PO Box 824
Durango, CO 81302
August 6, 2021

Objection Review Officer: Forest Supervisor Kara Chadwick
San Juan National Forest
USDA Forest Service
Attn: 1570 Objections
15 Burnett Court
Durango, CO 81301

Dear Objection Review Officer Chadwick,

I am writing to object to the Final Environmental Assessment, Finding of No Significant Impact, and Draft Decision Notice for the Salter Vegetation Management Project (Final EA hereafter). I am the "Lead Objector" and the only objector represented by this letter. This project is proposed on the Dolores Ranger District of the San Juan National Forest and the responsible official is Derek Padilla, Dolores District Ranger.

The following are my specific concerns at Scoping (Part A) and comments on the Draft EA (Part B). The Draft and Final EAs ignored 16 of 17 scientific concerns I raised about this project, and 12 of the 13 scientific sources that I submitted as the basis for these concerns. One scientific concern (A3) was insufficiently addressed, as explained below.

Thus, I object to the fact that my 17 scientific concerns, reproduced below, were completely ignored (16 of 17) or insufficiently addressed (1 of 17); indeed my scoping comments were twice completely ignored. And I object to the fact that 12 of the 13 published scientific sources I cited in my comments on Scoping and the Draft EA were not reviewed or cited in the Final EA. This is a large body of relevant scientific evidence for which there was no hard look. Lack of citation or discussion of these sources shows there was no look at all, even though required by NEPA.

The result is a document (Final EA) and draft ROD that are not adequately based on science, not congruent with the San Juan National Forest Land and Resource Management Plan (LRMP), and that do not show the public that the proposed action can actually accomplish the Purpose and Need.

Below I reproduce the 17 scientific concerns as they were presented on the Draft EA (Part A) and at Scoping (Part B), add an August 6, 2021 update to A3, and at the end (Part C) I suggest possible remedies.

PART A. Comments I provided on the Draft EA that were not addressed in the Final EA.

A1. The Draft EA does not adequately meet the requirements of the 2013 San Juan National Forest Land and Resource Management Plan (LRMP). The Draft EA does not fully: (1) set the project within the LRMP Sustainable Ecosystem Strategy (LRMP 2.1.1), (2) incorporate Disturbances and the Historical Range of Variability (LRMP 2.1.2), (3) adequately use Ecosystem Management (LRMP 2.1.4), or (4) meet the only timber objective for ponderosa pine forests (LRMP 2.9.5a).

First, the LRMP Sustainable Ecosystem Strategy (LRMP 2.1.1) explains that "Ecological sustainability is intended to provide the ecological conditions that maintain or restore the diversity of native ecosystems and natural disturbance processes...When applied effectively, the sustainable ecosystems strategy will result in ecological conditions similar to those under which native species evolved" (p. 13). The Draft EA is not consistent with this strategy because it does not specifically explain in detail how the proposed project will "provide the ecological conditions that maintain or restore the diversity of native ecosystems and natural disturbance processes." There is no mention of "restore" anywhere in the Draft EA except on p. 8, where past restoration was mentioned. Please add a new section in the Final EA, which explains in detail how the proposed actions will "maintain or restore" the project area's ponderosa pine ecosystems. Please specifically cite and review in this new section the key peer-reviewed scientific evidence about how ecological restoration relative to the HRV is to be accomplished, and implement changes in the project so that proposed actions clearly "maintain or restore the diversity of native ecosystems" in the project area. These key scientific sources, that need to be cited, reviewed, and used include, at a minimum, in addition to sources already used in the Draft EA (e.g., Baker 2018): Covington and Moore (1994), Allen et al. (2002), Romme et al. (2009), and Baker (2020).

Second, the LRMP section on Disturbances and the Historical Range of Variability (LRMP 2.1.2) explains that the Historical Range of Variability (HRV) "is an important concept used in the LRMP to guide the management of ecosystems and to achieve ecosystem sustainability...The HRV is then used to evaluate the current ecological conditions of ecosystems on TRFO and SJNF lands by comparing them to the ecological conditions that occurred during the reference period" (p. 14). This is not sufficiently implemented in the Draft EA: (1) there is only one paragraph copied from the LRMP (2.2.23) that describes the HRV in a general and qualitative way, with insufficient citation and use of published scientific sources, (2) there is no specific review of details about forest structure under the HRV, yet forest structure is the ecosystem component that will be most affected by the proposed actions, and (3) there is no detailed comparison of current forest structure and other ecological conditions to the forest structure and other ecological conditions that occurred under the HRV during the reference period. Scientific sources with this essential detailed evidence about HRV for forest structure in the study area are Romme et al. (2009) and Baker (2020). More general scientific information about HRV in southwestern ponderosa pine forests is available in many regional scientific publications (e.g., Covington and Moore 1994, Allen et al. 2002). The Final EA needs to review, present, and use this scientific evidence about the HRV relative to the same measures in current forests, from CSE data, to reformulate the project around restoring these forests so they are within the HRV, as is required by the LRMP.

