**UNITED STATES DEPARTMENT OF AGRICULTURE**
**FOREST SERVICE**
**SOUTHWESTERN REGION**

In the Matter of FOUR FORESTS RESTORATION INITIATIVE,
KAIBAB AND COCONINO NATIONAL FORESTS,
COCONINO COUNTY, ARIZONA – FINAL ENVIRONMENTAL
IMPACT STATEMENT

Attention: Regional Forester
Southwestern Region
333 Broadway Blvd., SE
Albuquerque, NM 87102

# OBJECTION OF ARTHUR FIRSTENBERG

Pursuant to 36 C.F.R. § 218.8, I submit this Objection in the above-named matter. The Responsible Officials are M. Earl Stewart and Michael R. Williams, Forest Supervisors, Coconino and Kaibab National Forests, respectively. The legal notice of the Final Environmental Impact Statement ("FEIS") was published in the *Arizona Daily Sun* on December 4, 2015, and this objection is timely filed within 45 days as specified in the Draft Record of Decision ("ROD") and 36 C.F.R. § 218.7(c)(2)(iv). This objection complies with the requirements of 36 C.F.R. § 218.8(c). It is based on my May 27, 2013 comments on the Draft Environmental Impact Statement ("DEIS"), on new information in the FEIS, and on the new Specialist Reports and Draft ROD. My comments on the DEIS are incorporated herein by reference. Documents referred to in this Objection that are marked with an asterisk (*) are attached hereto for inclusion in the record.

## Introduction

Twelve thousand years ago a series of large lakes covered many parts of New Mexico. The largest, Lake Estancia, occupied 430 square miles. Shall we restore it?

In what is now treeless desert at Chaco Canyon, New Mexico, Douglas fir, ponderosa pine, pinyon and juniper grew 5,500 years ago. Juniper and pinyon were still abundant 1,200 years ago when the Anasazi were building their remarkable city. To build their great houses, they harvested more than 200,000 trees of these and other species from the surrounding areas, eradicating the local woodlands and forcing them to rely on more and more distant forests for their supplies of timber.[1,2]

At one time eight million sheep and one million cattle roamed southern Arizona under Spanish rule. Beaver dams were numerous, and trout up to eighteen inches long were abundant in the Santa Cruz River. Tucson, which dammed the Santa Cruz in 1857 to form Silver Lake, got its drinking water from El Ojito Spring, within town limits. Tall grasses extended into the hills from a streamside forest. Today lake, spring, forest, and grasses are gone, and the Santa Cruz River is dry.

When the Forest Service speaks of "restoration," what exactly is it trying to restore? Search though I tried in the Final Environmental Impact Statement (FEIS), I could find no answer. Are we being asked to restore the Kaibab and Coconino forests as the timber barons left them in the early twentieth century? As Americans experienced them in the late nineteenth century after grazing their livestock in them? As the Spanish experienced them a century earlier? As the Indians experienced them before that? And which Indians, in which century?

> The imperative responsibility of any student of these matters is to provide the bases for restoring what man, especially "civilized" man, has supposedly destroyed. The overtones, if not the explicit assumption, are those of urgency of decision and of action to forestall disaster.

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[1] *J Betancourt, TR Van Devender, Holocene Vegetation in Chaco Canyon, New Mexico, *Science* 214:656-658 (1981).
[2] *NB English, JL Betancourt, JS Dena, J Quade, Strontium isotopes reveal distant sources of architectural timber in Chaco Canyon, New Mexico, *Proceedings of the National Academy of Sciences* 98(21):11891-11896 (2001).

James Malin wrote that in 1956.[3] He warned against acting on unproven assumptions, when doing so may land us in a worse situation than the one from which we are trying to extricate ourselves. He warned, in particular, against making assumptions about Indians who were neither more nor less human than we. “The question does not appear to occur to historians that the Indian culture might have been headed for a major crisis, possibly disaster, even if displacement by white culture had not intervened to give disaster a different form as well as to provide the Indian with a good alibi.” Considering the question of the restoration of the grasslands, he continued:

> A mere unquestioned acceptance of an unproved assumption does not constitute proof, regardless of the penalties imposed upon those who refuse to conform to the requirements of orthodoxy. In any case, the conditions prevailing in the grassland interior during the century from 1750 to 1850 were anything but the eighteenth-century ideal “state of nature.”

The Forest Service here, today, is acting with just such abandon towards an undefined goal, based on multiple assumptions that are not only unproven, but contradict one another. The two most basic are these:

**Assumption No. 1.** The Forest Service is so perfect in its control over nature that its policy of fire exclusion has meant no fires at all for a hundred years.

**Assumption No. 2.** The Forest Service is so powerless against nature that if it continues its past policies, it is 100% certain that every acre of the forest will burn with high severity fire in the next 35 years.

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[12] JC Malin, The Grassland of North America: Its Occupance and the Challenge of Continuous Reappraisals. In: *Man’s Role in Changing the Face of the Earth*, WL Thomas, Jr., ed., Univ. of Chicago Press 1956, pp. 350-366.

Those two assumptions are not compatible with one another. Yet they form the basis upon which the entire FEIS rests.

## Lack of Definitions

The following terms need to be defined. There is no definition of any of them in the FEIS:

**1. Fire exclusion.** If 90% of all wildfires are human-caused, and you succeed in putting out 90% of all fires, is this "fire exclusion" or is this a restoration of what is "natural"? Is putting out a human-caused fire "fire exclusion" or "restoration"?

**2. Natural.** What does restoring "natural" conditions mean? Leaving the land alone? Restoring it as it was in some undefined historical period? Imitating an unspecified prehistoric culture that no longer exists? What?

**3. Historical.** Which historical period, in which century, occupied by which culture?

**4. Restoration.** Restoration of what? Of a forest structure and fire regime in an unspecified century to imitate an unnamed culture living in a climate that is no longer the same? The definitions of "restoration" in the glossary (Appendix H) do not help, because they are referenced to "the time of settlement," which is undefined, or to the "historic range of variation," which is pegged to an unspecified period of history.

**5. Pre-European settlement.** Pre-American? Pre-Spanish? What? When? Which century?

## Objectives of the Project

The only concrete "objectives" are (p. 5 of the silviculture specialist report): (1) that there shall be 11,000 to 19,000 acres of ponderosa pine in the Kaibab National Forest, and over 30,000 acres in the two forests combined (p. 114) cut for timber production each year; and (2) that

13,000 to 55,000 acres on the Kaibab, and 40,000 to 60,000 acres in the two forests combined (p. 13 of the Draft ROD) are to be burned each year. These are explicitly the only objectives of this project. With all of the above terms undefined, clearly restoring natural or historical conditions is not the real purpose. The FEIS is simply an elaborate exercise to justify these two actions.

**Violation of NEPA Regulations**

**40 CFR § 1502.2(g):** "Environmental impact statements shall serve as the means of assessing the environmental impact of proposed agency actions, rather than justifying decisions already made."

**40 CFR § 1502.16 "Environmental consequences."** Both direct and indirect effects must be included, and "effects" must include ecological, social, and health effects, 40 CFR 1508.8. The FEIS includes no analysis of effects on the health of people with disabilities. It includes no analysis of escaped prescribed burns.

**40 CFR § 1502.24:** "**Methodology and scientific accuracy.** Agencies shall insure the professional integrity, including scientific integrity, of the discussions and analyses in environmental impact statements."

