From:	Joe Trudeau
To:	FS-4FRI Comment Database
Cc:	Redman, Robbin - FS; Kruger, Jeremy - FS; Souther, John - FS
Subject:	CBD Comments on the Rim Country DEIS
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Hello 4FRI Team Leaders-

Please accept the attached comments from the Center for Biological Diversity on the Rim Country DEIS. Attachments will follow in a subsequent email. Hey, it's not even 11:59 yet!

Thank you,

Joe

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January 16, 2020

4FRI Rim Country DEIS
c/o Coconino National Forest Supervisor's Office
1824 S. Thompson St.
Flagstaff, AZ 86001

Submitted electronically to: 4fri_comments@fs.fed.us

To the 4FRI Team at the US Forest Service:

Please accept these comments from the Center for Biological Diversity ("the Center") on the Four Forests Restoration Initiative ("4FRI") Rim Country Draft Environmental Impact Statement ("DEIS"). These comments are the culmination of years of very active involvement in the 4FRI effort. The Center has maintained a leading role in the 4FRI Stakeholders Group, and has engaged in a wide range of collaborative discussions with Stakeholders and the Forest Service. We intend to continue engaging in the deepest levels possible through the remainder of the planning process, and into the implementation of the Rim Country Project.

The Center participated intimately in the drafting of the Stakeholder comments which have been delivered to the Forest Service. We endorse those comments fully, and further elaborate on our perspectives on those concerns and recommendations in this letter.

We would like to express a sincere 'thank you' to the Forest Service 4FRI Team, who has worked diligently alongside us as we challenged each other to find common ground and devise solutions to complex social and ecological problems. We appreciate the efforts made by Forest Service individuals to get us requested information in a timely fashion, and for adapting to our needs as part of the collaborative process.

As you read these comments, you will learn that the Center still has substantial concern with key aspects of the Rim Country proposed action and preferred alternative. Our concerns are shared by other Stakeholders, as well. We have endeavored to provide you with clear and actionable recommendations for your consideration. We anticipate there will be extensive discussion to identify modifications to the proposed action that can alleviate our concerns. We look forward to resolving those issues in the spirit of collaborative forest and watershed restoration. We look forward to your response.

Respectfully,

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Contents

1. PURPOSE AND NEED

CONCERN: The DEIS focuses narrowly on ponderosa pine.

From the onset of the DEIS, there is a significant discrepancy between stated intent and conditions on the ground. Both the Proposed Action and the DEIS share identical language in stating the project purpose:

"*The purpose of the 4FRI Rim Country Project is to restore and maintain the structure, pattern, health, function, and vegetation composition and diversity in* ***ponderosa pine ecosystems****, thus moving the project area toward the desired conditions in the respective land and resource management plans*."[1]

The DEIS later slightly expands on this purpose in this statement by adding "and associated ecosystems:"

"*The Four Forest Restoration Initiative (4FRI) is a planning effort designed to restore forest resilience and ecosystem function in ponderosa pine forests and associated ecosystems across four national forests in Arizona including the Coconino, Kaibab, Apache-Sitgreaves, and Tonto National Forests*."[2]

As the Forest Service is aware, mixed conifer forests cover around 80,000 acres in the Rim Country analysis area.[3] Also, mixed deciduous early-seral forests, riparian areas, pinyon-juniper woodlands, and transitional Madrean-type woodlands cover a substantial portion of the project area. The ponderosa pine-centric attitude expressed in the DEIS extends to the flexible toolbox, the manner in which dwarf mistletoe is treated, the LTIP and OTIP, the way that treatment effects are modelled and presented, and in other ways. These concerns are further discussed later in this letter.

RECOMMENDATION: Because the Rim Country landscape is a dynamic and diverse aggregation of ecosystems across two elevational gradients, and because thinning, fire, and comprehensive restoration activities are planned for virtually the entire landscape, there is a need to more formally recognize the role of the 4FRI in restoring those systems. Any subsequent NEPA document prepared for the Rim Country project should expand the project purpose to more accurately reflect the scope of the proposed actions, or restrict the proposed actions to ponderosa pine forests as stated in the project purpose.

CONCERN: Project needs should consistently include need for restoring "woody" riparian vegetation.

The Rim Country Proposed Action scoping document lists seven needs for the project.[4] These are largely identical to those provided in the opening summary of the DEIS,[5] although a few words are different between the iterations. However, one small change between the Proposed Action and the list provided in the opening summary of the DEIS could have substantial implications and deserves clarification. The Proposed Action lists the fifth need as "[r]*estore woody riparian vegetation*," but the DEIS removes the word "woody" in the initial list. The DEIS does, however, include "woody" in other locations, such as on pages 21 and 54.

RECOMMENDATION: Ensure that every list of project needs is consistent and includes "restore woody riparian vegetation."

[1] Rim Country Proposed Action at 3, and Rim Country DEIS, Vol. 1, at ii, **emphasis added**.
[2] Rim Country DEIS, Vol. 1, at 2.
[3] Rim Country DEIS, Vol. 1, Table 4, at 12.
[4] Rim Country Proposed Action, at 3.
[5] Rim Country DEIS, Vol. 1, at ii.

CONCERN: Definition of resilience should include climate change.

The definition of resilience changed between the Proposed Action and iterations within the DEIS. The most important discrepancy is the elimination of climate change as a natural disturbance that is buffered by increased resiliency. This reference to climate change was removed from the DEIS in the opening summary,[6] but is still present in Chapter 1.[7] The Proposed Action cites the Forest Service Manual which states that "[r]*esilient ecosystems have greater capacity to survive disturbances and large-scale threats, especially under changing and uncertain future environmental conditions, such as those driven by climate change and human uses*."[8]

The resilience of restored landscapes following 4FRI treatments is inextricable from climate change influences. Conversely, the influences of climate change on ecosystem and species behaviors and patterns cannot be ignored. In "Foundations of Restoration Ecology," prominent scientists conclude that:

"*In practice, rather than emphasizing only time-specific historical ranges or predisturbance species assemblages, compositions, structures, and landscape patterns, a resilience approach to restoration embraces landscape macrodynamics that have characterized populations and species over long timeframes. These include the ability of species to shift locations significantly, fragment into refugia, expand or contract in range, coalesce with formerly disjunct populations, foster nonequilibrium genetic diversities, form novel plant associations, and accommodate population extirpations and colonizations - all in response to changing regional conditions*."[9]

Several important lessons are contained in Falk and Millar's quote. For example, current conditions of ecosystems in the 4FRI landscape reflect not only their response to fire suppression, grazing, and logging, but also reflect climatic conditions over the past century and a half. "Time-specific" approaches to restoration, such as seeking to emulate extreme low-density structures that resulted from centuries of frequent fires, or expanding open reference condition treatment allocations based on historical soil/structure relationships, ignore the episodic regeneration events of the past century (that would have increased forest density even in the absence of Euro-American intervention) and disregards the fact that "*all species move in space and time throughout their ecological and evolutionary history, often in response to shifting climate*."[10,11]

RECOMMENDATION: Consistent with FSM 2020.5, and the best available science on restoration ecology, reference to climate change should be returned to the initial discussion of resilience in the DEIS's opening summary, consistent with the definition in Chapter 1.

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[6] Rim Country DEIS, Vol. 1, at ii.

[7] Rim Country DEIS, Vol. 1, at 21.

[8] Forest Service Manual 2020.5, at 3.

[9] Falk, D.A., and C.I. Millar. 2016. The influence of Climate Variability and Change on the Science and Practice of Restoration. Pp. 484-514 in Palmer, M.A., J.B. Zedler, and D.A. Falk. 2016. Foundations of Restoration Ecology. Society for Ecological Restoration International. Island Press, Washington, D.C., at 501.

[10] *Ibid.*

[11] This concern is particularly relevant to the Grassland and Savanna Treatments and the Open Reference Condition modifier. We are concerned that the intent to restore savanna structure to anywhere that it existed in the recent past is overly rigid and discounts the process of shifting mosaics in time and space. Furthermore, we suspect this will be very difficult to field validate during implementation, and it further exacerbate what we argue is a trend towards overly intense treatments.

CONCERN: Natural disturbance agents are key drivers of resiliency.

The use of the term "survive" in the definition of resilience suggests that disturbances are by nature threats to the viability of ecosystems. This is not consistent with adaptations to frequent low-intensity (surface fire, aridity, low-level insect and disease occurrence) and infrequent high-intensity (mixed and high-severity fire, windthrow, drought, heavy snow/ice damage, flooding, insect and disease outbreaks) disturbances that southwestern forests evolved under. The Forest Service Handbook defines resilience as:

"*The ability of an ecosystem and its component parts to absorb, or recover from the effects of disturbances through preservation, restoration, or improvement of its essential structures and functions and redundancy of ecological patterns across the landscape*."[12]

The Society for Ecological Restoration (SER), which is cited in the Proposed Action and DEIS's descriptions of resilience, describes resilience as "*the ability of an ecosystem to regain structural and functional attributes that have suffered harm from stress or disturbance*."[13] In that same treatise, the SER states that a restored ecosystem "*will demonstrate resilience to normal ranges of environmental stress and disturbance*,"[14] that "[t]*he restored ecosystem is sufficiently resilient to endure the normal periodic stress events in the local environment that serve to maintain the integrity of the ecosystem*,"[15] and that "[t]*he biota of any given ecosystem must be resistant or resilient to the normal stress events that periodically occur in the local environment*."[16]

According, then, following the discussions in SER (2004), restoration outcomes should prepare an ecosystem to absorb (borrowing from FSH 1909.05) normal disturbances. In the case of the 4FRI landscape, those would include dwarf mistletoe, bark beetles, other less common insect and disease agents, periodic drought, frequent low -severity fire, infrequent mixed and high-severity severity fire, and storm damage. These disturbances are to be seen as "*stress events in the local environment that serve to maintain the integrity of the ecosystem*" and not as risk agents that should be managed into accord with human-defined parameters.

One of the persistent points of contention between the Forest Service and the Center (as well as numerous other stakeholders) is the treatment of dwarf mistletoe. As we have repeatedly asserted, dwarf mistletoes are common, native, and naturally occurring components of functioning ponderosa pine and mixed conifer ecosystems. Mistletoes are important habitat features which improve structural and habitat diversity,[17] and were historically were "kept in check" by frequent fires.[18] As we will expand on later in these comments, we stand by our position that small diameter thinning and repeated

[12] Forest Service Handbook 1909.12.05, at 17.

[13] Society for Ecological Restoration International Science & Policy Working Group. 2004. The SER International Primer on Ecological Restoration. Society for Ecological Restoration International, Tucson, at 7.

[14] *Ibid,* at 3.

[15] *Ibid,* at 3.

[16] *Ibid*, at 7.

[17] Chambers, C.L., and S.S. Germaine. 2003. Vertebrates. Pp 268-285 in Friederici, P. (ed.) 2003. Ecological Restoration of Southwestern Ponderosa Pine Forests. Society for Ecological Restoration International. Island Press, Washington, D.C.

[18] Covington, W.W. 2003. The Evolutionary and Historical Context. Pp 26-47 in Friederici, P. (ed.) 2003. Ecological Restoration of Southwestern Ponderosa Pine Forests. Society for Ecological Restoration International. Island Press, Washington, D.C.

prescribed fire will reduce current mistletoe occurrences to endemic levels, and there is no need to target any mistletoe incidence with higher intensity thinning treatments.

This position, that mistletoe and other naturally occurring disturbance agents have an important role to play, has been long-held by the 4FRI stakeholders. The 2010 Stakeholders landscape strategy report stated that "[n]*atural disturbance processes (e.g., fire, drought-mortality, endemic levels of forest pests and pathogens) are the primary agents shaping forest ecosystem structure, dynamics, habitats, and diversity over time*" and that "[f]*orest insects and pathogens occur and operate at endemic levels*."[19]

CONCERN: The Forest Service should clarify that natural disturbances (including pathogens and pests) are not existential threats to the survival of ecosystems, but rather they are the forces by which ecosystems have adapted to within the evolutionary environment.

CONCERN: Improvements to motorized transportation system are an uncertain project need.

As stated above, the Rim Country Proposed Action scoping document lists seven needs for the project[20] which are largely identical to those provided in the opening summary of the DEIS.[21] But even within the DEIS the lists of project needs are inconsistent. In Chapter 1, the DEIS provides an additional need for this project that was not explicitly listed in the Proposed Action. The additional item is to "[i]*mprove the motorized transportation system and provide for a more sustainable road system where poorly located roads are relocated or obliterated*."[22]

The DEIS states that "[a]*s Travel Management Rule (TMR) plans are completed and implemented for each forest, unneeded and poorly located roads may be improved, removed, or relocated to reduce effects on water quality and natural resources. The Forest Service will reclaim any previously disturbed areas used as temporary access roads on National Forest System lands once activities specified in the decision for the 4FRI Rim Country Project are completed*."[23]

The DEIS also states that "[t]*here is a need to have adequate access for project implementation, and decommission temporary roads after use to restore these areas once project activities are completed. In addition, there is a need to decommission unneeded routes identified during the forest Travel Management Rule planning processes as part of the restoration of the landscape in the project area*."[24]

RECOMMENDATIONS: 1) Any subsequent NEPA document prepared for the Rim Country analysis should ensure that every list of project needs is consistent, and 2) the need should be restated to clarify primarily that the road work that will occur is intended to reduce transportation system impacts to wildlife and watersheds, rather than just to improve the system and make it more sustainable.

[19] Sesnie, S.E., J. Rundall, S. Hedwall, and V. Horncastle, technical editors. October 1, 2010. Landscape restoration strategy for the first analysis area: report from the Four Forests Restoration Initiative Stakeholder Group to the USFS Planning Team, at 35.
[20] Rim Country Proposed Action, at 3.
[21] Rim Country DEIS, Vol. 1, at ii.
[22] Rim Country DEIS, Vol. 1, at 21.
[23] Rim Country DEIS, Vol. 1, at 18.
[24] Rim Country DEIS, Vol. 1, at 23.