Third, the LRMP section on Ecosystem Management (LRMP 2.1.4) explains that: "Ecosystem management on SJNR and TRFO lands, which uses the HRV for reference, will be implemented by maintaining or restoring the composition (plant species, animal species, and vegetation types), structure (size, density, and arrangement of live and dead vegetation, stream channel attributes) function (ecological processes and disturbances), and physical environment (soils, water, and geomorphology) of ecosystems" (p. 15). However, there is no reference at all in the Draft EA to "maintaining or restoring" or "HRV," nor is the project formulated relative to these requirements in the LRMP. The Final EA must enact Ecosystem Management by explicitly using these terms, fully elaborating the details of the HRV, particularly regarding the details of forest structure (e.g., tree density, basal area, size-class distributions, age-class distributions etc.), and explicitly restoring these forests so after harvesting they are within the HRV, with median and variability in

forest structure that is close to median and variability in forest structure under the HRV (i.e., details in Baker 2020). The Final EA must explain and document in detail how the proposed actions will maintain or restore forest structure, in particular, and other components of the HRV.

Fourth, the LRMP section on timber shows that this project is not consistent with the Forest Plan. The LRMP lists the following objective for ponderosa pine forests (2.9.5a on p. 81), and this is the only objective listed for ponderosa pine forests: "Within 10 years, conduct thinning–with an emphasis on restoration and fuels reduction of altered forest types–in the ponderosa pine and warm-dry mixed conifer vegetation types on approximately 15,000 to 20,000 acres of SJNF lands" First, this much harvesting has already been authorized in the Lone Pine project, so Salter would substantially exceed this specified timber harvesting acreage limitation in the LRMP. Second, neither Lone Pine nor Salter emphasize restoration and fuel reduction; they are instead like old-style commercial timber harvests of the pre-1990 era (before ecosystem management was declared on National Forests) when large trees were commonly logged. Commercial timber harvesting that maximizes sustained yield of timber products, rather than undertakes restoration and fuel reduction are serious departures from this specified objective for ponderosa pine in the LRMP. Please redo the goals, methods, and scale of this project so that they are specifically designed only for "restoration and fuels reduction" and the total area in Lone Pine and Salter together do not exceed the specified 15,000 to 20,000 acres over 10 years.

Fifth, the proposed alternative does not follow the LRMP and must be changed to follow it. I have heard SJNF officials several times make it clear that the LRMP must be followed, and can only be changed by amendment, which is unlikely to be a common practice. Kara Chadwick and Derrick Padilla both told us this during the development of the CFLRP proposal in January 2020. Kara Chadwick restated this during a recent collaborative training session with Jessica Western.

A2. The DWRF document "Resilience Metrics and Desired Conditions - Vegetation - Ponderosa Pine - 10-29-20" is not reviewed or used in the Draft EA. This document lists multiple metrics of forest structure at both stand and landscape scales that should all be reported and explained as informing desired conditions. The SJNF is a member of DWRF and accepted these resistance and resilience metrics as desirable conditions for the DWRF area, which includes this Salter project. Please explain in detail in the Final EA how these metrics will be addressed.

A3. The Single Tree Selection (p. 13-14) harvesting diameter limit of 26.9" is far too high, given the LRMP requirement to restore and maintain ponderosa pine forests using the HRV, as explained in A1 above, and evidence from peer-reviewed scientific reconstruction of the HRV for an area including the project area, and regional established science.

A3.1. **This proposed 26.9" dbh limit is not congruent with the LRMP**, which requires an emphasis on restoration or maintenance of forest structure under the HRV, as explained in A1 above. No scientific evidence is presented in the Draft EA that restoration or maintenance requires harvesting trees up to 26.9" dbh, and the best available evidence was not reviewed.