**40 CFR § 1508.7** "**Cumulative impact** is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions."

**40 CFR § 1502.20** requires site-specific analysis.

**40 CFR § 1508.27(b)(5):** Significant impact exists if the effects are highly uncertain.

**40 CFR § 1508.27(b)(10):** Significant impact exists if the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment. This action threatens violation of laws on climate change, laws protecting public health, laws protecting endangered species, laws protecting Class 1 air regions, and laws protecting people with disabilities.

## Fire Frequency and Severity

As James Malin so wisely observed:

> Is it any more possible to restore less remote than more remote time conditions? Are not all such changes in space and time irreversible? Each space-time situation is the product of a unique combination of factors which never can be brought together again.

Williams and Baker 2012,[4] 2013[5] show that the past is a mosaic, and that Forest Service dogma that says that ponderosa pine forests always had frequent surface fires and never severe crown fires until 100 years ago is wrong. In opposition to Williams and Baker, the Forest Service responds primarily with Fulé et al. 2014[6] (silviculture specialist report, p. 28).

Fulé et al. 2014 is not supported by the literature it cites. For example, Fulé says "The lack of direct documentary evidence of extensive crown fire in ponderosa pine forests in particular has been noted and reported repeatedly by ecologists and land-use historians for nearly

[4] Williams, M.A., and W.L. Baker. 2012. Spatially extensive reconstructions show variable-severity fire and heterogeneous structure in historical western United States dry forests. *Global Ecology and Biogeography* 21(10):1042−1052.
[5] Williams, M.A., and W.L. Baker. 2013. Variability of historical forest structure and fire across ponderosa pine landscapes of the Coconino Plateau and south rim of Grand Canyon National Park, Arizona, USA. *Landscape Ecology* 28:297−310. DOI 10.1007/s10980-012-9835-z
[6] Fulé, P.Z. 2014. Unsupported Inferences of High-severity fire in historical dry forests of the western United States: A response to Williams and Baker. Ecological Restoration Institute Fact Sheet: August 2014. Northern Arizona University, Flagstaff, Arizona.

90 years," citing Leopold 1924.[7] But Leopold 1924 says just the opposite, referring to "the pre-settlement period of no grazing and severe fires." Moreover, Leopold's article is about the "rough foothills corresonding in elevation to the woodland type." The trees were juniper and oak, not ponderosa pines.

**Tree Density**

Table 27 (p. 66) of the silviculture report establishes the reference conditions that the project is trying to duplicate: tree density of 11.7 to 124 trees per acre; basal area of 22.1-89.3 square feet per acre; size of tree groups is .003 to .72 acres; openness (portion of area not covered by tree crowns) of 52% to 90%.

However, the data in Table 27 are taken from Reynolds 2013,[8] which in turn is based on only six existing studies. "To date, only six studies report tree spatial reference conditions in the Southwestern ponderosa pine forests," says Reynolds. The above numbers are based on this sparse historical record—a record that, however, does not justify Reynolds' conclusions. Ponderosa pine forests were not, historically, the wide open parkland the Forest Service would like to restore.

Cooper 1960,[9] for example, is one of those six studies. Cooper relies heavily on *Beale's journal (1858) where Beale says that on the Mogollon Plateau "[t]he forest was perfectly open

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[7] Leopold, A. 1924. Grass, brush, timber and fire in southern Arizona. *Journal of Forestry* 22:1−10.

[8] RT Reynolds et al. 2013. Restoring composition and structure in Southwestern frequent-fire forests: A science-based framework for improving ecosystem resiliency. Gen. Tech. Rep. RMRS-GTR-310. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 76 pp.

[9] Cooper, C.F. 1960. Changes in vegetation, structure, and growth of southwestern pine forests since white settlement. Ecological Monographs 30:129-164.

and unencumbered with brush wood, so that the travelling was excellent."[10] However, this was at an elevation of 6,100 feet, where even today sparse pines intermingle with juniper grasslands. When Beale ascended to 7,400 feet, the mountains were "black with heavy timber," just as today.[11] Elsewhere in his journal he describes land "clothed with a noble forest of pine trees" (Beale 1858, p. 50); "Our road for the evening lay entirely through a heavy forest of pine" (Beale 1858, p. 51); "The slopes of the mesas on our left seem to be covered with a heavy growth of pine timber" (Beale 1858, p. 57); "A heavy growth of pine and cedar covered the hills in every direction... and extended as far as we could see from the high hill we ascended" (Beale 1858, p. 58). Beale states that the thickness of the trees "determined me to alter my course, and to endeavor to avoid the mountains by striking out upon the open plain." (Beale 1858, p. 53).

Cooper also quotes other early descriptions of unbroken forest, such as *Thornber (1905), who reports ponderosa pine forest on the Natanes Plateau, at an elevation of just over 6,000 feet, that formed "a more or less continuous, though in a few cases a dense covering over the entire plateau."[12]

Other early accounts agree. In 1859, *Thales H. Haskell crossed the Kaibab Plateau. He wrote: "[Brother Pearce's] pack horse got stubborn and the timber being so thick he soon got off the track and got lost…"[13]

Lang and Stewart, in 1910, surveyed the Kaibab Plateau, and took photographs that "show the range of very dense to very open forests that characterized the Kaibab Plateau in days

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[10] EF Beale,Wagon Road from Fort Defiance to the Colorado River. 35th Cong., 1st Sess., House of Representatives, Ex. Doc. No. 124, May 12, 1858, p. 49.
[11] *Id.*, p. 52.
[12] J.J. Thornber? Report of Trip Across the San Carlos, and the White Mountain Indian Reservations, July 18 to 29, Inclusive. In *Range Conditions in Arizona, 1900-1909,* Univ. of Ariz. Library, Tucson, AZ.
[13] Journal of Thales H. Haskell, prepared for publication by Juanita Brooks, *Utah Historical Quarterly* 12(1-2):68-102 (1944), at p. 75.

past."[14] (photos, Trudeau 2006, pp. 74, 76, 79). Trees per acre in pure ponderosa pine averaged 150, and in mixed conifer averaged 195 in their survey. (Trudeau 2006, p. 78). In 1913, forester Henry Graves described conditions on the plateau "ranging from dense stands to isolated trees and accompanied by patchy uneven ages reproduction." (photo of dense forest, Trudeau 2006, p. 80).

***Pearson 1950**,[15] cited in the silviculture specialist report (at p. 65) in support of creating open forests with widely spaced trees, says exactly the opposite. Pearson's monograph was a study of ponderosa pine silviculture. Large diameter, old growth trees were necessarily much fewer in number than small diameter, fresh growth that grew up in their place. When old growth was cut down, the forest that grew in its place was dense, and **needed to be so for healthy regeneration to take place**. Pearson says explicitly:

> "*Dense stocking is desirable in young stands*. During the pole stage, when the stems are shaping up, diameter growth is secondary to form and natural pruning. Dense stocking should be the rule. Overstocking is preferable to understocking, because in the former case, dominants usually assert themselves. If, as a last resort, pruning becomes necessary, removal of only enough stems to break the deadlock. If pole stands are too widely spaced, pruning provides a partial remedy. Progress of natural pruning provides an excellent criterion as to proper density of young stands." (p. 29, italics in original).