CONCERN: 4FRI DEIS is inconsistent with CFLRP requirements on duration of project.

The Omnibus Public Land Management Act of 2009 (P.L. 111-11, Title IV Forest Landscape Restoration) sets forth the criteria for proposing and implementing projects under the Collaborative Forest Landscape Restoration Program. We appreciate the Forest Service agreeing to add specific portions of the Omnibus Public Lands Management Act of 2009 that speak to eligibility of projects under the CFLRP and also project implementation.[25] This affirms the agency's commitment to the science-based underpinnings of the CFLRP.

Of some concern is the open-ended nature of the 4FRI implementation phase, which does not appear to be supported by the criteria set forth for the CFLRP. In particular, (b)(1)(B) specifically says that an eligible project "*identifies and prioritizes ecological restoration treatments for a 10-year period*."[26] However, the DEIS states that the Forest Service "*proposes to conduct restoration activities over a 20-year period or until proposed activities are completed*."[27] The DEIS repeats in more than a dozen locations the intent to take 20 years *or more* to implement the project, with no firm end date set. Does this open-ended proposal mean that in practice, 4FRI treatments could be taking place fifty years from now?

RECOMMENDATION: The Forest Service should clarify what authorization the Rim Country project is proceeding under that would allow implementation to occur for 20 years or longer.

THE FORESTS OF THE RIM COUNTRY LANDSCAPE ARE DIVERSE AND DYNAMIC ECOSYSTEMS WHICH CANNOT BE MANAGED ACCORDING SOLELY TO MEET DESIRED OUTCOMES FOR PONDEROSA PINE FOREST.

[25] Rim Country DEIS, Vol. 1, at preamble and 19-20.
[26] Rim Country DEIS, Vol. 1, at preamble and 19.
[27] Rim Country DEIS, Vol. 1, at preamble (pdf page 4).

2. OLD AND LARGE TREES: THE FOUNDATION OF A RESTORED FOREST

Protection of old and large trees has been a cornerstone of the Center's positions in 4FRI since the project was conceptualized. We have continued to stress that the intent of forest restoration is to restore old growth forests and attendant fire regimes, and the retention of all old trees and most large trees is part of this process. The DEIS provides some language consistent with our advocacy:

"*There is a need to retain as many old and large trees as possible, while moving toward restoration-based desired conditions and recognizing the ecological and socio-political importance of these trees. Where restoration activities occur in the ponderosa pine and dry mixed conifer cover types, there is a need to maintain and promote the development of old growth characteristics and components*."[28]

Despite the years of collaborative work, the Forest Service has devised a number of ways to justify cutting of some (or many) old or large trees within the flexible space afforded under the Old Tree Implementation Plan (OTIP) and Large Tree Implementation Pan (LTIP). The terrible tragedy at Little Creek is an example of just how the Forest Service can wander far from the hard-won social license for landscape scale logging. We stand by our assertion that if forest restoration is to fulfill its promise to the future, we must retain all old trees and the *vast majority* of large trees (those over 16" dbh). It is absolutely crucial that there is never another Little Creek.

Our key concerns with the OTIP, LTIP, and SPLYT frameworks are:

- The Forest Service will not commit to old and large tree protection.
- The OTIP is crafted to apply solely to ponderosa pine and does not protect other species.
- The OTIP excludes old tree diagnostic materials recorded in the first 4FRI ROD.
- The OTIP redefines old tree age to favor more aggressive logging.
- The term "additional habitat degradation" is arbitrary and inappropriate.
- The Rim Country DEIS seeks to deny 4FRI's regional influence on old and large tree protection.
- The LTIP's ability to satisfy stakeholder concerns for large tree retention remains virtually untested.
- The LTIP in effect provides a framework for large tree cutting, not retention.
- LTIP exception categories allow far too much large tree cutting.
- The LTIP's introduction section lacks contextual background of the value of large tree retention.
- The process for cutting of more large trees beyond LTIP exceptions should be removed.
- The Rim Country LTIP eliminates a key phrase which would limit application on limestone soils.
- The Rim Country LTIP eliminates a key phrase which focuses on removal of small trees.
- The Rim Country LTIP modifies a phrase so that it increases reliance on silviculture over fire.
- The LTIP exception category for Heavily-Stocked Stands with High Basal Area should be discarded.
- Modelling assumptions fail to incorporate LTIP criteria and are thus likely inaccurate.
- The indicators and measures for analyzing the issue of large tree retention are insufficient.
- The Rim Country Monitoring Plan suggests that utilization of the LTIP is optional.
- The Rim Country SPLYT definition is not the stakeholder version conveyed to the Forest Service.
- A discussion of SPLYT should be added into the introductory section of the LTIP.
- The criteria for identifying SPLYT stands needs to be evaluated.
- Treatment adjustments in SPLYT stands may not adequately protect mature forest values.

[28] Rim Country DEIS, Vol. 1, at 22.

CONCERN: The Forest Service will not commit to old and large tree protection.

The DEIS states that "[t]*he Old Growth Protection and Large Tree Retention Strategy (OGP/LTRS) as developed by the 4FRI Stakeholder Group will be evaluated and considered as fully as possible in all action alternatives*."[29] As in the first 4FRI analysis, the Forest Service will not commit to a vision shared by a broad constituency representing a broad range of interests. The OGP/LTRS was a significant investment from stakeholders, and had broad buy-in, even though it now appeasr to be far too permissive and allows abuse with unintended consequences. It is framed as old growth PROTECTION and large tree RETENTION. These are values shared by many, especially the Center.

We never intended for our work to be rearranged into "implementation plans," which seem to have morphed into rulesets to determine when it's justified to cut old or large trees, rather than focusing on their value "on the stump." For example, the Forest Service has sought to justify old and large tree cutting because of dwarf mistletoe, "forest health," "habitat degradation," to establish uneven aged structure, and other reasons. And the definition of what is "old" has even changed, with the 150 year threshold in the first EIS changing to establishment in 1870 or earlier.

In the DEIS, Table 10 describes uneven-aged treatments as "*retaining as many old or large trees **as possible***."[30] Similarly, intermediate thinning treatments would manage "*for improved tree vigor and growth by retaining the best growing dominant and co-dominant trees with the least amount of dwarf mistletoe and as many old and/or large trees **as possible***" and stand improvement treatments would retain "*as many old and/or large trees **as possible***."[31]

RECOMMENDATION: The Center strongly asserts that there should be no "as possible" language associated with old tree protection; this is an arbitrary and open-ended statement that will lead to another Little Creek. As for large trees (those over 16" d.b.h.) the term "as possible" is still arbitrary and open-ended. The LTIP as written is dramatically too permissive of large tree cutting (we'll explain this more shortly), and the idea of making old and large tree cutting decisions based on what's "possible" is beyond comprehension. In any subsequent NEPA document prepared for the Rim Country analysis, any reference to old trees must be accompanied by a commitment to their absolute protection from cutting, as described in a revised version of the OTIP, and any reference to large trees should be accompanied by clear direction to what is permissible under the criteria established in the final version of the LTIP, or another revised document which might replace it, as documented in the Record of Decision.

THE LITTLE CREEK TIMBER SALE, WHERE HUNDREDS OF LARGE, OLD TREES WERE CUT TO FAVOR SMALL AND MID-SIZE TREES.

[29] Rim Country DEIS, Vol. 1, at 26.
[30] Rim Country DEIS, Vol. 1, Table 10, at 32. **(emphasis added)**
[31] Rim Country DEIS, Vol. 1, Table 10, at 32. **(emphasis added)**

2.1. THE OLD TREE IMPLEMENTATION PLAN (OTIP)

CONCERN: The OTIP is crafted to apply solely to ponderosa pine and does not protect other species.

The diagrams and narrative descriptions used in the OTIP do not easily translate to characteristics of Douglas-fir, white fir, southwestern white pine, Arizona cypress, pinyon pine, Gambel oak, Emory oak, Arizona white oak, alligator juniper, Utah juniper, or the myriad other trees that will be encountered by those implementing the Record of Decision.

RECOMMENDATION: Any subsequent NEPA document prepared as part of the Rim Country analysis should include an Old Tree Protection Plan that describes old tree (over 150 years) and old growth group/stand characteristics for each species of tree found on the Rim Country project area. If qualitative characteristics are not definable, then diameter caps of can be used as a surrogate.[32]

CONCERN: The OTIP excludes old tree diagnostic materials recorded in the first 4FRI ROD.

The OTIP in the first 4FRI EIS includes some diagrams and narrative descriptions that are not included in the Rim Country DEIS. While these are specific to ponderosa pine, and have limited utility for other species, they should be brought forward into the Rim Country OTIP.

RECOMMENDATION: Any old tree diagrams and narrative descriptions used in the first 4FRI EIS should be included in the OTIP that is part of any subsequent NEPA document prepared as part of the Rim Country analysis.

CONCERN: The OTIP redefines old tree age to favor more aggressive logging.

The first 4FRI OTIP describes old trees as those approximately 150 years and older, but the Rim Country OTIP changes that to "Established prior to 1870."[33] The DEIS describes a number of scenarios where old tree mortality will occur independent of cutting, including the accumulation of litter and duff around the base intensifying fire effects,[34] crown damage,[35] buildup of needles in crotches and forks,[36] prescribed fire,[37] bark beetles,[38] dwarf mistletoe,[39] and other causes. Because old trees will continue to die from a variety of stressors,[40] it is vitally important to maintain all trees meeting the old tree definition, as well as large trees which serve functionally equivalent roles.

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[32] For trees where diameter is measured at breast height, 16" d.b.h. will serve as a surrogate for old age approximation. For trees where diameter is measured at root collar, 12" d.r.c. will serve as a surrogate for old age approximation.

[33] Rim Country DEIS, Vol. 2, Appendix D, Section C, at 617.

[34] Rim Country DEIS, Vol. 1, at 204.

[35] Rim Country DEIS, Vol. 1, at 205.

[36] *Ibid.*

[37] Rim Country DEIS, Vol. 1, at 232.

[38] *Ibid.*

[39] For example, recall the massacre at Little Creek. We appreciate that the DEIS states that "*old trees would not be cut for forest health reasons*" (DEIS at 617) and request that this statement is reiterated throughout any subsequent NEPA documents.

[40] Kolb, T.E., J.K. Agee, P.Z. Fule´, N.G. McDowell, K. Pearson, A. Sala, and R.H. Waring 2007. Perpetuating old ponderosa pine. *Forest Ecology and Management* doi:10.1016/j.foreco.2007.06.002

RECOMMENDATIONS: The DEIS frankly states that "[t]*he loss of old growth and old trees would require decades to centuries to recover*."[41] The retention of all old trees is imperative. 1) Any subsequent NEPA document prepared as part of the Rim Country analysis should maintain consistency with the first EIS and define old trees as those 150 years or older. 2) The Forest Service should collaborate with Stakeholders to develop a legacy tree guide to assist implementers with identifying old trees.[42]

CONCERN: The term "additional habitat degradation" is arbitrary and inappropriate.

The Rim Country OTIP states that "[r]*emoval of old trees would be rare. Exceptions would be made for threats to human health and safety, and those rare circumstances where the removal of an old tree is necessary in order to prevent* ***additional habitat degradation***."[43] We are unsure how an old tree can cause habitat degradation. In fact, old trees are often the source of valuable habitat features. The example given is "*the rare case of an old tree growing on the side of an existing curve in a road* … [where] … *equipment may require a wider turning radius*."[44] This may be an allowable exception, but an exception class specific to this example should be crafted, rather than using arbitrary terminology like "additional habitat degradation."

RECOMMENDATION: Any OTIP prepared in conjunction with any subsequent NEPA document prepared as part of the Rim Country analysis should clearly define what "additional habitat degradation" constitutes, or eliminate that arbitrary exception criteria and define specifically the instance exemplified in the "*the rare case of an old tree growing on the side of an existing curve in a road.*"

CONCERN: The Rim Country DEIS seeks to deny its regional influence on old and large tree protection.

The Rim Country OTIP states that "[t]*his old tree implementation plan will be applied to the Rim Country Environmental Impact Statement Record of Decision and may not apply to subsequent decisions on the same project area or on other areas within Region 3. Subsequent decisions may include an old tree implementation plan that reflects project specific current conditions and the purpose and needs of subsequent projects.*"[45] At a stakeholders DEIS Working Group, Forest Service NEPA specialist Katherine Sanchez-Meador stated that this statement is outside of the scope of the Rim Country EIS. Furthermore, the Center has long contended that the agreements forged through the 4FRI collaborative process should serve as templates for adoption into similar projects in the southwest.

RECOMMENDATION: The statement above should be struck from any subsequent NEPA document prepared as part of the Rim Country analysis and replaced with the following statement:

"The agreements, implementation plans, and restoration guidelines established in the 4FRI Rim Country Record of Decision, having been collaboratively crafted by some of the most intelligent and committed practitioners in the field, vetted by years of collaborative discussion, and founded in the best available science, should serve as templates for adoption into forest restoration projects in the Southwestern Region."

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[41] Rim Country DEIS, Vol. 1, at 228.

[42] Riling, J., K. Geier-Hayes, and T. Jain. 2019. Decoupling the Diameter–Age Debate: The Boise National Forest's Legacy Tree Guide. *Forest Science* doi: 10.1093/forsci/fxz004.

[43] Rim Country DEIS, Vol. 2, Appendix D, Section C, at 617. **(emphasis added)**

[44] Rim Country DEIS, Vol. 2, Appendix D, Section C, at 617.

[45] Rim Country DEIS, Vol. 2, Appendix D, Section C, at 617.

THE LITTLE CREEK TIMBER SALE, WEST ESCUDILLA RESTORATION PROJECT, ARIZONA

The Center has long contended that the agreements forged through the 4FRI collaborative process should serve as templates for adoption into similar projects in the southwest. We thought that was what happened with the West Escudilla decision, but unfortunately, the Little Creek massacre proved us wrong. We are hopeful, however, that forthcoming projects, *especially* the Black River Restoration Project, which is within the original conceptualized footprint of 4FRI, will adopt old and large tree protection measures so dutifully developed by the broad array of stakeholders committed to the 4FRI Rim Country project.