The best available scientific evidence for the project area shows harvesting trees up to 26.9" dbh will move stands in the Salter area further outside the HRV, and will not restore these forests, as required by the LRMP. Baker (2020), which presented the only detailed reconstruction of ponderosa pine diameter distributions under the HRV for an area that includes the project area, was not even cited in the Draft EA, and thus not used at all. I specifically requested in my

Scoping comments that this published, peer-reviewed scientific source be reviewed and used. Baker (2020) showed in Table 9 (p. 16) that 46.8% of ponderosa pine trees under the HRV were > 15.7" (40 cm) dbh and 33.1% were > 19.7" (50 cm). I calculated, using SJNF Common Stand Exam (CSE) data from the SJNF for the 16,997 trees in 394 active stands in the Salter project area, that only 42% of current trees are > 16" dbh and only 20% of current trees are > 20" dbh, thus there is a 5% deficit of trees > 16" and a 13% deficit of trees > 20" relative to the HRV that would need restoration under the LRMP. Proposed harvesting is not ecological restoration, and would further increase these deficits, not reduce them. Please review this evidence in the Final EA and change the preferred alternative so that it will restore these forests.

These required restorations can only be accomplished by avoiding harvest of trees > 16" dbh, since there is a documented deficit of trees of this diameter and larger in diameter. Note that a 16" diameter cap on harvesting is supported by Allen et al. (2002), a widely cited peer-reviewed scientific synthesis on how to restore southwestern ponderosa pine forests:

> "Ecological restoration should protect the largest and oldest trees from cutting and crown fires, focusing treatments on excess numbers of small young trees. Given widespread agreement on this point, it is generally advisable to retain ponderosa trees larger than 41 cm (16 inches) dbh and all trees with old-growth morphology regardless of size (i.e., yellow bark, large drooping limbs, twisted trunks, flattened tops). Despite the heterogeneity of forest site and stand conditions in the Southwest, cutting of larger trees will seldom be ecologically warranted as ''restoration'' treatments at this time due to their relative scarcity." (Allen et al. 2002, p. 1425).

A.3.2. The proposed harvesting is not congruent with well-established scientific methods of ecological restoration of ponderosa pine forests in the Southwest, which leave <u>all</u> presettlement trees (e.g., Moore et al. 1999, Allen et al. 2002), which also requires a 16" diameter cap at Salter. And, these trees are potential old growth, which, under the LRMP, should not be logged.

In 394 active stands with CSE data in the project area, obtained from Mark Roper in December 2020, I found 16,997 trees, but only 224 with ages. I corrected dbh ages to basal age by adding 15 years, based on the CSE data. Of the 224 ages, 10 were > 140 years, having originated in or before ca 1880, a reasonable estimate of the year of settlement by non-Indian people. Thus, the age sample shows that 4.46% of trees > 5" dbh in the project area likely would be pre-settlement trees. I do not have an estimate of current tree density for trees > 5" dbh in the Salter area, but assuming it averages 221 trees/acre over 25,000 acres and 4.46% are presettlement trees, that would be a very large number of trees, about 246,925, about half of which would be harvested under the preferred alternative. My estimate of 221trees/acre is the mean of a forest-wide CSE dataset in ponderosa pine forests. Travis Bruch of the Dolores District has an updated CSE dataset specifically for the Salter area in which only 1.86% of trees of all sizes are estimated to be presettlement. The calculation he gave me in an email is: ".0186 x 570 TPA x 25,000 acres = 265,050 trees." The two estimates are similar, but Bruch's estimate is specific to Salter. Thus, it is reasonable to assume that about half of 265,050 trees, or roughly 132,500 presettlement trees would be harvested under the preferred alternative. Please fully disclose this in the Final EA, and change the preferred alternative to protect all presettlement trees.

Please also report in the Final EA that 140-year-old presettlement trees that survive will become old-growth trees, and some stands would also likely qualify formally as old growth within 20

years, using Mehl's (1992) old-growth definition for southwestern Colorado, just a decade after this project is complete. Also please report that the current extent of formal old-growth ponderosa pine in the San Juan National Forest is well below desired conditions by reporting the current updated numbers. Protecting all these potential old-growth trees, as is required under the LRMP, is another reason that no logging of trees ≥140 years old should occur within the project area.

The LRMP makes it clear that this proposed logging of presettlement trees is not acceptable. In section 2.9.1, it says: "Forest management on SJNF and TRFO lands that results in, among other objectives, meeting needs or demands for forest product offerings...is done in a manner that: maintains or improves ecosystem function, resilience, and sustainability" (LRMP Ch. 2, p. 80). The science is clear that removing large ponderosa pines reduces stand resistance and resilience to fire. Large ponderosa pines have thicker bark that better resists mortality from the heat of fires, large ponderosa have elevated crowns and fewer branches so that they better resist high-severity fires. Higher resistance means that large ponderosa have a better chance of surviving fires and they disproportionately produce the most seed, providing a higher chance of successful regeneration by seed after severe fires or beetle outbreaks. Thus, large ponderosas, including all the 132,500 that are likely to be logged under the preferred alternative, are key to resilience after disturbances (Baker 2009 and many other scientific publications). Harvesting presettlement trees and potential old-growth trees clearly reduces both stand resistance and stand resilience to fires and other disturbances and also reduces these at the landscape scale. Please correctly report these scientific realities, and change the proposed alternative to protect all presettlement trees.