Figure 8D (Pearson 1950, p. 31) shows a young replanted stand of ponderosa pine with trees 30-36 inches apart. The stands contained 10,000 to 50,000 trees per acre until the trees were about 3 feet tall (p. 29). Table 6 (Pearson 1950, p. 28) gives a "spacing table for trees of different diameters" in a "well-stocked, many-aged stand on a better than average site for the Southwest." (Pearson 1950, p. 27). 2-inch-diameter (dbh) trees occupied 12 square feet each, were spaced 3.5

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[14] In: *JM Trudeau, *An Environmental History of the Kane and Two Mile Ranches in Arizona*, Grand Canyon Trust 2006, chapter 4, "Important Historical Accounts of the Kaibab Plateau."
[15] GA Pearson, *Management of Ponderosa Pine in the Southwest*, Agriculture Monograph No. 6, USDA Forest Service (1950).

feet apart, and numbered 3,615.4 trees per acre. 6-inch-diameter trees took up 88 square feet of space, were 9.4 feet apart, and numbered 1,073.7 trees per acre. 12-foot-diameter trees took up 348 square feet, were spaced 18.7 feet apart, and numbered 125 trees per acre. Old growth trees 3 to 4 feet in diameter occupied 3,000 to 6,000 square feet and numbered 8 to 15 trees per acre. Pearson comments that in mixed stands with trees of different diameters, the spacing rules are difficult to apply, and that overly dense growth is not a problem in the Southwest because nature prunes the trees to the proper density without human help:

> "Although overdense sapling stands are rather common, thinnings are not considered feasible or necessary in the Southwest. Although correctly timed and executed thinnings might be expected to increase the growth rate, the cost under present conditions would be far out of proportion to the benefits. Moreover, dominants generally make their appearance in the sapling thickets, and once they gain the lead, they hold and increase it. *Even the densest stands seldom stagnate as they do in other regions.*" (Pearson 1950, p. 29, emphasis added).

This was proven in an experimental plot in the Sitgreaves National Forest, where five plots of 3-foot-high ponderosa saplings, 10,000 to 50,000 per acre, were thinned to different densities, and then monitored at 5-year intervals. Fifteen years later, the tallest trees were in the plots where the trees were spaced 3 to 4 feet apart. Greater spacing retarded growth. And even the plot that was not thinned at all (with 10,000 or more trees per acre) had healthy growth: "[T]he unthinned plot contains as many distinct dominants as are needed to develop the desired irregular crown canopy." (Pearson 1950, p. 32). All plots suffered from tip moths, but the moths were most active, and the tree damage greatest, in the plot that had been thinned the most. (Pearson 1950, p. 32). Moreover, the least thinned plots were entirely covered with a uniform mat of needles. The grasses that grew up so thickly in the more-thinned plots reduced water absorption by the soil and inhibited tree growth. "From the standpoint of tree growth and water infiltration, needle litter is the more preferable ground cover." (Pearson 1950, p. 32). "Saplings and poles," he concludes, “should be dense enough to promote natural pruning without stagnation.” (Pearson 1950, p. 33).

**The entire premise behind 4FRI is exactly the opposite.** It is wrong. Again:

> “Dense stocking is desirable in order to encourage saw-timber form; but to be effective the number must be at least 3,000 per acre. The present cost of planting 3,000 trees would probably be $100 per acre. One thousand per acre, costing about $40, is the minimum number that might be expected to produce a reasonably satisfactory stand.” (Pearson 1950, p. 141).

The FEIS counts old growth and saplings the same—one tree—and states baldly that even 300 small trees is too many and that most must be gotten rid of by thinning and burning. But as Pearson showed in 1950, 300 small trees on an acre is not too many but too few for the health of the forest. A healthy stand of old growth, 8 to 15 trees per acre, will only emerge from a dense stand of young trees, hundreds or thousands to the acre. The strategy promoted in the present project—to thin out the young trees to provide them “room to grow”—is flat out wrong. They will be stunted and the forest will not survive.

The goal, in the Pearson study, was to produce a permanently sustainable yield of ponderosa pine for timber: “to leave a growing stock capable of producing satisfactory future crops at required intervals.” (Pearson 1950, p. 47). In fact this is not only still true today, it is written into every federal law regulating forests. Sustainable yield. The entire premise behind the FEIS violates this principle.

Pearson addresses fire as well, and puts the lie to many statements in the FEIS and its sources, for example Fulé’s “lack of direct documentary evidence” of extensive historical crown fires in ponderosa pine forests. Pearson talks about the obvious destructive effects of fire on pine seedlings:

> “Undoubtedly fire accounts for the lack of reproduction, or the absence of certain age classes, on extensive areas in the ponderosa pine type. Even under organized protection scarcely a year passes in which areas from 100 to 1000 acres are not virtually denuded of seedlings and saplings. Uncontrolled fire must be kept out of

> the forest for the benefit of tree reproduction as well as many other interests." (Pearson 1950, p. 124).

This also gives the lie to the myth of a century of fire exclusion. In 1950, in the middle of that century, this author was complaining that efforts at fire suppression were notoriously unsuccessful and that "uncontrolled fire" was common on a yearly basis. Pearson said the greatest fire danger was from logging slash. He said that litter from needles and twigs can contribute to the spreading of fires, but "[n]otwithstanding increased fire danger, a mat of needles is indispensable because it checks runoff, promotes water infiltration, retards evaporation, and adds organic matter to the soil." (Pearson 1950, p. 148). Needles are far preferable as a ground cover, he continues, to grass, for several reasons:

> "Of the two, herbaceous vegetation is less effective from the standpoint of timber production because it seldom forms a continuous mat, and because it competes with young trees for soil moisture. When dry, herbaceous vegetation is more flammable because it is better aerated. Unused dry grass generates intense heat of short duration and is dangerous mainly because it ignites quickly and carries fire rapidly to more bulky types of fuels such as needle litter and logging slash." (Pearson 1950, p. 149).

The FEIS aims for exactly the opposite: less trees, more grass. Ergo, more hot, rapidly spreading fires during dry seasons and droughts. Logging slash, says Pearson, is seldom continuous enough by itself to carry fire rapidly over large areas unless fanned by high winds. However, "[u]nutilized dry grass provides a connecting medium even with low wind movement." (Pearson 1950, p. 149). And, of course, replacing unbroken forest with lots of openings increases wind speed, spreading fire much more easily.

Woolsey 1911,[16] also cited in the silviculture specialist report (at p. 65), also reported extensive, huge fires in his time. In June 1910, he wrote, "a fire occurred on the Gila, Datil, and Apache National Forests which burned over about 60 square miles." (at p. 18).

*Brown et al. 1999,[17] cited by Fulé himself (2013), documents the enormous variability in fire frequency in historical ponderosa pine forests, as well as the occurrence of severe, stand-destroying fires at various intervals. "Large portions of the landscape did not record any fire for a 128 year-long period from 1723 to 1851" in the Cheeseman Lake, Colorado area, these authors say. "Fire severity varied from low-intensity surface fires to large-scale, stand-destroying fires, especially during the 1851 fire year but also possibly during other years," they say. Like Williams and Baker, they found "a greater range in fire behavior in ponderosa pine forests than generally has been found in previous studies."