**UNLOGGED OLD GROWTH PONDEROSA PINE FOREST,
WHITE MOUNTAIN APACHE INDIAN RESERVATION, ARIZONA**

2.2. THE LARGE TREE IMPLEMENTATION PLAN (LTIP)

CONCERN: The LTIP's ability to satisfy stakeholder concerns remains virtually untested.

Because so few acres have been treated under the first 4FRI EIS, there has been very little shared learning (almost none, really) within either formal monitoring or informal observational contexts. Therefore, we are very uncertain of how well the LTIP meets the objectives of the original retention strategy. It's entirely possible that the LTIP creates so many exceptions to large tree retention that is has almost no utility, and thus, a complete overhaul may be necessary.

The 4FRI Stakeholders Old Growth Protection and Large Tree Retention Strategy stated that "*we are committed to monitoring the outcomes of treatments that follow this guidance to determine if they achieve our ecological restoration goals. If they do not we are committed to adapting this policy to achieve better ecological outcomes.*"[46]

RECOMMENDATION: Unfortunately, because almost no monitoring data is available to address this uncertainty, we can't say if the LTIP is accomplishing its mission, at least as far as the Center's concerns for large tree *retention* are addressed, so we cannot offer a firm recommendation. However, we request continued Forest Service collaboration in assessing the effectiveness of the LTIP, and request that modifications may be made if it is not meeting our objectives of large tree retention.

CONCERN: The LTIP in effect provides a framework for large tree cutting, not retention.

The Center has long advocated for retaining large trees (those over 16" d.b.h.) as they are the next cohort to replace the old growth structure that has largely been lost due to past high-grade logging. Our scoping comments describe the values of large trees in detail. The evolution of the LTIP, however, has resulted in a framework that seems as if it's a large tree cutting plan - a far stretch from what was originally large tree retention plan.

The exception categories listed in the LTIP describe when and where implementers can cut large trees (those over 16" d.b.h.). This stands in contrast to the intent of the stakeholder-developed Large Tree *Retention* Strategy. Therefore, the term "Large Tree Implementation Pan" really does not accurately reflect the intent and outcomes of the LTIP, as written.

The DEIS states that: "*Modeling the most intense extent of the range of the prescribed treatment, combined with the protection of large and old trees, produced even-aged stands of larger trees in some cases. However, as treatments are applied on the ground, the use of the large and old tree implementation plans, in accordance with an uneven-aged thinning strategy, would be able to produce uneven-aged conditions across much of the landscape*."[47] This statement makes it clear that the use of the use of the large and old tree implementation plans will allow the Forest Service to cut large trees in areas that do not meet their criteria for even agedness.

The result of the use of the large and old tree implementation plans is that the landscape will actually move away from desired conditions for large trees on the landscape. Figure 26 in the DEIS shows that

[46] 4FRI Stakeholders Old Growth Protection and Large Tree Retention Strategy, 9/13/2011, at 7.
[47] Rim Country DEIS, Vol. 1, at 157.

current conditions are 9 TPA of 18-24" d.b.h. trees but both Alternatives 2 and 3 reduce the amount of 18-24" d.b.h. trees to 8 TPA, thus moving away from desired conditions.[48]

RECOMMENDATION: As the LTIP would allow the cutting of large trees such that their occurrence on the landscape actually decreases under both action alternatives, it should be renamed "Large Tree Cutting Plan" to reflect its true nature.

CONCERN: LTIP exception categories allow far too much large tree cutting.

In preparing the the first 4FRI EIS, the Forest Service calculated how much of the landscape would fall into one of the LTIP exception criteria. Using GIS, the result was that only 54,358 acres of the 596,716 acres proposed for treatment did not fit an exception category.[49] So, that means that in the first analysis area, 91% of the landscape was open to large tree cutting. This result was shocking and not at all what the Center had expected out of the Forest Service's interpretation of the Large Tree Retention Strategy.

RECOMMENDATION: Any subsequent NEPA document prepared as part of the Rim Country analysis should include a similar analysis to disclose how much of the landscape is not protected from large tree cutting.

CONCERN: LTIP introduction lacks contextual background of the value of large tree retention.

The LTIP begins with three paragraphs that introduce the section of Appendix D. The first paragraph addresses the legal compliance with forest plans and relevant law, the second paragraph defines large trees (albeit in a somewhat confusing manner; is it 16" or 18"?), and the third paragraph asserts that the Forest Service might just go ahead and cut more large trees anywhere if they determine that the large trees stand in the way of meeting restoration objectives. This section is lacking an important fourth paragraph, and that is the value of large trees and the long-standing stakeholder position that the default action is to retain them, and only in rare circumstances will they be cut.

The removal of large trees should be rare. The Seeps and Springs, Riparian, Wet Meadow, and Aspen exception categories all state that removal of large trees that have encroached upon those systems *"constitute a relatively small part of an overall … restoration effort.*" So, in these exceptions, it seems clear that large tree removal should in fact be very rare.

The Ponderosa Pine-Gambel Oak Forest exception category is broader, but still constrained by the prevalence of Gambel oak across the landscape. It's crucial to clarify that the exception does not apply to *any* large tree near an oak tree. The intent of the Large Tree Retention Strategy is to allow limited exceptions in pine-oak forest, which are forests where >10% of the stand BA or 4.6 m^2/ha (20 ft^2/ac) of BA consists of Gambel oak >13 cm (5 in) in diameter at root collar.[50] The exceptions are constrained by the distance of a large tree form an oak of a certain size, which in the original Large Tree Retention Strategy was "*where large post-settlement trees' drip lines or roots overlap with those of Gambel oak trees exhibiting drc of >12*"[51] but has been reduce to "*Large post-settlement trees' drip lines or roots do not overlap with those of Gambel oak trees exhibiting greater than 8 inch DRC*" in the Rim Country

[48] Rim Country DEIS, Vol. 1, Figure 26, at 158.
[49] 4FRI Modified Large Tree Strategy, Revision 5 - 05/23/2012.
[50] See 2012 Mexican spotted owl Recovery Plan, at 252, and 4FRI Stakeholders Old Growth Protection and Large Tree Retention Strategy, 9/13/2011, at 20.
[51] 4FRI Stakeholders Old Growth Protection and Large Tree Retention Strategy, 9/13/2011, at 20.

DEIS.[52] In the Rim Country DEIS, habitat criteria for Nest/Roost recovery habitat was met for 39,461 acres which includes 20,726 acres of pine-oak, 14,407 acres of mixed conifer, and 4,328 acres of GeoPhys model (unsure of what this means).[53] Therefore, we would argue that the exception criteria for "in MSO Recovery Habitat" in the LTIP should only apply to 20,726 acres.

RECOMMENDATIONS: 1) Any subsequent NEPA document prepared as part of the Rim Country analysis should add a paragraph to the introduction to the LTIP that briefly explains the ecological and social value of large trees, and that they will only be cut in rare circumstances that meet the criteria set forth in the LTIP exception categories. 2) The LTIP should also make clear that if the pine-oak exception is to be used, the stand must meet the threshold established in the MSO Recovery Plan for the definition of pine-oak forest, and we also request that the original oak diameter threshold of 12" d.r.c. is used in a revised LTIP. 3) A table that breaks down the acres associated with the pine-oak exception category should be provided in any subsequent NEPA document prepared as part of the Rim Country analysis. 4) The introductory section on LTIP should also clarify that there are no exception categories specific to dwarf mistletoe, and as such large trees cannot be cut because they have dwarf mistletoe, adding language indicating that "large trees will not be cut for forest health reasons."

CONCERN: Process for cutting of more large trees beyond LTIP exceptions should be removed.

As referenced above, the introduction to the LTIP in the Rim Country DEIS states that:

"*This plan may not include every instance where large post-settlement trees may be removed. There may be additional areas and/or circumstances where large post-settlement trees need to be removed in order to achieve restoration objectives. During implementation (prescription development), if there is a condition where forest plan desired conditions conflict with the exception condition categories listed below, no large trees would be felled until the NEPA decision is reviewed by the District. The District would decide whether the action is consistent with the analysis and the decision made*."[54]

This is another example of how the LTIP is incongruous with the stakeholder-developed Large Tree Retention Strategy. In contrast, the Strategy provides guidance for this situation:

"*We also recognize there may be additional areas and/or circumstances where large trees need to be removed to achieve restoration. These circumstances should be identified through a site-specific, agreement-based, collaborative process as described in the 4FRI Charter*."[55]

During the period of the formulation of the first 4FRI EIS, there was considerable discussion around this issue. The Center argued that the stakeholders should have a role in this evaluation, consistent with the Large Tree Retention Strategy. The Forest Service was intransigent and refused to budge. Considering the range of unresolved large tree concerns we have highlighted here, and further considering the recent tragic loss of old and large trees at Little Creek, we are now deeply concerned that this third paragraph in the LTIP simply is not compatible with our desired outcomes for large tree retention. In short, the LTIP already provides enough exceptions to large tree retention, and any additional, unforeseeable instances should not be impediments to implementation of an agreeable Decision.

[52] Rim Country DEIS, Vol. 2, Appendix D, Section C, at 624.
[53] Rim Country DEIS, Wildlife Specialists Report, at 33-34.
[54] Rim Country DEIS, Vol. 2, Appendix D, Section C, at 619.
[55] 4FRI Stakeholders Old Growth Protection and Large Tree Retention Strategy, 9/13/2011, at 4.

RECOMMENDATION: Any subsequent NEPA document prepared as part of the Rim Country analysis should delete the current language in the Rim Country DEIS LTIP identified above as the third paragraph in the LTIP.

CONCERN: Rim Country LTIP eliminates a key phrase which would limit application on limestone soils.

The 4FRI Stakeholders Old Growth Protection and Large Tree Retention Strategy describes within stand openings as being "*most pronounced on sites with heavy textured (e.g., silt-clay loam) soils*."[56] This language was brought verbatim into the LTIP in the first 4FRI EIS.[57] Interestingly, this phrase has been removed from the Rim Country DEIS. In a seminal work, Covington and Moore (1994) reported that "*soils, developed on basalt and cinders, are mostly silty clays and silty clay loams*" and that "*soils, developed from limestone, are mostly sandy and gravelly loams and loams*."[58] As a large proportion of the Rim Country landscape is derived from limestone and sandstone, it is quite important that this reference to soil structure influences on tree aggregation is included.

In addition to this apparent drift away from foundational 4FRI documents, there is an important nexus between this concern and our concern with openness and treatment intensity in the Rim Country landscape, which is markedly different than the general Flagstaff area analyzed in the first 4FRI EIS. Recent research by Rodman et al (2017)[59] reported very strong correlations between parent material (and resultant soil type and TEU) with tree density, basal area, and aggregation. They concluded that "*TEU site classification and parent material help to predict site productivity, which in turn influences understory composition and cover, wildfire activity, seedling establishment, overstory growth rates, and stand density*."[60] The sedimentary soils common in Rim Country produce dramatically more regeneration that the basaltic soils around Flagstaff, making within stand openings and regeneration openings risky, in terms of the likelihood that regeneration will outpace the ability for fire to maintain reduced ladder fuels. Region 3 Silviculturalist Jim Youtz has twice personally communicated to us that he shares our concern that Rim Country treatments will open the forest up too much and result in undesirable regeneration responses. The importance of recognizing the influence of soils on forest structure is made more apparent when considering the work presented by Arizona Game and Fish in June, 2018 to the 4FRI Planning Workgroup, which showed that the scope of inference for the few reference site studies used to support the desired conditions is only applicable to 25% of the Rim Country landscape, and that soils and TEUs are important considerations for determining desired forest structure.[61]

RECOMMENDATIONS: 1) Consistent with the Old Growth Protection and Large Tree Retention Strategy and the first 4FRI EIS, any subsequent NEPA document prepared as part of the Rim Country analysis should include the line "These openings are most pronounced on sites with heavy textured (e.g., silt-clay loam) soils" in the discussion of within stand openings in the LTIP. 2) In light of the risk posed by over-thinning on sedimentary soils, we also request that the intensity of treatments is evaluated for their

[56] 4FRI Stakeholders Old Growth Protection and Large Tree Retention Strategy, 9/13/2011, at 21.
[57] See first 4FRI EIS, Appendix D, at 52.
[58] Covington, W. W. and M.M. Moore. 1994. Postsettlement Changes in Natural Fire Regimes and Forest Structure: Ecological Restoration of Old-Growth Ponderosa Pine Forests. *Journal of Sustainable Forestry* 2(112): 153-181, at 163.
[59] Rodman, K.C., A.J. Sanchez-Meador, M.M. Moore, nd D.W. Huffman. 2017. Reference conditions are influenced by the physical template and vary by forest type: A synthesis of Pinus ponderosa-dominated sites in the southwestern United States. *Forest Ecology and Management* 404:316-329.
[60] Rodman et al (2017) at 323.
[61] See attachments for that report.

response on tree regeneration and increases in ladder fuels. 3) The language used in this exception category should be subject to change to accommodate other changes related to the use of the term interspace, discussed elsewhere in these comments as well as in the Stakeholders comment letter.

CONCERN: Rim Country LTIP eliminates a key phrase which focuses on removal of small trees.

The LTIP in the first 4FRI EIS states that within stand openings "*would be created by focusing on removal of VSS 3 and lower VSS 4, given the excess of such trees across the project area*."[62] Interestingly, this phrase has been removed from the Rim Country DEIS.

RECOMMENDATION: Consistent with the first 4FRI EIS, and in the interest of retaining large trees on the landscape, any subsequent NEPA document prepared as part of the Rim Country analysis should include the specification that within stand openings "*would be created by focusing on removal of VSS 3 and lower VSS 4, given the excess of such trees across the project area*."

CONCERN: Rim Country LTIP modifies a phrase so that it increases reliance on silviculture over fire.