Harvesting presettlement trees for these same reasons and many others is also not supported by the best available science on ecological restoration of ponderosa pine forests in the Southwest (e.g., Moore et al. 1999, Allen et al. 2002). Please revise the project to retain all presettlement trees, as in Moore et al. (1999) and Allen et al. (2002), and as is required by the LRMP.

I estimated from the Dec. 2020 best available (n=224) dataset of tree ages in the Salter area, from Mark Roper, that a 16" diameter cap would be needed to prevent the logging of presettlement trees at Salter. There are only 10 trees ≥140 years old in the dataset of 224 tree ages and the smallest is 16" dbh. These 10 diameters are: 50", 29", 27", 25", 24", 22", 19", 18", 17", and 16").

Please accordingly cite and review Moore et al. 1999 and Allen et al. 2002 in the Final EA, adopt ecological restoration as required by the LRMP, clearly explain that all presettlement trees will not be logged, and adopt a 16" diameter cap for all harvesting in the Salter project area, as is required by the LRMP and as recommended in the best available science for southwestern ponderosa pine forests (Moore et al. 1999, Allen et al. 2002).

A3.3. August 6, 2021 update on the treatment of A.3 in the Final EA

The Final EA proposed using tree size and morphology of pre-settlement trees (≥140 years old) to identify and "avoid harvesting pre-settlement trees." Avoiding the harvest of pre-settlement trees is a very positive addition to the project, but the particular method that is proposed is unfortunately not validated for use in the project area (only in the Colorado Front Range), and, at best, would require that validation be completed in the project area. This method is not validated anywhere specifically for identifying pre-settlement trees (≥140 yrs old), as is proposed in the Final EA, so I doubt it can be validated in the project area for the proposed application.

The Final EA says: “Common stand exam data will be used to establish a likely frequency and typical size of old trees within a stand as a guide for tree markers at the prescription level. Including this type of data in marking guides will help the markers understand which tree sizes within a stand might have the potential of being pre-settlement in age. Combining this data indicator with the more reliable visual characteristics will be used to avoid harvesting pre-settlement trees” (p. 6). Also, the Final EA says: “Old-aged trees will be identified using a combination of physical characteristics including large diameter relative to other trees in the localized area, large diameter branches, irregular crowns, flat tops, tall height and canopy position and bark thickness, color and pattern (Huckaby et al. 2003). When a determination of tree age cannot be made using physical characteristics, these trees will either be retained or assessed and documented at the harvest-unit scale to ensure old-aged trees are retained” (p. 16).

Huckaby et al. (2003) divided trees into three categories (< 150 years old, 150-200 years old, and > 200 years old) and used crown shape, live crown ratio, branches, trunk shape, bark, and likely injuries (Huckaby et al. 2003 Table 1). They indicate that “at about 200 year of age, ponderosa pine trees begin to take on distinctive physical characteristics as the result of physiological changes” but some “may look old earlier” (p. 18). This does not suggest that it will be possible to use the Huckaby et al. method to identify trees > 140 years old. Huckaby also describe trees that are “less than 150 to 200 years old” (p. 20), but they do not find that trees >150 years old can be definitively distinguished from trees that are younger, and they also do not suggest in any way that trees >140 years (presettlement in the project area) can be distinguished from younger trees. In our case at Salter, this proposed method, which is unlikely to work to identify pre-settlement trees, would have to be validated in a trial with hundreds of trees dated using an increment borer at the same time they are placed into pre- and post-settlement categories using tree morphology. I think it is highly unlikely this would work, but if it can be shown, through this necessary validation, to have high accuracy, then of course it could be used.

Much more reliable is a diameter cap, which is widely supported by science (e.g., Allen et al. 2002) and already validated for use in the study area (Baker 2021). The reliability of this method is why this is a widely used method. I used 1,732 ponderosa pine trees aged in CSE inventories, that included the project area (Baker 2021 Table 6, p. 15), to estimate the diameter at which 90% of ponderosas of a particular age would be protected. For ponderosas ≥140 years old, this is 17.4" dbh. To protect nearly 100% would require a 16" dbh diameter cap, but I suggested that in commercial timber areas, 90% protection could be a reasonable compromise. Note that a 17" dbh diameter cap would also protect about 80% of trees ≥120 years old, which Baker (2021) identified as the best source of future old growth, which need protection to meet the LRMP.