**The Myth of "Fire Suppression"**

The following documents refute the myths of a century of "fire exclusion," "unnaturally dense forests," and "increased risk of catastrophic fire." They prove that the effects of this project are highly uncertain.

a. *Ganey JL, Block, WM, Jenness, JS, Wilson, RA. Mexican Spotted Owl Home Range and Habitat Use in Pine-Oak Forest: Implications for Forest Management. *Forest Science* 45(1): 127-135 (1999):

> "[C]losed-canopy stands may be within the natural range of variability for ponderosa pine forests." (at 134).

[16] Woolsey T.S. Jr. 1911. Western yellow pine in Arizona and New Mexico. USDA Forest Service, Bulletin 101. Washington, DC.
[17] PM Brown, MR Kaufmann, WD Shepperd, Long-term, landscape patterns of past fire events in a montane ponderosa pine forest of central Colorado, *Landscape Ecology* 14: 513–532 (1999).

b. Baker WL. Fire history in ponderosa pine landscapes of Grand Canyon National Park: Is it reliable enough for management and restoration? *International Journal of Wildland fire* 15:433-437 (2006):

> "[C]ommon fire history methods are much less reliable than is often recognized.... *Management aimed at lowering fire risk*, as a means of restoration, *does not presently have a sound scientific basis*." (at 433) (*emphasis added*).

c. *Baker WL and Ehle DS. Uncertainty in Fire History and Restoration of Ponderosa Pine Forests in the Western United States. *USDA Forest Service Proceedings RMRS-P-29*: 319-333 (2003):

> "[The] assumption—that high surface-fire frequencies will restore and maintain the structure of these forests—lacks a foundation in reliable fire-history research." (at 319).
>
> "[T]here is little basis for the general perception that high- or mixed-severity fires, such as the 2000 fire that burned into Los Alamos, New Mexico, are not natural in ponderosa pine forests." (at 325).
>
> "[R]epeated prescribed burning of large areas of ponderosa pine forests at short intervals (e.g. less than 20 years) lacks a sound basis in science, and *should not be done at the present time*." (at 330) (e*mphasis added*).

d. *Baker WL and Ehle DS 2001:

> "Creation of low-density forest structures across all parts of ponderosa pine landscapes, particularly in valuable parks and reserves, is not supported by [the evidence]." (at 1205).
>
> "Because of [the] variability in forest structure and its potential importance to wildlife, *widespread intentional restoration of low-density forest structure across the landscape... is unwarranted*." (at 1224) (emphasis added).

e. *Baker WL, Veblen TT, Sherriff RL. Fire, fuels and restoration of ponderosa pine-Douglas fir forests in the Rocky Mountains, USA. *Journal of Biogeography* 34:251-269 (2007):

> "Historical sources and tree-ring reconstructions document that... fires naturally varied in severity in most of these forests... *[Trees] often attained densities much greater than those reconstructed for Southwestern ponderosa pine forests*." (at 251) (emphasis added).

f. *Brown JK. The "Unnatural Fuel Buildup" Issue. In: Lotan JE et al., eds., *Proceedings, symposium and workshop on wilderness fire, 1983 November 15-18, Missoula, MT*. General Technical Report INT-182, Ogden, UT, U.S. Dept. of Agriculture, Forest Service, Intermountain forest and Range Experimental Station, pp. 127-128:

> "An interesting aspect of fire is that it both decreases fuels by consuming them and increases fuels by killing living vegetation." (at 128).

g. Odion DC and Hanson CT. Fire Severity in Conifer Forests of the Sierra Nevada, California. *Ecosystems* 9:1177-1189 (2006):

> "The prevailing management view is that, because of fire exclusion, forest fires in the Sierra... are now almost exclusively large, high-severity, stand-replacing events (Skinner and Chang 1996). As a consequence, an extensive program for the management of national forest lands was initiated in 2004." (at 1178)
>
> "Patterns of fire severity were analyzed for conifer forests in the three largest fires since 1999... Contrary to the assumptions of fire management, we found that high-severity fire was uncommon. Moreover, pines were remarkably tolerant of it." (at 1177)
> "Condition Class [the supposed condition of an area based on how long fires have been excluded from it] was *not* able to predict patterns of high-severity fire." (at 1177) (emphasis added).
>
> "[F]orests dominated by ponderosa and Jeffrey pine had little high-severity fire." (at 1183)
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> "Our findings suggest that elevated risk of high-severity fire due to the effects of fire suppression is not the pervasive, predictable ecological problem that it has often been portrayed to be." (at 1187).

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

> "We found *no evidence* that contemporary high-severity fires have increased in proportion, area or patch size since 1984." (at 4).
>
> "[P]redictions that there will be ample, or excessive, high-severity fire... may be incorrect." (at 7).

i. Hanson C. *Forest and Wildland Fire Science Synthesis: Sierra Nevada*, 28 August 2013 (11 pages, review of studies):

> "*The Most Fire-suppressed Forests Are Not Burning More Intensely*. Contrary to widespread, popular assumptions, forest areas that have missed the largest number of fire return intervals are burning predominantly at low/moderate-intensity levels, and are not experience higher fire intensity than areas that have missed fewer fire return intervals—often the most fire-suppressed forests have *lower* levels of high-intensity fire. Six studies have been conducted on this issue, and *all* of them have found that the most fire-suppressed forests burn mostly at low/moderate-intensity." (at 6) (*emphasis original*)
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> "*Fire Intensity is Not Increasing, Contrary to Widespread Popular Belief*." (at 7) (*emphasis original*).

j. *Kaufmann MR, Huckaby L. Ponderosa pine in the Colorado Front Range: Long historical fire and tree recruitment intervals and a case for landscape heterogeneity. In Neuenschwander LF and Ryan KC, eds., *Proceedings from the Joint Fire Science Conference and Workshop, Boise, ID, June 15-17, 1999*, Moscow, ID: University of Idaho Press 2000, pp. 153-160:

> [M]any ponderosa pine forests are not characterized by a high-frequency surface fire regime." (at 153)

k. *Keeley JE and Fotheringham CJ. History and Management of Crown-Fire Ecosystems: a Summary and Response. *Conservation Biology* 15(6):1561-1567 (2001):

> "[In many forests] large, catastrophic crown fires are less dependent on unnatural accumulation of fuels and more dependent on ignitions coincident with severe weather. In these ecosystems, the widespread application of prescription burning to create age mosaics is not cost-effective management." (at 1565).

l. *Martinson EJ and Omi PN. Performance of Fuel Treatments Subjected to Wildfires. USDA Forest Service Proceedings RMRS-P-29 (2003), pp. 7-13:

> "Vegetation in untreated areas was denser, on average, than in treated areas: 931 versus 319 trees/ha. But *tree density differences between treated and untreated areas were insignificant as a predictor of fire severity differences* among our study sites." (at 11) (emphasis added).

m. *Keeley JE, Fotheringham CJ, Morais M. Reexamining Fire suppression Impacts on Brushland Fire Regimes. *Science* 284:1829-1835 (1999):

> "California shrubland wildfires are increasingly destructive, and it is widely held that the problem has been intensified by fire suppression, leading to larger, more intense wildfires. However, analysis of the California Statewide Fire History Database shows that, since 1910, fire frequency and area burned have not declined, and fire size has not increased." (at 1829).