The 4FRI Stakeholders Old Growth Protection and Large Tree Retention Strategy describes an ecological objective for the management of Heavily Stocked Stands with High Basal Area Generated By a Preponderance of Large Young Trees as being "[n]*atural fire (rather than silviculture) is the principle regulator of forest structure over time*."[63] This language was brought forward into the LTIP in the first 4FRI EIS with slight modification, to read as "[f]*ire is the principle regulator of forest structure over time*."[64] Interestingly, this phrase has been further distorted in the Rim Country DEIS, such that it now reads as "[f]*ire may be used with other methods to maintain forest structure over time*." This is another example of how the Forest Service continues to drift away from stakeholder perspectives and advance a narrative of continued silvicultural intervention into systems which we argue must be regulated by natural fire processes. Aside from the ecologically indefensible nature of this, the implementation track record of 4FRI phase one should be enough to make clear that continued mechanical intervention is simply not realistic, and that fire can and must be seen as the principle structural regulator in the future.

RECOMMENDATION: Consistent with the Old Growth Protection and Large Tree Retention Strategy, any subsequent NEPA document prepared as part of the Rim Country analysis should replace the line identified here with the original stakeholder vision that "*natural fire (rather than silviculture) is the principle regulator of forest structure over time*" in the discussion of Heavily Stocked Stands with High Basal Area Generated By a Preponderance of Large Young Trees in the LTIP.

CONCERN: Exception category of Heavily-Stocked Stands (with High Basal Area) Generated by a Preponderance of Large, Young Trees should be discarded.

The exception category of Heavily-Stocked Stands (with High Basal Area) Generated by a Preponderance of Large, Young Trees is contradictory with SPLYT, confuses the implementation of the decision, and as such should really be discarded. This category largely overlaps with the acres identified as SPLYT acres, and would apply a completely different treatment outcome.

RECOMMENDATION: Any subsequent NEPA document prepared as part of the Rim Country analysis should remove the exception category of "Heavily-Stocked Stands (with High Basal Area) Generated by a

[62] See first 4FRI EIS, Appendix D, at 53.
[63] 4FRI Stakeholders Old Growth Protection and Large Tree Retention Strategy, 9/13/2011, at 23.
[64] See first 4FRI EIS, Appendix D, at 52.

Preponderance of Large, Young Trees," but insert the language "*natural fire (rather than silviculture) is the principle regulator of forest structure over time*" in other appropriate areas in the document.

CONCERN: Modelling assumptions fail to incorporate LTIP criteria and are thus likely inaccurate.

The Modelling Assumptions portion of the DEIS states that: "*Within this project area, the majority of trees that meet the old tree definition are greater than or equal to 18". On the ground cutting prescriptions would follow the Old Tree Implementation Plan (OTIP) and trees larger than 18" that do not meet the OTIP criteria may be cut during implementation*."[65] This statement has several problems. First, it's overly ponderosa pine centric. There are many trees under 18" that are over 150 years old, especially when considering deciduous trees, junipers, pinyons, and suppressed forest conifers. Second, the statement suggests that if a tree is not old (per OTIP criteria) then it may be cut. This is only true if it falls into one of the narrowly defined LTIP exception categories. Third, the Rim Country LTIP defines large trees as those over 16." It states: "*For the purpose of this document, large post-settlement trees, as defined by the socio-political process, are those that are 16-inch DBH or larger*."[66] Lastly, considering these concerns, it may be such that the modelling outputs are do not represent the actual results of treatments.

RECOMMENDATIONS: The Modelling Assumptions portion of any subsequent NEPA document prepared as part of the Rim Country analysis should: 1) Clarify that generally, ponderosa pine and most forest conifers over 18" are old, but that many trees under 18" may be old depending on the species and the trees site quality; 2) Clarify that large trees may only be cut in accordance with the LTIP exception categories; 3) Specify that the LTIP defines large trees as those over 16" d.b.h.; and 4) because of the compounding effect of these issues, the modelling may need to be re-run under properly parameterized assumptions that incorporate projected LTIP implementation.

CONCERN: The indicators and measures for analyzing the issue of large tree retention are insufficient.

The DEIS appropriately identifies that large tree retention is a significant issue for analysis. If our comments are any indication, this remains a contentious issue with significant distance between the Forest Service and Center's perspectives. The DEIS states that:

"*The proposed action may cause the loss of large trees which may significantly affect old growth recruitment. Proposed management actions in old growth, future old trees (large young trees), and high-canopy patches should be very explicit, and no old trees be cut*."[67]

The DEIS then states that the issue will be addressed "… *in the effects analysis for all alternatives. Large tree retention will be addressed with treatment design and location, design features, mitigation measures, and BMPs to retain old growth and groups of large trees in all action alternatives*."[68]

The indicator or measure for this would be the "[n]*umber of acres of stands meeting collaboratively established Stands with a Preponderance of Large Young Trees (SPLYT) criteria*."[69]

We appreciate that the issue was framed appropriately, but it does not fully address our concerns. There are several concerns imbedded in this aspect of the issues analysis. First, in addition to our issue

[65] Rim Country DEIS, Vol. 1, at 142.
[66] Rim Country DEIS, Vol. 2, Appendix D, Section C, at 619.
[67] Rim Country DEIS, Vol. 1, at 26.
[68] *Ibid.*
[69] *Ibid.*

being that "no old trees be cut," we have consistently argued that relatively few large trees should be cut, too, with treatments focusing on small diameter, young trees, and any large tree cutting clearly defined as exceptions to the "*16" diameter threshold that limits the cutting of trees larger than 16" to circumstances and criteria set forth in pre-defined exception categories*"[70] in the LTIP. Second, the statement that BMP's would be crafted to retain "groups of large trees" dismisses the significance of large trees which are not part of groups. Third, the indicator/measure is narrowly prescribed and does not address the issue of large tree retention across the landscape, outside of stands identified as SPLYT.

Overall, the DEIS addresses large tree and old tree structure in an overly simplistic way by focusing analysis and metrics solely on SPLYT. For example, DEIS pages 140, 150, 161, and 173 all use SPLYT as the sole metric to describe the affected environment or the effects of the proposed action. Large trees are not confined to SPLYT stands, and in fact are protected across the entire project area unless they fit into one of the LTIP exception categories.

This narrowly defined indicator/measure may be incongruous with the Monitoring Plan too, which states that there would be ongoing compliance monitoring to assess whether: "*If mechanical treatments occurred, were they implemented in accordance with design features, BMPs, mitigation measures and the **silvicultural implementation guide***?"[71] As well as the monitoring question: "*Did management activities minimize old and large tree mortality*?"

RECOMMENDATION: In the section titled "Significant Issues Responded to through Mitigation Measures, Analysis, and Modifications to the Proposed Action" in any subsequent NEPA document prepared as part of the Rim Country analysis, please: 1) clarify that in addition to the statement that no old trees shall be cut, that few large trees would be cut and they would be cut only in accordance with the exception categories in the LTIP; 2) replace the phrase "*and BMPs to retain old growth and groups of large trees in all action alternatives*" with "*and BMPs to retain old growth and large trees in accordance with the exception categories in the OTIP and LTIP in all action alternatives*"; and 3) provide indicators/measures that relate to the larger issue of large tree retention and are not specifically focused on SPLYT acres only.

CONCERN: The Rim Country Monitoring Plan suggests that utilization of the LTIP is optional.

The Fine-scale Assessment section of the Biophysical Monitoring Plan directs the reader to "*see implementation plan which includes if and how the Large Tree Implementation Plan will be used for specific task orders.*"[72] This creates a level of confusion and suggests that the LTIP can be optionally applied during the development of task orders. It is our understanding, and we expect that the LTIP will apply equally across the entire project area.

RECOMMENDATION: Any subsequent NEPA document prepared as part of the Rim Country analysis should delete this sentence referring to "if and how" the LTIP would be used, and clarify that the LTIP applies mandatorily to all task orders in the projects implementation.

[70] 4FRI Stakeholders Old Growth Protection and Large Tree Retention Strategy, 9/13/2011, at 7.
[71] Rim Country DEIS, Vol. 2, Appendix E, at 671. **(emphasis added)**
[72] Rim Country DEIS, Vol. 2, Appendix E, at 675.

2.3. STANDS WITH A PREPONDERANCE OF LARGE YOUNG TREES (SPLYT)

The Center has long advocated for retaining large trees (those over 16" d.b.h.) as they are the next cohort to replace the old growth structure that has largely been lost due to past high-grade logging. In addition, stands or groves with mature, large tree structure with high canopy cover provide uncommon and valuable habitat for wildlife that require high canopy cover mature stands for nesting, roosting, or other life cycles. These stands also provide treasured social values for people seeking shade, spiritual renewal, and the sensations experienced in what some call cathedral forests. As a response to this need, the Forest Service and stakeholders developed the SPLYT concept as a way to identify and protect those values where they exist on the 4FRI landscape.

CONCERN: The Rim Country SPLYT definition is not the stakeholder version conveyed to USFS.

The first real quantitative definition of SPLYT offered in the DEIS does not accurately reflect the criteria agreed upon by the stakeholders and the Forest Service. The DEIS states that "[p]*onderosa pine stands of post settlement trees where the quadratic mean diameter of the* ***top 20 percent of trees*** *is greater than 15 inches and the basal area of trees greater that 16 inches is more than 50 square feet of basal area may be considered stands with a preponderance of large young trees (SPLYT stands)*."[73]

However, the SHG SPLYT position paper states that SPLYT criteria are:

a) Site Class 1;
b) Quadratic Mean Diameter (QMD) of the **largest 20 trees is >15"**; and
c) There is >50 square feet/acre of basal area in trees >16" diameter at breast height (DBH).

The inconsistent definition is used again at pages 150, 161, 173, 638 of the DEIS. While we cannot determine exactly when and where this flip from top 20 to top 20% occurred, we can say that at the September 7, 2016 Planning Workgroup meeting that "*Mark and Randy proposed to continue to refine the criteria and to run several iterations based on: Iterations of QMD Top 20 trees*."[74] The maps and tables attached to those meeting notes all confirm that top 20 trees, not top 20% of trees, was the metric under consideration. Later, the Planning Workgroup's August 9, 2017 Meeting Minutes also recorded the definition as top 20 trees, not to 20% of trees.[75]

RECOMMENDATION: We cannot determine how this mix-up occurred, but it has potentially very significant ramifications. The definition criteria offered by the Forest Service in the Rim Country DEIS appears to be inconsistent with what the Stakeholders have approved. We request that substantial attention is given to this in a constructive manner as soon as stakeholder workgroups resume their collaborative process of refining the EIS with the Forest Service. As a starting point, a comparison of the modelled results of both iterations should be created for stakeholder review and shared learning.

CONCERN: A discussion of SPLYT should be added into the introductory section of the LTIP.

Building off of comments earlier in this letter, the introductory section of the LTIP should be modified to better reflect the values of large trees and the Forest Service's commitment to protect them unless they fit into an exception category. As part of this, SPLYT should be incorporated into this section, so that

[73] Rim Country DEIS, Vol. 1, at 140. **(emphasis added)**
[74] 4FRI Stakeholders Planning Workgroup meeting notes, 9/7/2016.
[75] 4FRI Stakeholders Planning Workgroup meeting notes, 8/9/2017.

implementers have a clear understanding of how SPLYT identification and treatment modifications fit into the broader strategy of large tree retention.

RECOMMENDATION: Any subsequent NEPA document prepared as part of the Rim Country analysis should add a description of SPLYT to the introduction of LTIP.

CONCERN: The criteria for identifying SPLYT stands needs to be evaluated.

Conservation of these stands is a high priority to stakeholders and a critical component of collaborative agreement. At the outset of the Rim Country DEIS process, the SHG and Forest Service devoted considerable collaborative effort developing a methodology to identify and map these stands. The selected approach was formally adopted by the SHG, communicated to the Forest Service (see SHG Position Statement dated October 13, 2017) and appears in the Rim Country DEIS (although using a different criterion that the stakeholders letter, as described above). However, following personnel changes on the 4FRI Planning Team, the Forest Service informed stakeholders that this approach is not viable for implementers in the field, who must verify stand conditions (including the presence or absence of SPLYT characteristics) prior to treatment assignment via the Flexible Toolbox.

RECOMMENDATION: We recommend that the Forest Service develop a replacement SPLYT methodology that leverages work already completed (e.g., stand mapping and field assessments by stakeholders and the Forest Service). This second iteration should be done collaboratively and in the field, with participation by Forest Service personnel who will use the final product.

CONCERN: Treatment adjustments in SPLYT stands may not adequately protect mature forest values.

Under current direction, areas identified as SPLYT would be assigned treatments at the lower end of the of the assigned treatments range. This does not comport with what the Center understood during the formulation of the process, and it has only been during the Rim Country DEIS process that this has come into focus. In the absence of SPLYT stands being treated, we have not had an opportunity to validate the outcomes of the approach.

RECOMMENDATION: Stands identified as SPLYT should receive the lowest treatment assignment (10-25%), rather than the lower end of the assigned strata. If monitoring data indicates that treating SPLYT stands to the lowest intensity interferes with reducing high-severity fire risk at the mid and landscape scales then modifications can be discussed then under the adaptive management framework.

3. THE STRATEGIC TREATMENTS FOR FIRE USE ALTERNATIVE: A PATH FORWARD

The DEIS states that "*Seven issues, including treatments in MSO PACs, treatments in goshawk habitat, large tree retention, dwarf mistletoe mitigation, smoke/air quality, economics, and roads, contributed to alternative and design feature/mitigation measure development and focused the analysis*."[76] The DEIS later describes that "*four (4) alternatives recommended in public comments that have been considered and eliminated from detailed study*" including one that would "*prioritize strategic treatments for fire use*."[77] We interpret that to refer to the Strategic Treatments for Fire Use Alternative which we submitted to the Forest Service for consideration in May, 2018, which is addressed and summarily dismissed on page 57 of the DEIS. We stand by the framework which we presented in the Strategic Treatments for Fire Use Alternative proposal, and incorporate by reference the entirety of that work in these comments on the Rim Country DEIS.

