or curtailment of the populations' habitat or range as a result of salvage logging, tree thinning, and fire suppression activities throughout their respective ranges." USFWS (2013), on page 19, also "conclude[d] that the information provided in the petition and available in our files provides substantial scientific or commercial information indicating that the petitioned action may be warranted due to small population sizes for the Oregon Cascades-California and Black Hills populations, and due to climate change for the Oregon Cascades-California population." USFWS (2013), at pages 18-19, concluded that substantial scientific evidence indicates that current populations may be well below the level at which a significant risk of extinction is created based upon Traill et al. (2010), and concluded that, while some climate models predict increasing future fire, others predict decreasing future fire (due to increasing summer precipitation), and, in any event, models predict a shrinking acreage of the middle/upper-elevation conifer forest types upon which Black-backed Woodpecker depend most (range contraction).)***

Issue #6—Pacific Fishers, Fire, and Forest Structure

2004 Framework Assumptions/Conclusions:

The 2004 Framework FEIS (pp. S-15, 138, 243, and 246) assumed that mixed-severity fire, including higher-severity fire patches, was a primary threat to Pacific fishers, and the Framework FEIS (p. 242) did not include density of small/medium-sized trees among the important factors in its assessment of impacts to fishers. The U.S. Fish and Wildlife Service, in the fall of 2014, proposed to list the southern Sierra Nevada population of Pacific fishers as Threatened under the Endangered Species Act.

<u>*New Scientific Information*</u>:

The data indicate that one of the top factors predicting fisher occupancy is a very high density of small/medium-sized trees, including areas dominated by fir and cedar, and that Pacific fishers may benefit from some mixed-severity fire.

Garner, J.D. 2013. Selection of disturbed habitat by fishers (*Martes pennanti*) in the Sierra National Forest. Master's Thesis, Humboldt State University. ***(Fishers actively avoided mechanically thinned areas when the scale of observation was sufficiently precise to determine stand-scale patterns of selection and avoidance—generally less than 200 meters).***

Hanson, C.T. 2013. Pacific fisher habitat use of a heterogeneous post-fire and unburned landscape in the southern Sierra Nevada, California, USA. The Open Forest Science Journal 6: 24-30. ***(Areas used by Pacific fishers in fire areas have a significantly higher proportion of higher-severity fire (50-100% basal area mortality) within a 500 meter radius than random locations along survey transects within fires. Pacific fishers are using pre-fire mature/old forest that experienced moderate/high-severity fire at about the same levels as they are using unburned mature/old forest. When fishers are near fire perimeters, they strongly select the burned side of the fire edge.)***

Hanson, C.T. 2015. Use of higher-severity fire areas by female Pacific fishers on the Kern Plateau, Sierra Nevada, California, USA. The Wildlife Society Bulletin 39: 497-502. ***(Using a Pacific fisher scat-detection approach, the current hypothesis among land managers that fishers will avoid higher-intensity fire areas was rejected, and fishers used unlogged higher-intensity fire areas at levels comparable to use of unburned dense, mature/old forest. Female fishers demonstrated a significant selection in favor of the large, intense McNally fire over adjacent unburned mature/old forest, and the highest frequency of female fisher scat detection was over 250 meters into the interior of the largest higher-intensity fire patch (over 12,000 acres).***

Underwood, E.C., J.H. Viers, J.F. Quinn, and M. North. 2010. Using topography to meet wildlife and fuels treatment objectives in fire-suppressed landscapes. Environmental Management 46: 809-819. ***(Fishers are selecting the densest forest, dominated by fir and cedar, with the highest densities of small and medium-sized trees, and the highest snag levels.)***

Zielinski, W.J., R.L. Truex, J.R. Dunk, and T. Gaman. 2006. Using forest inventory data to assess fisher resting habitat suitability in California. Ecological Applications 16: 1010-1025. ***(The two most important factors associated with fisher rest sites are high canopy cover and high densities of small and medium-sized trees less than 50 cm in diameter [Tables 1 and 3].)***

Zielinski, W.J., J.A. Baldwin, R.L. Truex, J.M. Tucker, and P.A. Flebbe. 2013. Estimating trend

in occupancy for the southern Sierra fisher (*Martes pennanti*) population. Journal of Fish and Wildlife Management 4: 1-17. ***(The authors investigated fisher occupancy in three subpopulations of the southern Sierra Nevada fisher population: the western slope of Sierra National Forest; the Greenhorn mountains area of southwestern Sequoia National Forest; and the Kern Plateau of southeastern Sequoia National Forest area, using baited track-plate stations. The Kern Plateau area is predominantly post-fire habitat [mostly unaffected by salvage logging] from several large fires occurring since 2000, including the Manter fire of 2000 and the McNally fire of 2002. The baited track-plate stations used for the study included these fire areas [Fig. 2]. Mean annual fisher occupancy at detection stations was lower on Sierra National Forest than on the Kern Plateau. Occupancy was trending downward on Sierra National Forest, and upward on the Kern Plateau, though neither was statistically significant, possibly due to a small data set.)***

<u>Issue #7: Fire Intensity Trend</u>

2004 Framework Assumptions/Conclusions:

The 2004 Framework FEIS (p. 125) assumed that fire severity/intensity is increasing in Sierra Nevada forests.