These authors suggest that fire suppression has been beneficial, and that in an era of global warming, where ignitions are becoming inevitably more frequent, it is a terrible mistake to set fires instead of trying to put them out:

> "*[I]t is suggested that fire suppression plays a critical role in offsetting potential impacts of increased ignitions*." (at 1829) (emphasis added).

Instead of relying on unreliable tree-ring studies to guess the frequency of fire in the twentieth century, these authors consulted a database that contains the actual historical records. The California Statewide Fire History Database "includes all records from the California Department of Forestry and U.S. Forest Service and other county records. They found, to their surprise, that since 1910—during a century in which it has been assumed that fire frequency steadily decreased because of "fire suppression"—that actually

> "there has been a highly significant increase... in the number of fires per decade... In no county [in California] was there a significant decline in number of fires or area burned." (at 1829).

In other words, fires continued to burn throughout the twentieth century at ever-increasing rates in spite of efforts to put them all out, and the myth of "unnaturally dense forests caused by fire suppression" is just that: a myth.

n. *McKelvey KS and Busse KK. Twentieth-Century Fire Patterns on Forest Service Lands. In *Sierra Nevada Ecosystem Project: Final report to Congress*, vol. II, *Assessments and scientific basis for management options*. Davis: University of California, Centers for Water and Wildland Resources, 1996. These authors came to the same surprising conclusion as Keeley et al., i.e. that there was *no decrease in fire during the twentieth century* due to fire suppression:

> "Maps of twentieth-century fires on Forest Service lands were analyzed. Time trends showed no overall trend in acreage." (at 1119).

o. Williams MA and Baker WL. Spatially extensive reconstructions show variable-severity fire and heterogeneous structure in historical western United States dry forests. *Global Ecology and Biogeography*, DOI: 10.1111/j.1466-8238.2011.00750.x (2012):

> "[D]ry forests were [historically] structurally variable, containing from 20 to over 1000 trees $ha^{-1}$... A set of laws, policies and initiatives that aim to uniformly reduce fuels and fire severity is likely to move many of these forests outside their historical range of variability with adverse effects on biological diversity."

p. Baker WL. *Fire Ecology in Rocky Mountain Landscapes*, Island Press, Washington, DC 2009:

> "Fires may have declined since EuroAmerican settlement, but fuels have not built up to abnormal levels, nor are trees abnormally dense or fires more severe." (at 266).
>
> "The idea of fuel buildup in interludes without fire appears logical, but it is complex and *not generally supported by the evidence*... [F]uel buildup is not clearly evident, even in low-elevation forests (W.L. Baker, Veblen, and Sherriff 2007)." (at 389) (emphasis added).

> "The best available data suggest that *fire has not declined since EuroAmerican settlement... either overall in the Rockies or in most individual vegetation types.*" (at 414) (emphasis added).

q. *Odion DC et al., Examining Historical and Current Mixed-Severity Fire Regimes in Ponderosa Pine and Mixed-Conifer Forests of Western North America. *PLoS ONE* 9(2): e87852 (2014):

> "The high-severity fire rotations in Table 4 do not support the hypothesis that low/moderate-severity fire regimes were predominant in the majority of ponderosa pine and mixed-conifer forests of western North America." (at 7).
>
> "The hypothesis that mixed-severity fire prior to fire exclusion would be lower in the driest (ponderosa and Jeffrey pine) forests than other forests also was not supported... In all regions, there were tree-age data supporting considerable age-class diversity created by mixed-severity fire, and a paucity of undisturbed park-like forests." (at 9).
>
> "*We did not find evidence to support the hypothesis that fire exclusion has greatly increased the prevalence of severe fire in ponderosa pine and mixed-conifer forests*." (at 10) (emphasis added).

In coming to these conclusions, Odion et al. analyzed the US Forest Service Inventory and Analysis database for forests throughout the Northern Rockies, Central and Southern Rockies, Southwest, Eastern Cascades, Klamath region, and Sierra Nevada. They found no support for any of the common assumptions driving Forest Service policy and this project.

r. *Goforth BR and Minnich RA. Evidence, Exaggeration, and Error in Historical Accounts of Chaparral Wildfires in California. *Ecological Applications* 17(3): 779-790 (2007). These authors found that the current "deficiency" of fire due to "fire suppression" is erroneous partly because beliefs about enormous amounts of fire in the past are a myth:

> "We find that the data do not support pre-suppression megafires, and that the impression of large historical wildfires is a result of imprecision and inaccuracy in the original reports, as well as a parlance that is beset with hyperbole." (at 779).

**Prescribed Fire is Ineffective or Counterproductive**

**<u>Ineffective</u>**

a. *Bond ML, Lee DE, Bradley CM, Hanson CT. Influence of Pre-Fire Tree Mortality on Fire Severity in Conifer Forests of the San Bernardino Mountains, California. *The Open Forest Science Journal* 2:41-47 (2009):

> "We found no evidence that pre-fire tree mortality influenced fire severity. These results indicate that *widespread removal of dead trees may not effectively reduce higher-severity fires*" (at 41) (*emphasis added*).

b. *Campbell JL, Harmon ME, Mitchell SR. Can fuel-reduction treatments really increase forest carbon storage in the western US by reducing future fire emissions? *Front. Ecol. Environ.* 2011; doi: 10.1890/110057 (13 pages):

> "*[T]he protection of one hectare of forest from wildfire require[s] the treatment of 10 hectares*." (at 6) (emphasis added).

c. *Miller JD et al. Trends and causes of severity, size, and number of fires in northwestern California, USA. *Ecological Applications* 22(1):184-203 (2012):

> "[T]he percentage of high-severity fire did not differ whether the re-burn interval was less than or greater than 30 years." (at 184).

Even areas that had not experienced fire for more than 75 years almost always burned at low intensity:

> "Douglas-fir (DF) forests that had not experienced fire since at least 1910 (the beginning of our fire occurrence data set), but then burned after 1986 (i.e., during the period for which we have severity data, 1987-2008), did so at an average of 9% high-severity fire.

d. *van Wagtendonk JW, van Wagtendonk KA, Thode AE. Factors Associated with the Severity of Intersecting Fires in Yosemite National Park, California, USA. *Fire Ecology* 8(1):11-32 (2012):

> "In 1972, Yosemite National Park established a wilderness fire zone in which lightning fires were allowed to run their courses under prescribed conditions... The proportion burned in each fire severity class was not significantly associated with fire return interval departure class." (at 11)

In other words, fires in areas that burned more recently did not burn less severely than fires in areas that had not burned in a long time.

e. McKelvey and Busse 1996:

> "An analysis of reburn patterns showed that, given a particular risk zone, fire location is nearly random." (at 1119).
>
> "[T]there is *no evidence that areas that have burned in the past are less likely to burn in the future*." (at 1130).

These findings are all the more significant because, said these authors, even a zone with the highest fire frequency during the twentieth century had far less fire than the Forest Service is aiming for:

> "If we had systematically burned this zone on a ten-year cycle in order to reduce fuels, we would have burned approximately 2.6 million ha (308,299 ha x 8.5) (6.4 million acres) over the same time period—more than fifteen times the amount burned in wildfires." (at 1130).

To do so much harm with a tool that is not even effective is wrong.