3.1. STRATEGIC TREATMENT OPTIMIZATION IS THE BEST SCIENCE AND THE BEST POLICY

CONCERN: The Rim Country DEIS does not utilize the best available science or follow policy recommendations for strategic treatment placement and prioritization.

The DEIS reminds us that "[t]*he 4FRI stakeholders developed a comprehensive restoration strategy for the first analysis area on the Coconino and Kaibab National Forests*" and that "[t]*he Forest Service used the stakeholder's landscape strategy to inform the purpose and need and proposed action for both the 1st 4FRI EIS and this Rim Country Project DEIS*."[78] The stakeholders landscape strategy, appropriately titled the "Landscape restoration strategy for the first analysis area," set an early expectation that 4FRI would use the most advance scientific tools available to prioritize and strategically locate treatments in order to maximize restoration value from limited resources.

In the spirit of that strategy, and recognizing that the Forest Service was not using any semblance of prioritization in the Rim Country analysis, we submitted the Strategic Treatments for Fire Use Alternative. Now that we have thoroughly reviewed the Rim Country DEIS, and we have confirmed that it fails to use any form of strategic treatment placement or prioritization, we see the need even more for the analysis of the Strategic Treatments for Fire Use Alternative. We are disappointed that our alternative was not given its due attention. And we are disappointed that the Forest Service has proposed mechanical treatments on 93% of the Rim Country landscape. Choosing our alternative would reduce the acreage treated mechanically to within the range that we found consensus around, and still make plenty of acres available for a sustainable forest products industry.

The DEIS states that "t]*he prioritization of treatment areas will be a part of the implementation of Rim Country, though broad recommended methodology is presented here*."[79] We have not been able to identify the broad recommended methodology which is referred to in that statement. This leads us to believe that there is no coherent strategy in placing treatments on the landscape.

As we explained in the Strategic Treatments for Fire Use Alternative, mechanical treatment prioritization and strategic placement of mechanical treatments is consistent with objectives established in the

[76] Rim Country DEIS, Vol. 1, at ii.
[77] Rim Country DEIS, Vol. 1, at 54.
[78] Rim Country DEIS, Vol. 1, at 23.
[79] Rim Country DEIS, Vol. 1, at 215.

Mexican spotted owl Recovery Plan,[80] the Statewide Strategy for Restoring Arizona's Forests,[81] the Landscape Restoration Strategy for the First Analysis Area,[82] the Memorandum of Understanding between the 4 Forest Restoration Initiative (4FRI) Collaborative Stakeholder Group Representatives and the U.S. Forest Service,[83] the National Cohesive Wildland Fire Management Strategy,[84] and dozens of scientific articles published in peer reviewed journals and reviewed thoroughly in our Strategic Treatments for Fire Use Alternative proposal.

The Landscape Restoration Strategy for the First Analysis Area stated that:

"… spatial fuel treatment patterns over a sub-set of areas across a landscape can be optimized to influence the movement of large fires and reduce the threat of severe crown fire behavior. The firescape concept lends itself to an iterative fire modeling and a Strategic Placement of Treatments (SPOTS) approach that can be modeled with Treatment Optimization Model (TOM) functions in the FlamMap fire modeling software package (Collins et al. 2010). LSWG participants anticipate that a SPOTS modeling approach could be used to model potential areas for mechanical thinning within a firescape and treatment area, which over time would facilitate the safe operational management of planned and unplanned fire ignitions."[85]

They further stated that:

"*When coupled with the re-establishment of landscape-scale fire processes over time, the strategic implementation of thinning and burning treatments in parts of the study area is anticipated to create forest conditions that are less prone to shifts in native plant community structure and composition*."[86]

Our Strategic Treatment for Fire Use Alternative is a natural extension of the SPOTS and TOM frameworks suggested for use in 4FRI by the Landscape Restoration Strategy for the First Analysis Area, a report that was requested by the Forest Service. These frameworks have been further refined over the past decade. As we argued in our Strategic Treatments for Fire Use Alternative proposal, there is a need to maximize the benefits of scarce resources and limited industry capacity in order to harness the restorative benefits of prescribed and managed wildfires at the landscape scale. The current direction in the Rim Country DEIS assumes the impossible (that is that almost 1,000,000 acres would be treated in the next decade or two), and as such fails to present a realistic strategy for accomplishing the vision of restored forests and fire regimes shared by the Center and many of our stakeholder partners.

[80] USFWS 2012 Mexican Spotted Owl Recovery Plan, First Revision (*Strix occidentalis lucida*). Southwest Region U.S. Fish and Wildlife Service Albuquerque, New Mexico.

[81] Governor's Forest Health Council, State of Arizona. June 2007. The Statewide Strategy for Restoring Arizona's Forests. Aumack, E., T. Sisk, and J. Palumbo, editors. Published by Arizona Public Service, Phoenix, AZ.

[82] Sesnie, S.E., J. Rundall, S. Hedwall, and V. Horncastle, technical editors. October 1, 2010. Landscape restoration strategy for the first analysis area: report from the Four Forests Restoration Initiative Stakeholder Group to the USFS Planning Team.

[83] Memorandum of Understanding between the 4 Forest Restoration Initiative (4FRI) Collaborative Stakeholder Group Representatives and the U.S. Forest Service, signed February 22, 2011.

[84] National Strategy 2014: https://www.forestsandrangelands.gov/strategy/thestrategy.shtml

[85] Sesnie et al (2010), at 10.

[86] Sesnie et al (2010), at 17.

3.2. RIM COUNTRY DEIS PRESENTS A SILVICULTURAL SOLUTION TO AN ECOLOGICAL PROBLEM

CONCERN: The Rim Country DEIS is overly reliant on forest structural manipulation to meet "desired conditions" that are outside the stakeholders zone of agreement.

At the core of the Strategic Treatments for Fire Use Alternative is our position that the current direction in planning, analysis and implementation of 4FRI is overly reliant on meeting structural and compositional targets, representing what is in effect a non-viable silvicultural solution to a complex ecological problem. The quest to create the ideal vegetative state across every operable acre has marginalized the overriding importance of fire-driven ecological processes. These comments have provided several examples of how language in the DEIS supports our assertion that desired structure and density is overriding the value of process-driven forest structure and composition.

The Center rejects a framework which assumes that complex ecosystems can be wrangled into fixed proportions of tree ages and sizes that must be repeatedly tinkered with at 30-year rotations to maintain "desired conditions." In areas where strategically located mechanical intervention is implemented, fire alone can and should be the primary future maintenance tool.[87] This notion has been deleted from the Rim Country DEIS, as we pointed out in the LTIP section of this letter.

The Center strongly supports a sustainable and appropriately scaled forest products industry that can accomplish the hard work of thinning in order to restore ecologically appropriate and low-risk fire processes. However, measuring the health of the forest on the basis of density-metrics represents a worn-out allegiance to a past industrial paradigm that is not the right scale or approach for northern Arizona's forests. This regulated-forest model defines successful restoration as growing large, defect-free trees as quickly as possible and ignores the complexity of process-centered ecosystem function.

Applying a new form of growth and density regulation, as articulated in GTR-310[88] and codified into flawed Forest Plans and desired conditions documents cannot by itself accomplish restoration at meaningful landscape scales; only the additive effects of frequent fire can fully restore these ecosystems. Renowned fire ecologist Dr. Pete Fulé stated that "*The fire-related adaptations of pine forests are associated with fire's role as a selective force going far back in evolutionary time,*"[89] suggesting that restoration of fire adapted dry forests is inseparable from the influence of recurrent fire as a primary selective force.

Unfortunately, the Forest Service has neglected to take this fantastic opportunity to analyze an alternative that maximizes return on limited resources by focusing thinning on the acres that truly need it the most. Restoring a forest is not an exercise in manipulating every quantifiable metric into a neat category, or alleviating any form of stress that might lead to unexpected mortality. The era of sanitation is over. It's time to get smart about how we restore this landscape.

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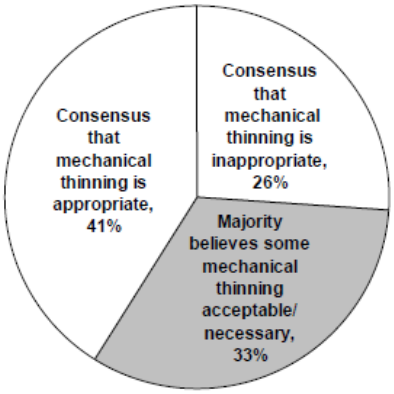
[87] North, M., B.M. Collins, and S. Stephens. 2012. Using Fire to Increase the Scale, Benefits, and Future Maintenance of Fuels Treatments. *Journal of Forestry* 110(7): 392-401; and Reinhardt, E.D., R.E. Keane, D.E. Calkin, and J.D. Cohen. 2008. Objectives and considerations for wildland fuel treatment in forested ecosystems of the interior western United States. *Forest Ecology and Management* 256:1997-2006.

[88] Reynolds *et al.* 2013. Restoring composition and structure in Southwestern frequent-fire forests: A science-based framework for improving ecosystem resiliency. RMRS-GTR-310.

[89] p. 528 in Fulé 2008. Does it make sense to restore wildland fire in changing climate? *Restoration Ecology* 16(4): 526-531.

3.2.1. MECHANICAL THINNING IN THE RIM COUNTRY DEIS EXCEEDS SOCIAL AGREEMENTS

The DEIS offers some appropriate background to the saga that has been 4FRI. In Chapter 1, the DEIS harkens back to the Small Diameter Wood Supply in Northern Arizona report, which "*demonstrated a level of "social agreement" on how much, where, and under what basic parameters mechanical treatment, as one restoration tool, could be used to accelerate restoration of the 2.4 million-acre initiative area.*"[90]



As published in the Journal of Forestry,[91] the small-diameter wood supply study achieved consensus around mechanical thinning on appropriately 41% of the 2.4 million-acre 4FRI landscape. That amounts to approximately 988,000 acres where there was consensus on the need for mechanical thinning. In the first EIS, approximately 44% of the analysis area was authorized for mechanical thinning. Now, the Rim Country Preferred Alternative makes up to 72% of the landscape available for mechanical thinning. Across both analyses, this departure equates to over 330,000 acres beyond the consensus for mechanical thinning. The chart at left is taken from the "Analysis of Small-Diameter Wood Supply in Northern Arizona."[92]

This exceedance of the consensus agreement on the extent of thinning appropriate for the landscape does not even account for the additional acres within the 4FRI footprint that have been made available to thinning under different NEPA decisions, which, based on Table 25 in the Cumulative Effects discussion, would be between approximately 184,039 acres and 258,416 acres.[93] Reasonably foreseeable activities within the cumulative effects area adds another 111,243 acres of mechanical thinning that is on the near-term horizon,[94] bringing the amount of the Rim Country landscape that has already been assigned, or will soon be assigned, thinning treatments since the 2008 wood supply study to as much as 369,659 acres, or 38% of the area where there was consensus for the need for mechanical intervention. These values don't even include projects on the Apache National Forest, including the West Escudilla Restoration Project (~32,000 acres of thinning), the forthcoming Black River Restoration Project (~60,000 acres of thinning), the Hannagan Forest Health Project (~3,000 acres of thinning), the Easy Eagle/Mud Springs Project (~ 80,000 acres of thinning), Wallow Fire salvage (~14,000 acres of salvage), and potentially other projects.

The Rim Country project is often described as being 1,240,000 acres. The vegetation analysis provides a more accurate area, which is reported as 1,238,658 acres.[95] According to this section of the DEIS,

[90] Rim Country DEIS, Vol. 1, at 3.
[91] Hampton et al. 2011. Estimating regional wood supply based on stakeholder consensus for forest restoration in northern Arizona. *Journal of Forestry* 109: 15-26.
[92] Hampton, H.M., S.E. Sesnie, B.G. Dickson, J.M. Rundall, T.D Sisk, G.B. Snider and J.D. Bailey. 2008. Analysis of Small-Diameter Wood Supply in Northern Arizona. Forest Ecosystem Restoration Analysis Project, Center for Environmental Sciences and Education, Northern Arizona University.
[93] Rim Country DEIS, Vol. 1, Table 25, at 183-186. Addition of all mechanical treatments acreages provided since 2008 equals 184,039 acres. An additional 74,377 acres of mechanical thinning were recorded in the FACTS database but had no NEPA record associated with them. The date of these activities is not disclosed.
[94] Rim Country DEIS, Vol. 1, Table 27, at 188.
[95] Rim Country DEIS, Vol. 1, at 136.