New Scientific Information:

Collins, B.M., J.D. Miller, A.E. Thode, M. Kelly, J.W. van Wagtendonk, and S.L. Stephens. 2009. Interactions among wildland fires in a long-established Sierra Nevada natural fire area. Ecosystems 12:114–128. ***(No increase in high-severity fire found in the study area within Yosemite National Park.)***

Crimmins, S.L., et al. 2011. Changes in climatic water balance drive downhill shifts in plant species' optimum elevations. Science 331:324-327. ***(Precipitation was found to be increasing [Figs. 2A and S1-C].)***

Dillon, G.K., et al. 2011. Both topography and climate affected forest and woodland burn severity in two regions of the western US, 1984 to 2006. Ecosphere 2:Article 130. ***(No increase in fire severity was found in most forested regions of the western U.S., including no increasing trend of fire severity in forests of the Pacific Northwest and Inland Northwest, which extended into the northern portion of the Sierra Nevada management region.)***

Hanson, C.T. , D.C. Odion, D.A. DellaSala, and W.L. Baker. 2009. Overestimation of fire risk in the Northern Spotted Owl Recovery Plan. Conservation Biology 23:1314–1319. ***(Fire severity is not increasing in forests of the Klamath and southern Cascades or eastern Cascades.)***

Hanson, C.T., and D.C. Odion. 2014. Is fire severity increasing in the Sierra Nevada mountains, California, USA? International Journal of Wildland Fire 23: 1-8. ***(Hanson and Odion (2014)***

conducted the first comprehensive assessment of fire intensity since 1984 in the Sierra Nevada using 100% of available fire intensity data, and, using Mann-Kendall trend tests (a common approach for environmental time series data—one which has similar or greater statistical power than parametric analyses when using non-parametric data sets, such as fire data), found no increasing trend in terms of high-intensity fire proportion, area, mean patch size, or maximum patch size. Hanson and Odion (2014) checked for serial autocorrelation in the data, and found none, and used pre-1984 vegetation data (1977 Cal-Veg) in order to completely include any conifer forest experiencing high-intensity fire in all time periods since 1984 (the accuracy of this data at the forest strata scale used in the analysis was 85-88%). Hanson and Odion (2014) also checked the approach of Miller et al. (2009), Miller and Safford (2012), and Mallek et al. (2013) for bias, due to the use of vegetation layers that post-date the fires being analyzed in those studies. Hanson and Odion (2014) found that there is a statistically significant bias in both studies (p = 0.025 and p = 0.021, respectively), the effect of which is to exclude relatively more conifer forest experiencing high-intensity fire in the earlier years of the time series, thus creating the false appearance of an increasing trend in fire severity. Interestingly, Miller et al. (2012a), acknowledged the potential bias that can result from using a vegetation classification data set that post-dates the time series. In that study, conducted in the Klamath region of California, Miller et al. used a vegetation layer that preceded the time series, and found no trend of increasing fire severity. Miller et al. (2009) and Miller and Safford (2012) did not, however, follow this same approach. Hanson and Odion (2014) also found that the regional fire severity data set used by Miller et al. (2009) and Miller and Safford (2012) disproportionately excluded fires in the earlier years of the time series, relative to the standard national fire severity data set (www.mtbs.gov) used in other fire severity trend studies, resulting in an additional bias which created, once again, the inaccurate appearance of relatively less high-severity fire in the earlier years, and relatively more in more recent years. The results of Hanson and Odion (2014) are consistent with all other recent studies of fire intensity trends in California's forests that have used all available fire intensity data, including Collins et al. (2009) in a portion of Yosemite National Park, Schwind (2008) regarding all vegetation in California, Hanson et al. (2009) and Miller et al. (2012a) regarding conifer forests in the Klamath and southern Cascades regions of California, and Dillon et al. (2011) regarding forests of the Pacific (south to the northernmost portion of California) and Northwest.)

Hanson, C.T., and D.C. Odion. Sierra Nevada fire severity conclusions are robust to further analysis: a reply to Safford et al. International Journal of Wildland Fire **24**: 294-295. ***(Safford et al. 2015 hypothesized that, if the analysis in Hanson and Odion 2014 had been restricted to wildland fires in mixed-conifer and yellow pine forests on National Forest lands, a significant upward trend in fire severity since 1984 might have been evident. Hanson and Odion (in press) empirically tested this hypothesis and found, again, no increasing trend in fire severity in the Sierra Nevada.)***

Miller, J.D., C.N. Skinner, H.D. Safford, E.E. Knapp, and C.M. Ramirez. 2012a. Trends and causes of severity, size, and number of fires in northwestern California, USA. Ecological Applications 22:184-203. ***(No increase in fire severity was found in the Klamath region of California, which partially overlaps the Sierra Nevada management region.)***

Issue #8: Home Protection from Wildland Fire

2004 Framework Assumptions/Conclusions:

The 2004 Framework assumed that home protection is best accomplished by a ¼-mile wide "Defense Zone" surrounding towns, and groups of cabins, as well as an additional 1.5-mile wide "Threat Zone" surrounding the Defense Zone.