Aldo Leopold said the same thing in 1920. "Prescribed burning" was then called "light-burning."

f. *Aldo Leopold, "Piute Forestry" vs. Forest Fire Prevention," *Southwestern Magazine* 2:12-13 (1920):

> "Light-burning" means the deliberate firing of Forests at frequent intervals in order to burn up and prevent the accumulation of litter and thus prevent the occurrence of serious conflagrations. This theory is called "Piute Forestry" for the alleged reason that the California Indians, in former days, deliberately "light-burned" the forests in order to protect them against serious fires.

> "Foresters generally are strenuously opposing the light-burning propaganda because they believe that the practice of this theory would not only fail to prevent serious fires but would ultimately destroy the productiveness of the forests."

g. Baker WL 2009:

> "Wildland fire management in the United States today has been shown to be ineffective, and logically misdirected... Ineffectiveness is documented by rising amounts of burned area in spite of increasing fire control and fuel reduction." (at 415).

h. *Price OF, Bradstock RA, Keeley JE, Syphard AD. The impact of antecedent fire area on burned area in southern California coastal ecosystems. *Journal of Environmental Management* 113:301-307 (2012):

> "A fundamental assumption in this debate is that areas of reduced fuel have an inhibitory effect on the behavior of subsequent wildfires. Our results showed no evidence that wildfire area was negatively influenced by previous fires." (at 301).
>
> "This study provides no evidence of any inhibitory effect of past fire on subsequent fire." (at 304).

i. *Rhodes JJ and Baker WL. Fire Probability, Fuel Treatment Effectiveness and Ecological Tradeoffs in Western U.S. Public Forests. *The Open Forest Science Journal* 1:1-7 (2008):

> "[E]mpirical evidence of severity reduction was seen in the lee of only three of several dozen treatments in two Arizona wildfires." (at 6).

**<u>Counterproductive</u>**

a. Hanson 2013 (at 6):

> "[O]ften the most fire-suppressed forests have *lower* levels of high-intensity fire." (*emphasis original*).

b. Aldo Leopold 1920:

> "1. Light-burning destroys most of the seedling trees necessary to replace the old stand...
> "2. Light-burning gradually reduces the vitality and productiveness of the forage.
> "3. Light-burning destroys the humus in the soil necessary for rapid tree growth...
> "4. Light-burning, by inflicting scars, abnormally increases the rots which destroy the lumber, and increases the resin which depreciates lumber grades and *intensifies subsequent fires*.
> "5. Light-burning, in most cases at least, *increases the destructive effects of wood-boring insects*." (at 12).

c. Martinson and Omi 2003:

> "Theory does suggest that *fire intensity may be exacerbated by fuel treatments*... Canopy reduction exposes surface fuels to increased solar radiation, which would be expected to lower fuel moisture content and promote production of fine herbaceous fuels. Surface fuels may also be exposed to high wind speeds, accelerating both desiccation and heat transfer. Treatments that include prescribed burning may increase nutrient availability and further stimulate production of fine fuels. All these factors facilitate combustion, increase rates of heat release, and increase surface fire intensity." (at 7) (*emphasis added*).

d. Miller et al. 2012 found that if a second fire occurred less than 30 years after a first fire, it was likely to be *more severe*, not less severe, than if it occurred more than 30 years after the first fire:

> "In areas where we had record of a previous fire in D[ouglas F[ir] before 1987, a second fire occurring between 1987 and 2008 tended to burn at similar levels of high severity (10%) if the fire occurred within 30 years of the first fire. Second burns occurring in DF > 30 years after the initial fire were, however, significantly less severe (5% for both 31-60 years and > 60 years)." (at 191).

e. *Odion DC et al., Patterns of Fire Severity and Forest Conditions in the Western Klamath Mountains, California. *Conservation Biology* 18(4):927-936 (2004):

> "Considerably *less* high-severity fire occurred where fire had previously been absent since 1920 in closed forests compared to where the forests had burned since 1920... [N]onforest vegetation

> burned with *greater* severity where there was a history of fire since 1920." (at 927).

In other words, forests that have not burned in a long time are *more*, not less, fire resistant than fires that have burned in recent years. This prescribed burning project, if implemented, will increase, not decrease, the risk of catastrophic fire in the Santa Fe Municipal Watershed.

f. Baker WL 2009:

> "Removing canopy trees leads to a hotter, drier, windier *microclimate*, the climate in a small area. [It] can increase temperatures in surface fuels... reduce fuel moisture... and increase wind speed... Removing half the volume of a western white pine stand in northern Idaho lowered fuel moisture about one-third (Hornby 1935); increased windspeed 6 to 10 times; and increased the number of critical fire days, with duff moisture less than 10 percent, by about 4 times (Jemison 1934). Modeling potential fire behavior in Colorado showed that *creating open-canopy forests, by thinning closed-canopy forests, would lead to higher fireline intensity, even under moderate weather, because of lower fuel moisture and higher wind speed* (Platt, Veblen, and Sherriff 2006)." (at 373-374) (emphasis added).

> "Most modeling does not take into account that thinning that lowers canopy cover can actually increase, rather than decrease, fire risk. This can occur because reduction in canopy cover lowers fuel moisture and increases wind speed, potentially increasing, not decreasing, fireline intensity." (at 426).

g. Odion and Hanson 2006:

> "[W]e found that fire severity generally decreased rather than increasing from Condition Class 2 to 3+."

In other words, the longer it had been since the forest previously burned, the *less* severely it burned during a recent fire. The authors explained:

> "Once forest overstories close in the Sierra, they may exclude pyrogenic shrubs with high light requirements (Show and Kotok 1924), greatly decreasing the potential intensity of understory combustion. The base height of the forest canopy sufficiently dense to propagate fire may also become relatively high in long-unburned forests (Stephens and Moghaddas 2005)." (at 1187).

h. *Bebi P, Kulakowski, D, Veblen TT. Interactions Between Fire and Spruce Beetles in a Subalpine Rocky Mountain Forest Landscape. *Ecology* 84(2): 362-371 (2003). There was a spruce beetle outbreak in the 1940s in a subalpine forest in northwestern Colorado that cause substantial tree mortality. According to prevalent current assumptions, the presence of a lot of dead trees should have increased the fire risk in areas affected by the beetles. These researchers found just the opposite:

> "Fire density in this time period [between 1950 and 1990] was significantly *lower* in areas affected by the 1940s spruce beetle outbreak than in areas not affected by the outbreak." (at 366) (*emphasis added*).
>
> "From 1948 through 1950, only three fires were recorded in the study area and none of these were stands affected by the spruce beetle outbreak." (at 367).

**Escaped Prescribed Burns**

The risk of escaped prescribed burns was not analyzed and is great:

a. Aldo Leopold 1920:

> [I]t would be in practice absolutely impossible to fire the Forests without destroying the young growth, not to mention the constant risk of the fire breaking out of bounds and destroying buildings, fences, and mature timber.

b. *Kolden CA. Climate Impacts on Escaped Prescribed Fire Occurrence in California and Nevada. Master's Thesis, University of Nevada, Reno, May 2005. Her thesis shows that escaped prescribed burns are growing more, not less common, and that escaped burns are more likely to occur under wetter, not drier conditions:

> "Large escaped fires (>200 ha) were found to occur under wetter conditions than smaller fires, and on low fire danger days." (at p. i). "Review of the data revealed a steady linear increase in the number of escaped fires with time (Fig. 4.2), which mirror the linear increase of prescribed fire use in general for the region over the last 30 years." (at p. 50).