The Final EA argues that past diameter caps “limited prescriptions in meeting the full intent for uneven aged management and economically stable harvests by removing the option for the silviculturist to establish the diameter limit based on conditions on the ground and desired future conditions,” (p. 8). However, the LRMP makes it clear that it is the desired future condition, based on the HRV, that determines the harvesting prescription, not the other way around. There is no basis in the LRMP (see A.3.1 above) for simply choosing an arbitrary harvesting prescription (e.g., uneven aged) instead of basing the harvesting prescription on the need for the forest to be restored so it is within the HRV. The Salter area is deficient in large and old trees. I suggest it would be satisfactory to protect 90% of them using a 17" diameter cap. Uneven-aged criteria can then simply be applied to trees <17" dbh, which will allow the forest to be restored to the HRV. Please change the decision to this.

A4. Brush thinning (p. 16) need is not supported by data and is not "limited." This section implies brush thinning will be limited by the use of the phrase: "there may be instances" but Table 2 p. 13 indicates limited use is not the case, as this table says "no more than 5,000 acres," which is certainly not limited to just "instances."

Please restrict this treatment to no more than 500 acres, which could be considered "limited," while 5,000 acres is not limited under any definition. Please first present evidence from CSE data that there is a need for this treatment, and, if so, where is the need. Also, please omit all use of mastication, as this can lead to holdover fires from smoldering combustion, and mastication does not replicate any natural process in these ecosystems, thus is definitely not restorative.

A5. The review of environmental effects in Section 3 on Fuels and Fire Management (p. 35) shows that fires have already accomplished much of the desired reduction in basal area and brush thinning, suggesting the proposed actions should be omitted where fires have occurred. Since the Forest Plan requires "restoration" and fires are generally inherently restorative, the Draft EA must present compelling detailed evidence (current tree density and basal area versus tree density and basal area under the HRV, current shrub density versus shrub density under the HRV), by treatment unit, that show why any further removal of trees or any reduction in shrub density beyond reductions from fires is needed to restore treatment units that have burned. Show the CSE estimates of tree density, basal area, and diameter distributions for burned units relative to units that have not burned, so that it is clear whether further treatment is needed or not needed to restore these units so they are congruent with the HRV.

A6. The Draft EA has the spatial structure component of restoration incorrect throughout. The correct terms in the science are not "group, clump and individual structure" (p. 12, 15), but instead "individual, clump, and opening" (ICO; Churchill et al. 2013). It is important to have small openings inside stands in addition to individual trees not in clumps, and also the clumps. If there is another scientific source for the group vs. clump distinction used in the Draft EA, then cite and explain it, but in any case also include "opening" as an additional component. Otherwise, change all references to the science use of the ICO terms and cite Churchill et al.

A7. The Draft EA needs to add monitoring of restoration of spatial structure. Table 5, p. 29 needs to list that restoration of spatial structure using the ICO method (Churchill et al. 2013) will be monitored using pre- and post-harvest and pre- and post-prescribed fire plots.

A8. The Draft EA needs to provide scientific sources for "Conditions Influencing Silvicultural Treatments" (p. 16). Stand diameter index is not explained, nor is there any scientific source for its use–those must be supplied or this left out as a criterion. What is the scientific source for the 80 basal area criterion? If there is none, it must be left out.

A9. The Draft EA says that "Forest inventory has shown one of the underrepresented size class components in these stands is seedlings" (p. 16), but presents no data, and does not evaluate this relative to the HRV as is required by the LRMP. Please analyze the CSE data and present seedling and sapling densities per acre on a map or in a table by stand and treatment unit. I can see that this is easily calculated in the CSE data. The Final EA must specifically show, using CSE data, that seedlings are "underrepresented" relative to the HRV, as that is the LRMP standard for whether there is a need for them to be restored. To meet this standard, it is essential

to present the evidence in Baker (2020), which shows from multiple sources that ponderosa pine regeneration was typically poor or very sparse in the area under the HRV. Promoting too many seedlings relative to the HRV could set these forests up for excessive future tree density.