New Scientific Information:

Cohen, J.D., and R.D. Stratton. 2008. Home destruction examination: Grass Valley Fire. U.S. Forest Service Technical Paper R5-TP-026b. U.S. Forest Service, Region 5, Vallejo, CA. ***(The vast majority of homes burned in wildland fires are burned by slow-moving, low-severity fire, and defensible space within 100-200 feet of individual homes [reducing brush and small trees, and limbing up larger trees, while also reducing the combustibility of the home itself] effectively protects homes from fires, even when they are more intense)***

Gibbons, P. et al. 2012. Land management practices associated with house loss in wildfires. PLoS ONE 7: e29212. ***(Defensible space work within 40 meters [about 131 feet] of individual homes effectively protects homes from wildland fire. The authors concluded that the current management practice of thinning broad zones in wildland areas hundreds, or thousands, of meters away from homes is ineffective and diverts resources away from actual home protection, which must be focused immediately adjacent to individual structures in order to protect them.)***

Issue #9: Ineffectiveness of Thinning

2004 Framework Assumptions/Conclusions:

The 2004 Framework assumed that mechanical thinning would consistently and effectively reduce fire intensity.

New Scientific Information:

The goal of thinning is to prevent high-intensity fire patches from occurring during high/extreme fire weather, but these conditions are precisely when thinning is least effective:

While some studies indicate that thinning can reduce tree mortality levels from fire in low/moderate fire weather conditions (though such studies do not account for tree mortality from thinning itself)—i.e., conditions in which high-intensity fire patches do not occur—increasingly data indicate that larger fires are driven by weather (hot, dry, windy conditions), and forest structure and "fuel" are relatively unimportant factors (Reinhardt et al. 2008 [Forest Ecology and Management 256: 1997-2006], Lydersen et al. 2014 [Forest Ecology and Management 328: 326-334], DellaSala and Hanson 2015 ["The Ecological Importance of

Mixed-Severity Fires: Nature's Phoenix"]). Whether or not thinning occurs, the only common denominator that tends to substantially reduce fire intensity and spread is fire itself—and only if it has occurred relatively recently (generally less than 10 years before), while thinning alone can tend to increase fire intensity (Stephens and Moghaddas 2005 [Forest Ecology and Management 215: 21-36, Table 12], Safford et al. 2012 [Forest Ecology and Management 274: 17-28], van Wagtendonk et al. 2012, DellaSala and Hanson 2015). In other words, thinning is largely irrelevant, and only fire tends to affect future fire behavior—and even then only for a short period of time, after which fires burn in a typical mixed-intensity pattern. Historically, the fire rotation interval (generally, how often fires actually occurred, on average, in a given stand) in mixed-conifer and ponderosa pine forests of the Sierra Nevada was around 17 to 43 years, depending upon slope aspect (Beaty and Taylor 2001, Bekker and Taylor 2001), and fire-free intervals of 50 to 100 years also occurred naturally in these forests (Stephens and Collins 2004 [Northwest Science 78: 12-23]). Therefore, there were always many areas in which fires were largely unaffected by previous fire, historically.

If the Forest Service intends to thin forests to reduce/prevent high-intensity fire occurrence, it must thin and burn each stand every 8 to 10 years for hundreds of years to even have a 50% chance of preventing high-intensity fire—and this would cause massive landscape-level habitat and watershed damage:

Understory biomass returns very rapidly after thinning and fire, so to the extent that thinning and subsequent burning results in conditions less likely to experience high-intensity fire for a period of time, such conditions last for only 8 to 10 years. Given the extremely low rate of high-intensity fire (a given stand experiences high-intensity fire only once every 700 years or so, currently), this means that, to have even a 50/50 chance of having a thinned/burned area prevent high-intensity fire, thinning and burning of logging slash piles would have to occur every decade for hundreds of years in any given stand (Rhodes and Baker 2008 [The Open Forest Science Journal 1: 1-7]). This would result not only in permanent loss of closed-canopy forest, but would also result in massive and chronic watershed damage, given repeated soil impacts from logging road creation, constant reconstruction of logging roads, logging skid trails, and landings (Rhodes and Baker 2008). Moreover, burning of logging slash piles creates unnaturally severe localized impacts to soils, as burning slash piles—often several meters tall—cook and smolder for days on hundreds of sites across thinning units, unlike wildland fires which pass over a given patch of ground very quickly.

Sincerely,

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