The number of escaped prescribed burns per year, just in California and Nevada, rose steadily from zero in 1970 to more than 900 in 2002 (Figure 4.2, p. 50).

**Construction and Use of Roads**

2,787 miles of roads will be heavily used to implement this project (FEIS, p. 30). That's 2,787 miles of roads in a 915 square mile area, or more than 3 miles of roads in every square mile of forest. (pp. 425-428).

2,218 miles of these roads will be used in perpetuity (p. 428). Only 500 miles are presently maintained as level 3-5 roads (suitable for passenger cars), so in order to haul timber and heavy equipment in perpetuity, another 1,718 miles of roads will be upgraded to level 3-5 maintenance, more than quadrupling the number of miles of well-maintained, heavily used roads in these forests. (p. 429). In addition, 684 miles of roads managed by jurisdictions other than the Forest Service are likely to be used for hauling timber and materials (p. 429).

Another 520 miles of new roads will be constructed, and the FEIS makes much of the fact that these new roads will be "temporary": they will be used "only" for the next ten years to haul timber, and then they will be decommissioned. After decommissioning, roads "begin to naturalize about 5 years later." (FEIS, p. 401). In other words, these "temporary" roads will have serious effects on soils, vegetation, waterways and wildlife lasting much more than 15 years. And there is no guarantee of decommissioning: roads that are supposed to be temporary could become permanent depending on future "contracts" (p. 427).

Even though the Forest Service's intent is to intensively utilize thousands of miles of roads in perpetuity, the effects on soils, water, and wildlife are only analyzed for the first ten years. "A long-term maintenance schedule after the life of this project for roads is outside the scope of this analysis." (FEIS, p. 425). Of course it is outside the scope of this project. This way they can say the new roads are all temporary and never have to tell us when, if ever, they will be decommissioned. This is another example of illegal segmentation. The Forest Service must by law analyze all past, present, and reasonably foreseeable future actions and has not done so. 40 CFR § 1508.7.

**Climate Change**

The FEIS's conclusion that its preferred alternative will actually *reduce* carbon dioxide emissions and *ameliorate* climate change (Fire Ecology Specialist Report, pp. 255 ff.) is false and contradicted by the following studies.

a. Campbell (2011):

> "Our review reveals high C[arbon] losses associated with fuel treatment.... Carbon (C) losses incurred with fuel removal generally exceed what is protected from combustion should the treated area burn. *[F]orests that burn less often store more C[arbon] than forests that burn more often*." (at 1) (*emphasis added*).

b. *Luyssaert S. et al. Old-growth forests as global carbon sinks. *Nature* 455:213-215 (2008):

> "We find that in forests between 15 and 800 years of age, net ecosystem productivity (the net carbon balance of the forest including soils) is usually positive. Our results demonstrate that old-growth forests can continue to accumulate carbon, contrary to the long-standing view that they are carbon neutral... Old-growth forests accumulate carbon for centuries and contain large quantities of it. *We expect, however, that much of this carbon, even soil carbon, will move back to the atmosphere if these forests are disturbed.*" (at 213) (emphasis added).

c. Neary DG, Overby ST, Hart SC. Soil Carbon in Aris and Semiarid Forest Ecosystems. In Kimble JM et al., eds., *The Potential of US Forest Soils to Sequester Carbon and Mitigate the Greenhouse Effect*, CRC Press, Boca Raton, FL, pp. 293-310:

> "The forest floor (O horizon) is a critical component of ecosystem sustainability... [T]here is considerable concern over the potential to

> quickly release large quantities of C[arbon] to the atmosphere from forest floor and biomass burning." (at 6-7).
>
> "Current forest management direction in the Intermountain West will result in far greater areas of the forests being treated with prescribed fire than was ever seen in the 20th Century. *The net result will be decreases in forest floor, and aboveground biomass, and mineral soil C[arbon] pools*." (at 10) (emphasis added).

**Unvalidated Computer Modeling**

On p. 18 the silviculture specialist report states that only 34% of the project area has any data at all on "species, class, diameter, height, age, growth, damage and disease," and only a fraction of that 34% has any data on "surface fuels and understory plant species." The entire FEIS is therefore invalid, because it is not site specific.

The majority of the "data" used in the FEIS are not real data but extrapolations from untested computer simulations, using a program called "most similar neighbor imputation program version 2." This methodology is untested and unvalidated. <u>Crookston et al. 2002</u>, cited in the report, is simply a user guide to the computer program, which has not been independently validated.

The method used to extrapolate to the year 2050 is "Forest Vegetation Simulator," another untested, unvalidated computer program. <u>Dixon 2002</u>, cited in the report, is a user's guide. <u>Keyser and Dixon 2008</u> is an instruction manual. <u>Friederici 2004</u>, cited on p. 26 of the silviculture report, is a description of the techniques foresters use to try to fill in the gaps in their knowledge. It states that "detailed data about understory vegetation, small trees, wildlife, and the degree to which native peoples burned forested areas, are simply not available for most periods in the past."

The set of "modeling assumptions" used in the FEIS is given on pp. 20-24 of the silviculture report, without any stated justification for any of the assumptions or any claim that these simulation methods have ever been proven in the real world. These methods of extrapolation have not been scientifically tested, and USFS does not claim that they have been, or cite to any literature proving their validity. *The entire silviculture report and FEIS, and all the so-called "data" in it and all the tables, are computer simulations based on unvalidated, non-peer reviewed, untested assumptions and models.*

**Additional Comments on the Silviculture Specialist Report (McKusker et al. 2014)**

p. 6: **Clearcutting.** "Harvest operations" may create "openings" up to 40 acres in size. "Clearcutting" is allowed where it is the "optimum" strategy for reaching the objectives. **"Optimum" is not defined.**

p. 7 "Trees established after 1890" are to be removed if "biophysical conditions would have supported stable openings over time." **"Biophysical conditions" is not defined.**

pp. 7, 11: **Clearcutting then reseeding for regeneration**. The intention is to create permanent tree plantations in parts of the forest, and meadows elsewhere.

p. 12: Restoring "**forest resilience**" and "**forest function**" are putative goals. But the whole purpose of this project is to *destroy* forest resilience. This term is defined in the glossary:

> The ability of a social or ecological system to absorb disturbances while retaining the same basic structure and ways of functioning, the capacity for self-organization, and the capacity to adapt to stress and change.