A10. Proposed treatment of noxious weeds and invasive species (p. 22) does not attempt to reach desired conditions, and formal monitoring is needed. The desired-condition summary on p. 10 says "Invasive plant species are absent or rare," but the proposed treatment on p. 22 only proposes "to prevent further spread." Cheatgrass and Kentucky bluegrass have become common and even abundant in parts of the ponderosa pine forests of the SJNF. The LRMP clearly requires that if they are found to even be just "rare," then there must be explicit treatment to remove these invasive species. It definitely is not acceptable under the LRMP to simply leave invasive species at any level–please change this section to be very clear that if invasive species are found in any part of the project area, they must be removed, and any activity that would spread them must be stopped or fully mitigated. The desired condition is none, and the proposed action must use all available means to achieve this. Also, since harvesting activities definitely can disturb vegetation and soils in ways that may increase invasive species, it is essential to set up a formal monitoring procedure to collect pre-harvesting and post-harvesting as well as pre-fire and post-fire data.

A11. Reasons given for preferring Alternative 2 over Alternative 3 are not valid relative to the LRMP. The DraftEA explains why Alternative 2 is preferred over Alternative 3 in a series of statements: (1) "Application of a 20-inch diameter limit would reduce the prescription effectiveness and consequently limit movement toward desired conditions as described in the Land and Resource Management Plan," (2) "Large tree retention limits the ability to fully utilize the silviculture systems designated by the Land and Resource Management Plan," and (3) "Basal area retention goals and uneven-aged characteristics are being compromised, leaving stands less resilient and making long term resistance less likely to occur" (p. 59).

These are not valid arguments. The silvicultural system, under the LRMP, does <u>not</u> determine what the forest structure is that is to be left after harvesting–it is clearly the management objectives that determine what the forest structure is: "The silvicultural systems shown, that meet the management objectives for the landscape or individual stands of trees within a landscape can be used..." (LRMP 2.9.14). To determine the management objectives, harvesting in ponderosa pine forests under the LRMP must first be shown to "restore or maintain" forests so they are within the HRV, in the Salter case focusing on forest structure (e.g., tree density, basal area, diameter distributions including large trees, composition etc.). The LRMP clearly requires that management objectives restore or maintain forest structure under the HRV, not forest structure that meets a particular version of an uneven-aged silvicultural system. See Section A1 above for quotes from the LRMP explaining how HRV and restoration determine harvesting goals.

PART B. Comments I provided at Scoping that were not addressed in the Draft EA or in the Final EA.

B1. Please present detailed scientific evidence about current and desired forest conditions in the project area and the differences between these

I would like to see published scientific evidence about desired forest conditions, in addition to the summary paragraph on p. 10, and detailed evidence about current conditions from analysis of common stand exam data by your office both presented in the Final EA itself that together document that the following component of the stated need is correct and explains in detail the

differences with the desired condition:

> "A comparison based on common stand exams, Forest Vegetation Simulation modeling, and field observation between the current and desired conditions shows that the condition of the ponderosa pine cover type found within the Salter Vegetation Management activity area is different from the desired conditions associated with that vegetative cover type in the San Juan National Forest Land and Resource Management Plan" (p. 11 Salter Draft EA).

The desired conditions are just a qualitative summary paragraph. Please in the Final EA analyze and present current forest conditions in the Final EA by treatment unit. For analysis of current conditions, please present in the Final EA figures, tables, and maps showing tree density, basal area, tree species composition, diameter distributions by species by at least 2" size classes, and also present summary data for trees per acre above 16", 18", and 20" dbh, and presence of seedlings and saplings separately for each treatment unit across the project area and overall for the project area. These should be derived from analysis of the CSE data in the project area. You can average or find the median for each variable within a treatment unit or polygon and present it as a label on a GIS map showing each unit. You can show the variability in each variable (e.g., tree density) by presenting a table showing the standard deviation, coefficient of variation, and the quartiles of the distribution of each variable within each treatment unit and across the project area. See Baker (2020 Table 6 on p. 12) for examples of this kind of table showing variability.

However, where there is significant variability across a treatment unit because of variability in past logging, fires, beetle outbreaks, or other significant past disturbances, it would be better to break these up into separate treatment units, or at least present these same analyses for these distinct parts of treatment units.