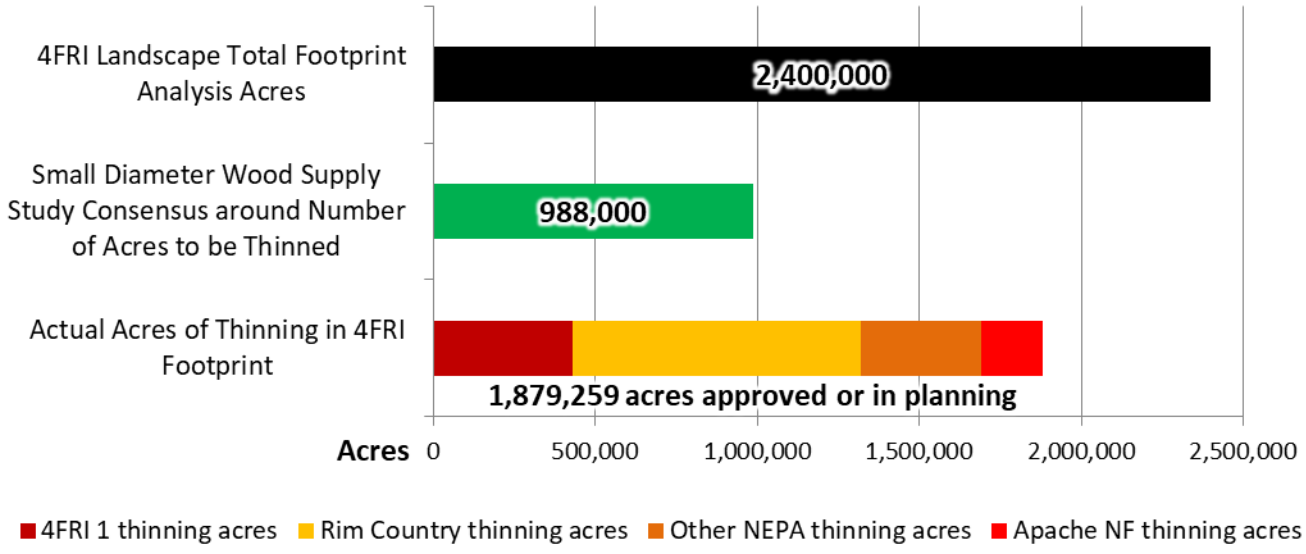
"[a]*pproximately 255,249 acres have been removed from this silvicultural analysis because they are part of an ongoing project or are being analyzed in a separate analysis,*" "[a]*pproximately 30,263 acres are either non National Forest System lands, or are non-forested,*" and "[a]*n additional 1,141 of these acres identified as "Other" in Table 4 were determined to be either surface water, mineral pits, dams or road surface and will not be given a detailed description in this silvicultural analysis*."[96] The DEIS then says that "[t]*he remaining 951,691 acres, considered the analysis area, will be analyzed in this report*." As an initial matter, the Forest Service has provided an inaccurate reporting as these numbers simply don't add up. But more importantly, if the area available for mechanical treatments by way of this process of elimination is 951,691 acres (or 952,005, depending on who's math you trust), and the area reported in the DEIS as receiving mechanical treatment is 889,340 acres, then the preferred alternative assigns mechanical treatments to a whopping 93% of the analysis area.

Of the 1,238,658 acres within the project area:

- Approximately 255,249 acres have been removed from this silvicultural analysis because they are part of an ongoing project or are being analyzed in a separate analysis (Figure 3). Silvicultural treatments and their effects within these areas will not be analyzed in this report.
- Approximately 30,263 acres are either non National Forest System lands, or are non-forested.
- An additional 1,141 of these acres identified as "Other" in Table 4 were determined to be either surface water, mineral pits, dams or road surface and will not be given a detailed description in this silvicultural analysis.
- The remaining 951,691 acres, considered the analysis area, will be analyzed in this report.

Shown above: Page 136 of the DEIS provides inaccurate accounting as these numbers do not add up.

Nearly 1.9 million acres have NEPA decisions or are in analysis for thinning in the 4FRI Footprint. This far exceeds the area with consensus around the need for thinning.



The consensus acreage represents what's driven the "1,000,000 million acres thinned over 20 years" narrative that has become the broadly accepted goal of the 4FRI Stakeholders and the Forest Service.

[96] Rim Country DEIS, Vol. 1, at 136.

3.2.2. MECHANICAL THINNING TREATMENTS IN THE RIM COUNTRY DEIS ARE TOO INTENSE

The issue of treatment intensity has been a consistent concern throughout the 4FRI process. Forest Service proposals for Full Restoration and Extended Duration Restoration have been met with substantial controversy and have been resisted by a majority of the stakeholders. As we have stated numerous times, aggressive, overly intense treatments will have undesired effects on canopy-dependent wildlife, exceed social tolerance, and increase ladder fuels to the point of increasing fire risk.

The DEIS describes several treatment categories that allow increases in treatment intensity, including:

- Dwarf Mistletoe
- Regeneration Openings
- Open reference condition modifiers for savanna treatments[97]
- Wildland-Urban Interface
- The LTIP exception categories, especially exceptions for creating interspace
- The entire Mechanical Flexible Toolbox

These treatment strata permit the Forest Service to ramp up treatment intensities and create more open post-treatment landscapes. We strongly believe that the cumulative effect of these treatments dramatically exceeds the degree of openness that we are comfortable with. In some cases, these treatments are simply scientifically unjustified. For example, the additional 10-20% additional regeneration openings are a purely silvicultural density-regulation tactic. The Center and the DEIS Workgroup have repeatedly asserted that additive regeneration openings are not supported by dry forest restoration science and should either be removed from the proposed action and treatment design altogether or tallied in with overall post-treatment openness.

However, our concern that the DEIS prescribes overly intense treatments is not limited to these categories. Silvicultural modelling suggests that the preferred alternative pushes stand density below desired conditions and on a trajectory to stay below in a large amount of the project area.

For example, in the DEIS, Figure 27[98] shows that the proposed action treats the landscape too intensively, with trees per acre dipping below desired conditions in 7% of acres in 2029 and increasing to 12% of acres below desired conditions in 2039. Similar trends are reported for basal area and Stand Density Index (SDI) and addressed on the next two pages. The narrative explanations of the modelling results in the DEIS do not explain why so many acres are below desired conditions, and set on trajectories to move further from desired conditions. We consider this a very troubling indication that thinning prescriptions are too intense.

As another example, in describing the effects of Alternative 2 on the northern goshawk, the DEIS states that "*Mid-aged forest in age class 3 (5-12" in diameter), and age class 4 (12-18") would be greatly*

[97] We reiterate a concern first established in the Stakeholders Old Growth Protection and Large Tree Retention Strategy at 15: "*There are some debate and questions about where and how much the grassland-forest mosaic shifts over time and space. There … questions about whether some recently-burned areas are early seral forests or stable grasslands, whether or how they may be surrogates for historical grasslands, and if or how that should factor into the overall retention of forest cover. Recognizing the importance of montane grassland restoration, we encourage all parties to seek resolution to these issues on a case-by-case basis through field visits, literature review, and/or discussion*."

[98] Rim Country DEIS, Vol. 1, Figure 27, at 159.

reduced, meeting desired conditions for these age classes in 30 years."[99] Thirty years is far beyond the planning window for this project, and this statement indicates that intense treatments in goshawk habitat will push mid-size trees below desired conditions for three decades.

In addition, modelling appears to fail to distinguish between landscape strata, and as such areas like goshawk PFAs in wet mixed conifer forest are considered to be above desired conditions, even though specific criteria for desired conditions apply to those strata. (More on this soon)

The DEIS admits that thinning is one reason why existing conditions are not meeting desired conditions:

"*There are approximately 132,240 acres (severe disturbance areas) where high severity effects from fires, such as the Dude and Rodeo-Chediski fires, insect and disease outbreaks, or* ***harvesting operations have resulted in reduced forest cover*** *and a departure from desired conditions*."[100]

Based on modelling results, and considering the exceedingly vast allowance for large tree cutting, we have no reason to believe that the currently proposed levels of thinning wouldn't result in reduced forest cover and a departure from desired conditions.

The effects analysis claims that "[h]*igher-intensity thinning would likely have the greatest potential for groundwater recharge, and stream and spring discharge, by reducing evapotranspiration rates*,"[101] but this is not necessarily true, as there are conflicting reports published in the literature.

Consider, for example, this passage from the DEIS: "*In areas where the annual precipitation is less than 20 in (500 mm), removal of the forest canopy does not typically increase annual water yields. The decrease in interception and transpiration caused by forest thinning is usually offset by the increase in soil evaporative losses, resulting in no net change in runoff as long as factors affecting runoff processes are not changed (for example, soil compaction which causes a shift from subsurface flow to overland flow). Evapotranspiration rapidly recovers with vegetative regrowth in partially thinned forests. Increases in runoff due to thinning operations rarely persist for more than 5 to 10 years.*"[102] In addition, any increases in runoff could be offset by climate change,[103] and the DEIS does not analyze the effects of intensive thinning on soil drying.

[99] Rim Country DEIS, Vol. 1, Table 18, at 71.
[100] Rim Country DEIS, Vol. 1, at 14, **emphasis added**.
[101] Rim Country DEIS, Vol. 1, at 113.
[102] Rim Country DEIS, Vol. 1, at 123, original in-text citations omitted.
[103] O'Donnell, F.C., W.T. Flatley, A.E. Springer, and P.Z. Fule. 2018. Forest restoration as a strategy to mitigate climate impacts on wildfire, vegetation, and water in semiarid forests. *Ecological Applications* 0(0): 1-14.

3.2.2.1. RIM COUNTRY TREATMENTS PUSH LARGE AREAS BELOW DESIRED CONDITIONS FOR BASAL AREA

Figure 28[104] shows that the proposed action treats the landscape too intensively, with basal area dipping below the stated desired conditions range of 30-90 ft^2 BA in 26% of acres in 2029 and increasing to 29% of acres below desired conditions in 2039. We have plotted generic trend lines onto Fig. 28 to show this. Collectively, with 275,990 acres below desired conditions in 2039, these trends suggest that treatments are too intense, and conflict with the statement that "[t]*he number of trees per acre,* ***basal area****, and SDI would decrease considerably, trending toward desired conditions within NRV ….*"[105]

The **green line** shows that a growing amount of the landscape is below and trending away from desired conditions, with 29% of the landscape (275,990 acres[106]) below 30 ft^2 BA by 2039, increased from 26% of the landscape in 2029.

The **red line** shows a large growth of the portion of the landscape that meets desired conditions by 2029, but then trending away, with 56% of the landscape between 30 and 90 ft^2 BA by 2039. The reduction in acres meeting desired conditions is driven more by growth of acres below 30 ft^2 BA than above 90 ft^2 BA.

The **blue line** shows a major reduction by 2029 in the portion of the landscape that is above desired conditions, followed by a plateau, with 15% of the landscape above 90 ft^2 BA by 2039, a minor decrease from 2029.

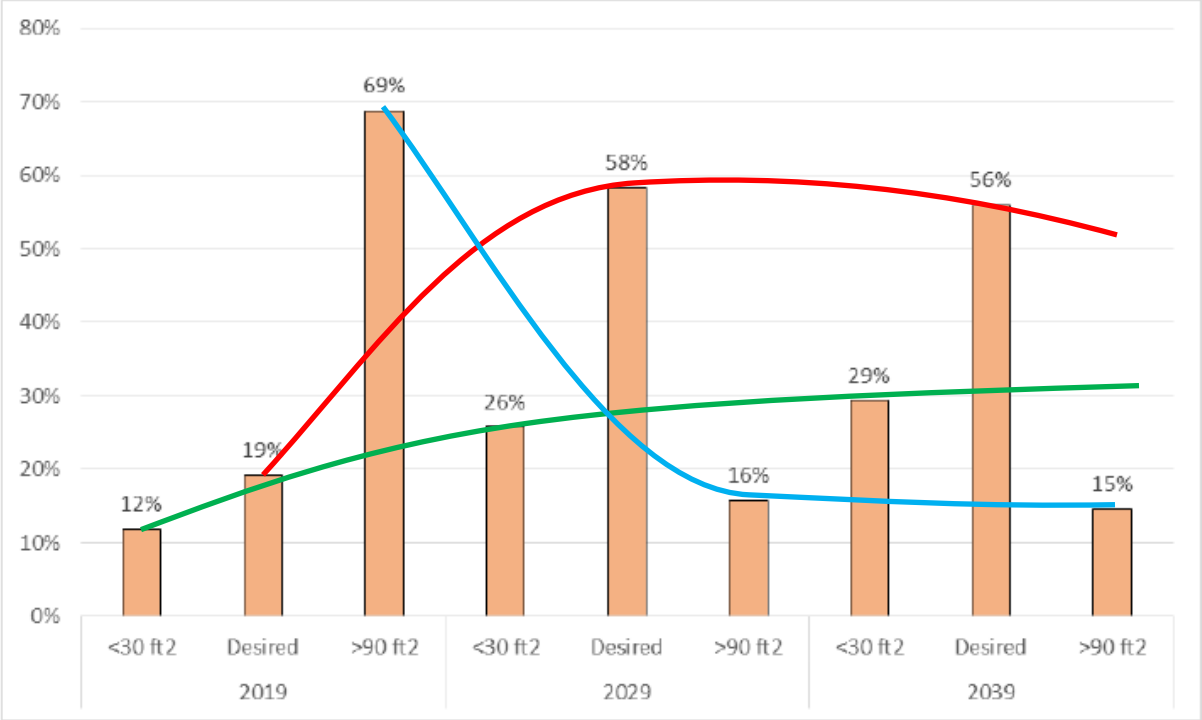


Figure 28. Alternative 2 - Proposed Action – Percent of acres meeting desired condition for basal area across the analysis area.

[104] Rim Country DEIS, Vol. 1, Figure 28, at 160.
[105] Rim Country DEIS, Vol. 1, at 180. **(emphasis added)**
[106] Based on Silvicultural report using 951,691 acres as the basis for analysis.

CONCERN: The range used to illustrate silvicultural modeling results in the DEIS misrepresents the amount of acres "above desired conditions."

The graphs displayed in Figures 28 and 37 of the DEIS[107] shows modeling results, including showing the "desired condition" range of 30-90 ft^2/acre. However, a number of vegetation and habitat strata have desired conditions that are above 90 ft^2/acre, therefore, the way the data is displayed incorrectly assigns those areas to the class of acres that are "above desired conditions."

Dry and Wet Mixed Conifer Forest: The Rim Country DEIS analyzes 59,860 acres of dry mixed conifer and 19,855 acres of wet mixed conifer forest under USFS management.[108] Forest Plans define desired conditions for these forests beyond the 30-90 ft^2/acre as suggested in the graphs and text in the DEIS.