If the forest didn't keep stubbornly regenerating itself with thick young growth no matter what is done to it, the Forest Service wouldn't have to go back in every five years to slash and burn it into "clumps of trees separated by interspaces." *The Forest Service doesn't want the forest to be resilient.*

As for “forest function,” the closest term in the glossary is “forest health.” But this is defined as the Forest Service’s “perception and interpretation” of the forest’s condition, which is not a definition at all, and not subject to independent verification.

p. 13: 400,000 acres out of the 988, 764 acres of the project area was excluded from analysis, in violation of the requirement to analyze cumulative impact. The reason given is that these other acres are either analyzed *separately* elsewhere, not analyzed at all because they are in “special management areas,” or administered by other entities than USFS. Under the law this is not allowed. Cumulative impacts must be analyzed “regardless of what agency (Federal or non-Federal) or person undertakes such other actions.” 40 CFR § 1508.7.

p. 41: “High forest densities result in increased inter-tree competition, decreased tree health, growth and vigor, decreased regeneration of shade intolerant species, stagnation of structural stage progression, increased insect and disease-related mortality especially in older age classes, decreased horizontal heterogeneity, decreased understory productivity and diversity, and increased fire hazard.” Not one of these statements is backed by any data or citation to any study. Not one of these statements is true.

p. 43: **canopy cover** target is 40%. **Opening size** target is 4 acres and 200 feet width (i.e. 1 acre by 4 acres). **Mexican Spotted Owl** areas are to have “interspaces” occupying up to 50% of the area. None of these numbers is related to actual research, but seem to have been conjured out of thin air.

p. 64 on **climate change –** all statements in this section are unsupported. The repeated statement that burning would sequester more carbon than not burning is wrong (see above).

p. 67: the “cessation of fire” supposedly occurred “about 1900.” This is obviously false, as attested to by contemporary observers (Woolsey 1911) and later observers (Pearson 1950).

p. 67: restoration to conditions of "pre-European settlement times." **"Pre-European" is not defined.**

p. 216: the half of the 4FRI on the Apache-Sitgreaves and Tonto National Forests (the other million-plus acres) is illegally excluded from the analysis of cumulative effects. 40 CFR § 1508.7.

**<u>Additional Comments on the Fire Ecology Specialist Report (Lata 2014)</u>**

p. 108: Figure 40 gives the lie to statements in the FEIS and Silviculture Report about effects on climate change. Figure 40, using the FEIS's own unvalidated computer model, says the no treatment alternative would have emissions of 79,000 pounds per acre in the wildfire that is sure to consume the entire forest by 2050. That is 79,000 pounds per acre over 35 years. All of the burn treatments, in this model, will have emissions of 31,000 pounds per acre in each prescribed burn, which means every 5 years, plus 52,000 pounds per acre after treatments in the inevitable wildfire. This gives a grand total of 269,000 pounds per acre for the prescribed burn alternatives, versus only 79,000 pounds per acre for the no-action alternative.

p. 277: "Examining the cumulative effects from smoke on air quality differs from the evaluation of cumulative effects for many other resources because of the transient nature of air quality impacts." A lie. **Effects of continual burning are not "transient."** When you burn throughout the year, the impacts are not transient, as has already been angrily pointed out by some commenters in the Verde Valley: the comments, for example, of <u>Thomas Inch</u>:

> "My family moved here from Los Angeles to get out of the toxic air and now the Valley is resembling Los Angeles."

Comments of <u>B. Chrisman, M.D.</u>:

> "I live in the Verde Valley, having come here ten years ago for the famous clean air like so many others. Only the air is no longer clean and smoke hangs in this well populated valley for days or weeks at a time."

Comments of Susan MacKay:

> "The White Mountain Stewardship Contract is the first and largest forest stewardship contract in the nation, and the forest management model on which the 4 Forests Restoration Initiative is to be based. When I first moved to this area (because of respiratory problems), the WMSC had not yet begun, the air was clean, and my respiratory difficulties abated shortly after my arrival. But in the past several years, due to increased, nearly year-round, long-duration, prescribed burns I have had a return of asthmatic symptoms and, in addition, developed Chronic Obstructive Pulmonary Disease (COPD), which I did not have when I moved here. Many of my neighbors are also now afflicted with chronic coughing, shortness of breath, wheezing, fatigue and other symptoms of respiratory distress that they didn't experience until the WMSC prescribed burns became so massive and frequent. The WMSC is currently treating up to 15,000 acres of forest per year whereas the proposed 4FRI is proposing to treat up 50,000 acres per year, three times that amount."

p. 277 "It is a relatively simple exercise to estimate the total tons per acres of emissions." It's so simple that the author is unable to state how she did it. The emissions modeling "details" (Appendix F) are incomprehensible and have nothing to do with the emissions numbers given on page 40. It looks like she pulled those numbers out of thin air.

p. 381: the emissions do *not* include carbon dioxide. Global warming is ignored.

## Additional Comments on the FEIS

p. ix (table): Claim that 74 springs will be "restored," but in fact many more springs will disappear due to lack of water infiltration into the ground once the trees are gone and grass grows up instead. Pearson 1950 (see above).

p. xii: Claim that fire emissions would be highest in Alternative A (no action): 80,000 pounds per acre. The FEIS claims a reduction from 80,000 pounds to 31,000 pounds, but leaves out entirely all the emissions every five years as if the intentional burning has no emissions. (See my comments on the Fire Ecology Specialist Report, above). This alone is enough to invalidate this FEIS.

p. xiv: Claim an increase in water yield and watershed function. Another lie. Trees themselves are reserves of water . Treed land absorbs hugely more water than treeless land—even well-tended ploughed farmland. In a famous experiment in New Jersey, forest land absorbed five inches of water per hour for ten hours, while 600 feet away, cleared cultivated land of the same soil type could not absorb more than an inch altogether. Simonin 2007 showed the negative effects of forest thinning on water balance in plots of ponderosa pine in Arizona during a drought.[18]

p. 22: "Currently, about 191,000 acres (38 percent) of the project area has crown fire potential." This number is plucked out of thin air with no justification and no citation to any study. "Additional acres, primarily within or next to Mexican spotted owl habitat, are at risk from high-intensity surface fire that can result in high-severity effects." Ditto. These, and most other "facts" in the FEIS and its tables, are based, as the silviculture specialist report admits, on no data, but on untested computer simulations.

p. 140 **water quantity –** Claim that "Water yields from the ponderosa pine vegetation type are likely reduced from historic conditions due to increased stand densities that result in higher evapotranspiration rates." This is the exact opposite of the truth (see above).

p. 213: the major groups affected by air pollution are listed, and the chemically sensitive are not mentioned. Neither are they mentioned in the Fire Ecology Specialist Report (at p. 98). Some commenters in the Verde Valley have already said that the burning already going on is creating smoke throughout the year almost without exception. (see above). Figure 35 (p. 95) of the Fire Ecology Specialist Report reveals that more than 30,000 acres per year are already being

[18] *K Simonin et al., The influence of thinning on components of stand water balance in a ponderosa pine forest stand during and after extreme drought, *Agricultural and Forest Meteorology* 143: 266–276 (2007).

burned in the project area. Acreage burned will more than triple under this project (Table 29, p. 107).

pp. 431, 437 **Climate Change**. In yet another contradiction, the conclusions of Campbell et al. 2011[19] on carbon emissions are dismissed solely because it is a study about "fuel treatments," not "restoration treatments." But Hurteau and North 2009's opposite conclusion is accepted. Hurteau and North call this type of restoration treatment a "fuel treatment" (p. 437). **Neither term is defined.** This pattern is throughout the FEIS: it accepts studies that support its foregone conclusions, and rejects studies that do not support them. This is not good science and is a blatant violation of NEPA regulations. Agencies must assess impacts, not justify decisions already made, 40 CFR § 1502.2(g), and they must insure professional and scientific integrity, 40 CFR § 1502.24.

## CONCLUSION

For all of the above reasons, the FEIS should be rejected. The FEIS shows no regard for life, human or otherwise, and satisfies neither the letter nor the spirit of the National Environmental Policy Act. Alternative A, no action, is the only alternative action that is justified, and should be the one chosen.

Respectfully submitted,

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