The following components of desired conditions for Ponderosa Pine Forests presented on p. 10 of the Draft EA are apparently not provided by CSE data. Please collect new data about current variability in these across the project area and present these data in the Final EA:
1. Clumpiness (number of trees per clump, clump area) of ponderosa pine
2. Canopy layers of ponderosa pine
3. Area of openings and percent composition (shrubs, native grasses, native forbs, introduced grasses and forbs) of openings between the clumps. Native grasses should be identified and estimated by species, since the key indicator species are specified in the desired condition.
4. Diameter-class distribution of Gambel oak central stems within patches of shrubs and the area of patches of these shrubs
5. Variability in forest litter depth. I would add that variability in duff depth is also important.
6. Extent of invasive plant species
7. Abundance and size of snags and large wood on the forest floor

Please also present and analyze the recent fire rotation for low-intensity fire in the project area using MTBS (Monitoring Trends in Burned Area) and SJNF fire records. Fire rotation, which is the estimated time to burn once across a land area, is calculated as the time period of observation / (sum of area burned by all fires that burned at low intensity/project area). For example, if the period of observation is 1980-2020, the area burned at low intensity over this period was 7,000 acres and the project area is 35,000 acres, then the fire rotation is 40 years/(7,000/35,000) = 200 years. Further explanation, if needed, is in Baker (2009). This estimate of the current rate of

burning is essential for comparison with desired conditions and planning future burning.

To provide comparable analysis of desired conditions, please present identical details and scientific evidence for the same forest variables
Please present estimated means, medians, and distributions etc. for desired conditions for all the elements of forest structure and composition described on p. 10 of the Draft EA, which I have also listed in the previous section above.

Please substantiate the scientific basis for each detail of the desired condition by presenting the details from scientific sources already in the Forest Plan, but updated with all available detailed scientific evidence since the Forest Plan. Key scientific sources for the project area must include detailed use of Romme et al. (2009), Baker (2018), and Baker (2020), which are the major scientific sources with abundant ecological information about desired conditions in the project area. I would request that details be presented for each variable in figures, tables, and maps that are otherwise identical to those presented for the modern forest, as explained above.

B2. Please show exactly how each proposed treatment will achieve each desired condition.
For example, the pre-commercial thinning description in Table 1 says "thinning...to spacing specifications" whereas the desired conditions (p. 2) say "Tree clumps vary in density from widely spaced large trees to tightly spaced small trees." Since the usual intention of commercial timber operations is to thin to space trees widely so they grow timber faster, how could commercial thinning lead to the desired condition–it seems that it will instead destroy any variable spacing that exists. If the specification had been to use variable-density thinning to explicitly produce clumps containing a specific range of trees within a certain distance, combined with openings etc. then it would have been clear that the proposed treatments will produce the desired condition.

In the Final EA, I would like to see a list of each desired condition, each current condition, and a detailed specification for how a particular treatment will be used to achieve each desired condition. Please put this information in tables and/or figures, and use maps to show where specific treatments will be used.

B3. Please develop and analyze a feasible alternative that will just meet the minimum needs of Dolores-Montezuma-La Plata County local industry, so that more natural processes can be used to achieve the remainder of the desired ecological conditions. This could be called an Economy and Ecology alternative or something else that explains it briefly.
I would like to see answered in the Final EA what is the minimum commercial timber production necessary to achieve the desired conditions and provide for existing local industry, so that a large amount of desired conditions could be achieved using natural processes, particularly prescribed fire and managed fire. I would to see an alternative developed and analyzed, after reviewing the CSE data and the disturbance history I presented above, that achieves desired conditions using just essential timber production and the rest using natural processes (e.g., fire).

I am an ecologist, so of course I am interested in using natural ecological processes wherever possible, but I am not opposed to some commercial timber harvesting either. One reason I would like to see this alternative presented and analyzed throughout the Final EA is that we already have lots of timber production occurring in the nearby Lone Pine project, and unless there is something I do not know, it seems that there is no specific need to maximize timber production

on the Salter project to sustain the local industry at this time. If there is, please present evidence.

I suggest at the outset that prescribed fire and managed fire could be the primary natural processes used to thin forests in a way that promotes the clumping and variability in forest structure that are described in the desired condition. This makes the most sense since it is fire that historically created these desired conditions. Managed fire is ecologically recognized as the best tool used to promote both stand- and landscape-scale heterogeneity in these forests and increase future forest resilience to impending disturbances. Of course, some timber harvesting/thinning and prescribed burning may first be needed in the vicinity of highly valued resources and assets.

A good starting point is that the large area of land that has a history of high-grade logging is a potentially sensible location for the commercial harvesting for wood production, whereas the large area that is recovering from past moderate- to high-severity fire (Baker 2018) is potentially a sensible location for primarily use of fire to achieve desired conditions.