- Dry mixed conifer forest on the Coconino National Forest can be managed up to 100 ft^2/acre, but "*Denser tree conditions exist in some locations such as north-facing slopes and canyon bottoms*."[109]
- Dry mixed conifer forest on the Apache-Sitgreaves NF (ASNF) can be managed up to 100 ft^2/acre.[110]
- Wet mixed conifer forest on the ASNF can be managed up to 180 ft^2/acre.[111]

Goshawk PFA's: Approximately 38,000 acres in Rim Country are in northern goshawk PFAs,[112] some of which overlap with the acres listed above for mixed conifer. In ponderosa pine and mixed conifer forest, treatments in these habitats would be modified such that residual basal area is 10-20% higher than the surrounding forest. According to the Silviculture Specialist Report, and based on our understanding of the issue, this would mean that post-treatment basal areas across approximately 38,000 acres could be:

- Up to 96 ft^2/acre in in ponderosa pine on the ASNF and up to 107 ft^2/acre in the Coconino NF.[113]
- Up to 120 ft^2/acre in dry mixed conifer on the ASNF and Coconino NF.[114]
- Up to 198 ft^2/acre in wet mixed conifer on the Coconino NF and up to 216 ft^2/acre on the ASNF.[115]

Mexican spotted owl PAC's and nest/roost recovery habitat: There are approximately 111,000 acres in Rim Country are in 196 MSO PACs[116] and approximately 39,400 acres in Rim Country are MSO nest/roost recovery habitat.[117] Nest/roost recovery habitat in mixed conifer forest should maintain 120 ft^2/acre, and in pine-oak forest minimum basal area should be 110 ft^2/acre though US Fish and Wildlife Service emphasizes that those values are minimums, not targets.[118]

RECOMMENDATION: Any subsequent NEPA document prepared for the Rim Country analysis should illustrate and report on modelling results in a manner that does not portray modelled acreage above 90 ft^2/acre basal area as "above desired conditions" if those acres are located in wildlife or vegetation strata that have desired conditions above 90 ft^2/acre as described in applicable planning documents.

[107] Rim Country DEIS, Vol. 1, at 160 and 172.
[108] Rim Country DEIS, Vol. 1, at 12.
[109] Rim Country DEIS, Silviculture Specialists Report, at 34.
[110] Rim Country DEIS, Silviculture Specialists Report, at 20.
[111] Rim Country DEIS, Silviculture Specialists Report, at 21.
[112] Rim Country DEIS, Wildlife Specialists Report, at 42.
[113] Rim Country DEIS, Silviculture Specialists Report, at 18 (ASNF) and at 31 (Coconino).
[114] Rim Country DEIS, Silviculture Specialists Report, at 20 and 34.
[115] Rim Country DEIS, Silviculture Specialists Report, at 36 (Coconino) and 22 (ASNF).
[116] Rim Country DEIS, Wildlife Specialists Report, at 34.
[117] Rim Country DEIS, Wildlife Specialists Report, at 33-34.
[118] 2012 MSO Recovery Plan, Table C. 3.

3.2.2.2. RIM COUNTRY TREATMENTS PUSH LARGE AREAS BELOW DESIRED CONDITIONS FOR STAND DENSITY

Figure 29[119] shows that the proposed action treats the landscape too intensively, with SDI dipping below the stated desired conditions range of 25-45% of SDI Max in 65% of acres in 2029 and increasing to 73% of acres below desired conditions in 2039. We have plotted generic trend lines onto Fig. 29 to show this. Collectively, with 694,734 acres below desired conditions in 2039, these trends suggest that treatments are too intense, and conflict with the statement that "[t]*he number of trees per acre, basal area, and* ***SDI*** *would decrease considerably, trending toward desired conditions within NRV ….*"[120]

The **green line** shows that a growing amount of the landscape is dramatically below and trending away from desired conditions, with 73% of the landscape (694,734 acres[121]) below 25% of SDI Max by 2039, increased from 65% of the landscape in 2029.

The **red line** shows a minor growth in the portion of the landscape that meets desired conditions by 2029, but then trending away, with just 21% of the landscape between 25% and 45% of SDI Max by 2039. The reduction in acres meeting desired conditions is driven primarily by growth of acres below 25% of SDI Max.

The **blue line** shows a major reduction by 2029 in the portion of the landscape that is above desired conditions, followed by a slight downward trend, with 6% of the landscape above 45% of SDI Max by 2039, a minor decrease from 2029. The continued decrease of area above desired conditions is driven by growth in the area below desired conditions.

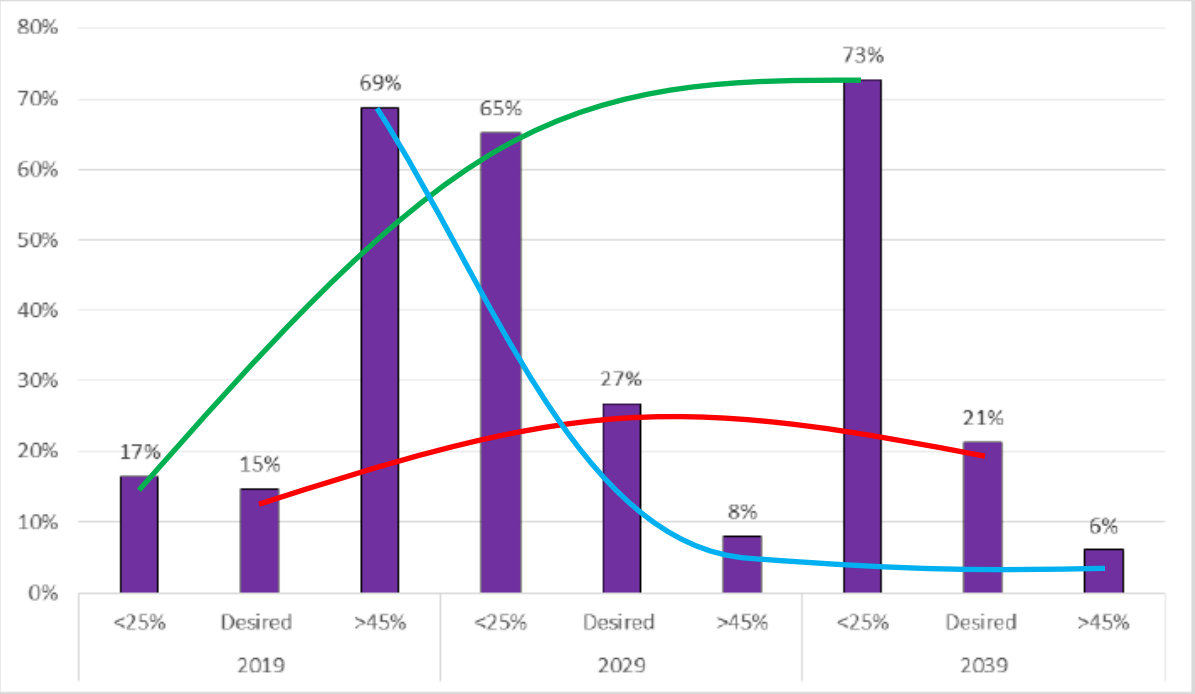


Figure 29. Alternative 2 - Proposed Action – Percent of stands meeting the desired condition for stand density index

[119] Rim Country DEIS, Vol. 1, Figure 29, at 161.
[120] Rim Country DEIS, Vol. 1, at 180. **(emphasis added)**
[121] Based on Silvicultural report using 951,691 acres as the basis for analysis.

3.2.2.3. DWARF MISTLETOE: A NATURAL FOREST FRIEND, OR A FIENDISH FOE?

The Forest Service has repeatedly attempted to portray the level of dwarf mistletoe on the landscape as an existential threat to forest sustainability. Data presented to the Stakeholders, and first hand observations in the field, have not convinced us that this argument has merit.

Importantly, the DEIS admits that "[c]*urrently 75% of acreage has a low dwarf mistletoe infection rating, 22% of acres have a moderate rating, and 4% have a severe infection rating. 96% of the project area meets the desired condition for mistletoe infection severity*."[122] This is repeated in the statement that "*Stands covering approximately 22 percent of the Rim Country project area exhibit infections at moderate severity levels (20 percent to 80 percent of susceptible trees infected) while stands making up four percent of the area have high severity infection ratings (more than 80 percent of susceptible trees infected).*"[123]

These statements do not suggest to us that there is a serious problem or that the level of infection is dramatically outside of natural range of variability.

Figure 31[124] shows that despite dramatic landscape scale thinning that moves nearly ¾ of the landscape below desired conditions for stand density index, and nearly 1/3 of the landscape below desired conditions for basal area, that mistletoe infection in the moderate and severe classes will actually increase from 26% to 34%. This should suggest that either the modelling assumptions are off, the data imputations are off, or that the intensity of treatment is driving the increased infection rate.

The Center stands by the assertion in the Stakeholders letter of April 4, 2017 to the Forest Service that thinning and burning within a conventional restoration approach is appropriate for managing stand with dwarf mistletoe.

CONCERN: DIES mischaracterizes of best available science on ponderosa pine dwarf mistletoe.

In citing Conklin and Fairweather (2010), the DEIS claims that "[w]*hile experts think that the extent of dwarf mistletoe has increased only modestly, the abundance and intensity of infections have increased substantially across the project area due to closed forest conditions, lack of low severity fire, and lack of adequate mitigation management.*"[125] This statement is misleading and does not accurately cite the referenced report.

First, Conklin and Fairweather (2010) never use the term "intensity" to describe dwarf mistletoe infection, so ascribing this term to their work misrepresents the source literature.

Second, this statement leaves out an essential word that Conklin and Fairweather (2010) use repeatedly throughout their report; that is the conditional verb modifier "probably." Their report actually says that "[m]*istletoe abundance is **probably** greater today than in the 1800s, mostly because there are more trees now, especially in the ponderosa pine type*."[126] Furthermore, they state that *"…the number of infected ponderosa pines on the landscape—and the abundance of its mistletoe—have **probably***

[122] Rim Country DEIS, Vol. 1, Table 5, at 13.
[123] Rim Country DEIS, Vol. 1, at 15.
[124] Rim Country DEIS, Vol. 1, Figure 31, at 164.
[125] Rim Country DEIS, Vol. 1, at 137.
[126] Conklin, D.A., and M.L. Fairweather. 2010. Dwarf mistletoes and their management in the Southwest. USDA Forest Service, Southwestern Region, R3-FH-10-01. 23p., at 5. (**emphasis added**)

increased considerably in many areas"[127] though they never mention any specifics of the "project area" as claimed in the statement above from the DEIS.

Third, this statement does not include one of the causes of the probable increase in dwarf mistletoe abundance, and that is thinning and logging. Conklin and Fairweather (2010) assert that "[a] *century or more of fire exclusion* ***and decades of selective cutting*** *have generally been favorable for dwarf mistletoes*."[128] It is a dramatic exaggeration to assume that any form of logging, ecologically-based or not, is effective at reducing mistletoe infection. Again, from Conklin and Fairweather (2010):

"*The vast majority of stand entries have involved some type of selective or partial cut, which, over the long run, tends to favor mistletoe. Even on research plots that have received multiple "sanitation" treatments, mistletoe has seldom, if ever, been eliminated through partial cutting. Monitoring of several ponderosa pine stands in Arizona and New Mexico where all, or at least most, of the visibly- infected trees were cut indicates that stand infection levels return to pre-treatment levels in about 20 years (Geils, unpublished data)."*[129]

Following the slightly inaccurate citation of Conklin and Fairweathers (2010) report, the DEIS cites Kenaley (2008) in stating that "[t]*his increased infection severity has been associated with decreased resilience to beetle- and drought-induced mortality.*"[130] This sentence should not begin with the word "this" in referring to increased infection severity, as the use of that word infers that Conklin and Fairweather (2010) established that there has been an *increase* in infection severity, which they did not. They did state that "*ponderosa pine forests along the Mogollon Rim in central Arizona are severely infested with dwarf mistletoe*"[131] but made no assertion that the level of severity had increased. In fact, in that section of their report they attribute regional variations in severity to climatic and genetic differences and interactions with wildlife that disperse the seeds.

But more importantly, beyond semantic word choice, are the details reported in Kenaley et al (2008). Their results from the Kaibab and Coconino National Forests do indicate that there is a relationship between mistletoe severity ratings and bark beetle induced mortality, but it's not as simple as saying mistletoe infection = bark beetle mortality. Kenaley et al (2008) reported that 69.2% $^{(\pm 25.7\%)}$ of ponderosa pine mortality was in trees with severe dwarf mistletoe infections (DMR scores of 5 and 6). With *Ips* beetle specifically, 77.4% $^{(\pm 18.9\%)}$ of ponderosa pine mortality was in trees with severe dwarf mistletoe infections (DMR scores of 5 and 6). Furthermore, the vast majority of mortality was in trees in the intermediate crown position, rather than dominant or co-dominant, with 61% of all severely infected (DMR scores of 5 and 6) dead trees being in the intermediate crown position. The authors stated that:

"…*percentage of mortality of severely infected trees within the intermediate crown class was significantly higher compared with all other crown classes and dwarf mistletoe rating class interactions based on nonoverlapping 95% confidence intervals. This result clearly showed that intermediate trees*

[127] *Ibid,* at 7. (**emphasis added**)
[128] *Ibid,* at 18. (**emphasis added**)
[129] *Ibid,* at 5-6.
[130] Rim Country DEIS, Vol. 1, at 137.
[131] Conklin, D.A., and M.L. Fairweather. 2010. Dwarf mistletoes and their management in the Southwest. USDA Forest Service, Southwestern Region, R3-FH-10-01. 23p., at 8.

that were severely infected with dwarf mistletoe comprised the majority of observed ponderosa pine mortality across all study sites." [132]

Kenaley et al (2008) concluded that:

"*From an ecological perspective, Ips bark beetles can be viewed as "natural" thinning agents that are removing severely dwarf mistletoe-infected and stressed trees from the landscape, thereby improving the long-term productivity and health of pine forests in northern Arizona*."[133]

RECOMMENDATION: To fairly cite the source literature, and to most accurately reflect the demographic changes in ponderosa pine dwarf mistletoe occurrence, we recommend deletion of the statement identified above from page 137 of the DEIS, and complete replacement with this selection from Conklin and Fairweather (2010):

"*Mistletoe abundance is probably greater today than in the 1800s, mostly because there are more trees now, especially in the ponderosa pine type. Much of the increase in tree density is due to major regeneration event(s) around 1920 (often linked with overgrazing), coupled with the exclusion of fire which had previously kept the forests more open. Natural openings filled in with young trees, facilitating the spread of mistletoe. While the number of infected trees has probably increased substantially, the actual proportion of the landscape with mistletoe has probably increased only modestly (if at all, see next paragraph) from historic levels, again, because of the relatively slow rate of spread. While mistletoe has undoubtedly spread into some previously uninfested stands, it can be assumed that much of its increase can be considered spread into previously existing openings within already infested stands*."[134]

CONCERN: Dwarf mistletoe will be used as a reason to cut large trees which are not covered under LTIP exception categories.