B4. Heterogeneous stands in heterogeneous landscapes needed to reduce beetles
The project description lists two of the needs: (1) "the need to improve resilience or maintain the resistance of forest ecosystems in an effort to increase protection against epidemic insect and disease outbreaks" and (2) "the need to increase the structural diversity of the ponderosa pine forest represented across the landscape" (p. 3), both of which are ecologically sensible.

It is well established that treating individual stands to reduce attack by beetles is ineffective, as explained in Graham et al. (2016), the most comprehensive study of beetle outbreaks in ponderosa pine in North America: "...treating a single stand to be resistant to MPBs would be insufficient to alter MPB dynamics and large areas or landscapes need to be in a resilient condition to keep MPB populations at endemic levels (Bentz et al. 2009; Fettig et al 2014)" (p. 155).

Thus, these authors conclude that: "...heterogeneous landscapes composed of stands with heterogeneous structures and containing densities in the neighborhood of 80 feet^2 of basal area are resistant to MPB infestations..." (p. 157). Please review and incorporate the findings of this key study by Graham et al. into the proposed project.

In particular, please plan the treatments to create heterogeneous stands and heterogeneity across the project area, then document in detail that this will be achieved by showing the variability in residual basal area and tree density, after treatments, expected across the project landscape. Show this as histograms for both basal area and tree density and also show these on a map, using either labels or colors for classes of residual basal area and tree density, also showing the before-harvesting basal area and tree density in each treatment unit.

In locations affected by the roundheaded pine beetle, please leave 50% of the dead and dying trees as mitigation for the documented adverse environmental effects of salvage harvesting (Lindenmayer et al. 2008), and please do not plant trees in these areas, as this will adversely affect the future resistance and resilience of the forests in this area.

B5. Please provide an economic analysis for all alternatives.
The reason that I am requesting this is that I am very concerned about the cost, in public and private money provided to the Forest, of all alternatives, given the potential economic costs we

are facing with Covid-19 and other threats to our local and national economy. Please show us what the estimated costs are for each component (e.g., specific treatments) of the project, and please also show us the details of where the funding comes from. We have long heard about below-cost timber sales; will this be one, or will it not?

B6. Please protect all extant large trees in the project area to increase resistance/resilience to fire.

Based on direct records by land surveyors in the late-1800s, approximately 47% of ponderosa pines were larger than about 16" dbh (40 cm), about 33% were larger than about 20" dbh (50 cm), and about 17% were larger than about 24" dbh (60 cm) in the ponderosa pine zone in the San Juan Mountain study area, which includes the project area–see Baker (2020 Table 9 p. 16). About 59% of ponderosa-pine forest area in the late-1800s would meet today's definitions for old-growth forests (Baker 2020 p. 21). There is no question that high-grade logging removed most of the large, old trees from the project area by about the 1950s although high-grade logging continued into the 1980s (Romme et al. 2009).

It is well documented that in ponderosa pine forests it is these large, old trees that provide the essential resistance and resilience to fire that is now particularly needed as fire is increasing with global warming. Large trees have the thickest bark, the highest crown base height, and have the greatest ability to survive substantial crown scorching and still resprout and survive (Baker 2009). Not only do large ponderosas have the greatest likelihood of surviving, thus provide the greatest resistance to fire, but large ponderosas also disproportionately provide the most seed for sexual regeneration after fires, thus they provide most of the essential resilience to fire.

It is thus essential for the Final EA, if the goal is to include increased resistance and resilience to fire, to heed and remedy the serious deficiency in large trees as an essential part of the desired conditions for the project area. This is another reason that it is essential to restore these forests using a 16" diameter cap, which would not only protect presettlement trees, but also protect the large and old trees that provide the most resistance and resilience to fire.

PART C. Potential remedy

The Final EA and draft ROD, documented by the above comments, ignored highly relevant science and the San Juan National Forest LRMP, and failed to disclose to the public that the proposed action likely does not accomplish the Purpose and Need.

For each of my 17 scientific concerns, 16 of which were completely ignored in the Final EA and Draft ROD, I proposed a particular action that still represents an achievable remedy for each of these 17 concerns. I urge you to undertake all of these remedies, which would enable me to remove my objection completely.

Together, these 17 concerns indicate the need for revisions that likely require amendment to the Final EA, that analyzes an ecological restoration alternative based on sufficient review of the the HRV, as this is required by the SJNF LRMP, and is needed to remedy the omission of the large body of scientific evidence about the HRV and other ecological concerns, that I submitted at Scoping and as comments on the draft EA. An amendment is also necessary to overcome the omission of most of the essential data needed to show that the proposed project actually will accomplish the Purpose and Need.

Sincerely,

William L. Baker, PhD.

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