The DEIS states that "[s]*ome dwarf mistletoe will be retained as a natural component for wildlife, and limits will be placed on removal of large infected trees*."[135] We appreciate that limits will be placed on cutting large trees, but what are the limits? Are they in the Large Tree Cutting Plan?

Conklin and Fairweather (2010) stated that "*… it is appropriate to retain larger, more severely infected trees (DMR 4–6) within some groups. Although it is commonly believed that removing these trees slows disease spread and intensification, usually the reverse is true*."[136]

As we have explained elsewhere in this letter, the LTIP exception categories are overly broad and cover too much of the landscape. The added possibility that mistletoe severity rating will allow cutting of large trees not covered by other overly broad exception categories is another reason to doubt the Forest Service's commitment to protect old and large trees, especially considering what happened at Little Creek.

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[132] Kenaley S.C., R.L., Mathiasen, and E.J. Harner. 2008. Mortality Associated with a Bark Beetle Outbreak in dwarf mistletoe-infested ponderosa pine stands in Arizona. *Western Journal of Applied Forestry* 23: 113 - 120, at 117-118.

[133] Kenaley et al (2008), at 118.

[134] *Ibid,* at 5.

[135] Rim Country DEIS, Vol. 1, at 26.

[136] Conklin and Fairweather (2010), at 15.

RECOMMENDATION: Any subsequent NEPA document prepared for the Rim Country analysis should clarify that large trees will not be cut on the basis of the mistletoe infection severity level at the tree or stand level.

CONCERN: Dwarf mistletoe is driving treatment intensity and prioritization.

Ponderosa pine dwarf mistletoe should not be a fundamental driver of treatment priorities or treatment assignment in an ecological restoration project. Such an approach is inconsistent with the best available science. The DEIS states that the desired condition for mistletoe is that "[s]*tands in the project area have low to moderate dwarf mistletoe infection severity (Less than 20% of trees infected)*."[137] We stand by our frequently made assertion that conservative restoration thinning and application of prescribed fire is an adequate approach to maintain mistletoe at levels within the desired range.

The DEIS states that "[t]*he presence of dwarf mistletoe will not be used to prioritize areas for treatment, but it will be addressed where it exists. Considerations for implementing IT treatments and prescribed fire will be included in the implementation plan as they continue to be developed with the 4FRI Stakeholder Group*."[138]

However, it also states that "[t]*reatments to address high severity dwarf mistletoe infections in some stands include high intensity thinning and creation of considerable interspace in order to slow spread of mistletoe and with a purpose of improving forest health*."[139]

RECOMMENDATION: Any subsequent NEPA document prepared for the Rim Country analysis should clarify that mistletoe severity levels will not lead to increased treatment intensity or prioritization for treatment, and should specify that severely infected stands should be deferred from mechanical entry and be assigned burn-only treatments. In particular, the dwarf mistletoe infection decision variable should be removed from the Mechanical Treatments FTA.

CONCERN: Mistletoe treatments should not be applied to Mixed Conifer Forest.

The DEIS does not clarify how the proposed action would treat dwarf mistletoe in mixed conifer forests and trees other than ponderosa pine. The DEIS does not explain the ecological value of dwarf mistletoes in coniferous trees, especially for how they are used for nesting by Mexican spotted owls.

RECOMMENDATION: Any subsequent NEPA document prepared for the Rim Country analysis should clarify that in mixed conifer forests, and specifically for conifers other than ponderosa pine, dwarf mistletoe infection will not affect treatment assignment or implementation decisions other than decisions to defer treatments to burn-only in cases of severe infection.

[137] Rim Country DEIS, Vol. 1, Table 5, at 13.
[138] Rim Country DEIS, Vol. 1, at 30.
[139] Rim Country DEIS, Vol. 1, at vi.

3.2.3. DESIRED CONDITIONS IN GTR-310 DO NOT ACCOUNT FOR RIM COUNTRY'S VARIABILITY

As we discussed in our Rim Country scoping comments, the Center has considerable concerns with the Forest Service's General Technical Report 310 (GTR-310).[140] This is the Forest Service's own self-published desired conditions for dry conifer forest in the southwest and its use in the Rim Country project should be tempered by site-specific considerations. Much of the information used in GTR-310 report to describe desired conditions for ponderosa pine and mixed conifer forest is derived mainly from studies that may not represent the soil and climate particularities of the Rim Country landscape. Furthermore the Rim Country landscape is a widely variable mosaic of ecosystems arranged across several topographic and elevational gradients, meaning generalized desired conditions should not be applied universally across the project area.

GTR-310 presents a useful review of the literature, but it should be perceived as rough guidelines for determining natural range of variability within the context of site-specific considerations. We reviewed the 111 studies cited in GTR-310 as sources of information for reference conditions, disturbance histories, disturbance effects, stand structure and composition, and canopy openness. These studies are listed by location in a table and a map on the following pages. Of these 111 published studies, a few are directly relevant to the Rim Country landscape, and those should be given preference in determining how to meet desired conditions for the Rim Country project. As the table later in this letter clearly shows, the sources consulted for the formulation of desired conditions for the southwest cover a vast geographic range, clustered especially around the Flagstaff area. Other than those specific to the Mogollon Plateau, many sources used to establish the pooled and averaged desired conditions in GTR-310 do not represent the soils or processes that may be unique to Rim Country.

In GTR-310, Reynolds and others (p. 12) admit uncertainty in their recommendation of desired conditions for dry conifer forest resulting from a paucity of supporting information and geographic imbalance of accessible data:

"*There is a clear need for additional reference condition data sets, including sites from a wider spectrum across environmental gradients (e.g., soils, moisture, elevations, slopes, aspects) occupied by frequent-fire forests in the Southwest, especially in dry mixed-conifer. While the quantity of reference data sets is increasing, existing data represent a largely unbalanced sampling across gradients (e.g., most data sets are from basaltic soils and on dry to typic plant associations), and there have been few studies quantitatively*."

The GTR-310 approach to uncertainty is to blur site-specific forest variation across a vast geographic area and *scale up* desired conditions to broad landscapes with a generic "pooled natural range of variability" (Reynolds et al. 2103: p. 11):

"*The natural range of variability can be estimated by pooling reference conditions across sites within a forest type. Reference conditions for a forest type typically vary from site to site due to differences in factors such as soil, elevation, slope, aspect, and micro-climate and manifests as differences in fire effects, tree densities, patterns of tree establishment and persistence, and numbers and dispersion of*

[140] Reynolds, R.T., A.J. Sánchez Meador, J.A. Youtz, T. Nicolet, M.S. Matonis, P.L. Jackson, D.G. DeLorenzo and A.D. Graves. 2013. *Restoring Composition and Structure in Southwestern Frequent-Fire Forests: A Science-Based Framework for Improving Ecosystem Resiliency*. USDA For. Serv. Rocky Mtn. Res. Sta. Gen. Tech. Rep. RMRS-GTR-310. Fort Collins, CO.

snags and logs. When pooled, these sources of variability comprise the natural range of variability of a site or forest type."

Much of GTR-310 is based on reconstruction studies of "Woolsey Plots." In 1909, T.S. Woolsey, Jr., Assistant District Forester and Chief of the Office of Silviculture (Southwestern District now Southwest Region 3), and G. A. Pearson, Director, Fort Valley Forest Experiment Station (Flagstaff, AZ), drafted instructions that led to establishment of a network of permanent plots in ponderosa pine, mixed conifer, and spruce-fir forests of the Southwest. Between 1909 and 1941 Woolsey and team established 140 plots in AZ and NM, of which 98 were in ponderosa pine. Of the pine plots, 30% are located southwest of Flagstaff at the Coulter Ranch site. Of the 140 plots, 44 were in the Coconino NF.

"*So-called sample plots were established on logged over areas in order to ascertain how fast residual stands would grow, whether they could produce merchantable timber, and whether natural restocking would take place*" (Pearson, 1933, p. 272).

Bell and others[141] compared current conditions of 14 Woolsey plots to 98 AZCFI and 58 FSFIA plots in the Flagstaff/western Mogollon Rim area. The metrics under comparison were Trees/Hectare, BA/Hectare, QMD, and frequency of DBH classes/hectare. Comparisons of forest structural data applied a distance-based multivariate nonparametric permutation method. All analyses indicated dissimilarity between the FIA and CFI plots compared to the Woolsey plots across the study area, and across TEU's. Within TEU's, the Woolsey plots were not statistically dissimilar, but current conditions were consistently denser in all metrics. Bell and others' results suggest that Woolsey plots are only representative of the TEU to which the plot belongs.

"*The selection of [Woolsey] plot locations in the early 1900s followed a subjective nonrandom approach. [Our] results indicated that the Woolsey plots (1) were neither historically nor contemporarily representative of the entire study area because of environmental and current forest structural differences with respect to the FSFIA and AZCFI and (2) may be considered historically representative of their corresponding TEUs. Our study supports the use of TEUs for defining the applicability of information obtained from the Woolsey plots….Subjective plot selection, together with the small sample size of this rare dataset, raises questions about the inference space with regard to the larger, heterogeneous landscape of ponderosa pine forests in northern Arizona*"

The Center is not the first entity to bring this important level of uncertainty to the Forest Service's attention. In fact, the Stakeholders Landscape Restoration Strategy for the First Analysis Area cited Bell et al (2009) in stating that "[u]*ncertainty exists about historical forest plots and reconstruction data and their representation of prior forest conditions (Bell et al. 2009), particularly with respect to the spatial heterogeneity and structural conditions across large landscapes.*"[142]

Disturbance patterns are driven by spatial and temporal variation in climate, vegetation growth habitats, and management history. These are place-specific and cannot reliably be generalized over broad

[141] Bell, D.M., P.F. Parysow, and M.M. Moore. 2009. Assessing the representativeness of the oldest permanent inventory plots in northern Arizona ponderosa pine forests. *Restoration Ecology* 17(3): 369-377.

[142] Sesnie, S.E., J. Rundall, S. Hedwall, and V. Horncastle, technical editors. October 1, 2010. Landscape restoration strategy for the first analysis area: report from the Four Forests Restoration Initiative Stakeholder Group to the USFS Planning Team, at 13.

landscapes or timeframes.[143,144] Ecologists stress the need for definition of locally specific reference conditions to justify restoration goals and outcomes due to scale dependence of ecological patterns.[145,146,147] For example, Korb and others[148] stated this about their study results from the San Juan Mountains of southern Colorado:

"*Our findings demonstrate the need to develop site-specific reference conditions and for managers to exercise caution when extrapolating fire regimes and forest structure from one geographic locality to another given a projected warmer climate making conditions more favorable to frequent, large wildfires*."

Desired conditions for dry conifer forests established in GTR-310 are not specific to Rim Country, and should be critically reviewed prior to drafting prescriptions. They fail to address uncertainty and qualified disagreement among experts about forest ecology and management in the Southwestern Region. Close inspection of place-specific information reveals that Reynolds and others selectively interpreted literature to make a poorly supported case for sustained mechanical intervention as a surrogate for restoration of natural fire regimes. Reynolds and others (p. 48-49) state:

"*The re-establishment of frequent, low-severity fire is critical to the success of our restoration framework. However, because of limitations such as proximity to human developments, air quality restrictions, and workforce capacity, the use of fire will probably continue to be limited. Therefore, mechanical-only treatments, or perhaps combinations of fire and mechanical treatments, are likely to be the restoration tools of choice in much of the Southwestern landscape*."

That statement is the sole basis presented by the authors for their recommendation of landscape-scale mechanical treatments of vegetation in ponderosa pine and mixed conifer forest. Furthermore, we would argue that workforce limitations will affect mechanical thinning operations more than fire management crews. The "implementation recommendations" of Reynolds and others (p. 35-37) do not present a compelling fact-based case for the efficacy of mechanical treatments to manage structure or composition in fire-adapted forest, other than to allude that such treatments may be desirable for unstated reasons.

It is true that Reynolds and colleagues synthesized a wide array of literature, but, the studies used to substantiate the GTR-310 structural framework are disproportionately clustered around northern Arizona, including a number of studies at the same sites (Gus Pearson Natural Area and Fort Valley Experimental Forest), and including a reliance on re-measures of the historic "Woolsey plots", which are

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[143] Agee, J.K. 1996. The influence of forest structure on fire behavior. Pp. 52-68 in: J.W. Sherlock (chair). *Proc. 17th Forest Vegetation Management Conference.* 1996 Jan. 16-18: Redding, CA. Calif. Dept. Forestry and Fire Protection: Sacramento.

[144] DellaSala, D.A., J.E. Williams, C.D. Williams and J.F. Franklin. 2004. Beyond smoke and mirrors: a synthesis of fire policy and science. *Conservation Biology* 18: 976-86.

[145] Noss, R., P. Beier, W. W. Covington, R. E. Grumbine, D. B. Lindenmayer, J. W. Prather, F. Schmiegelow, T. D. Sisk, and D. J. Vosick. 2006. Recommendations for integrating restoration ecology and conservation biology in ponderosa pine forests of the Southwestern United States. *Restoration Ecology* 14: 4-10.

[146] Swetnam, T.W., C.D. Allen and J.L. Betancourt. 1999. Applied historical ecology: Using the past to manage the future. *Ecological Applications* 9(4):1189-1206.

[147] White, P.S. and J.L. Walker. 1997. Approximating nature's variation: selecting and using reference information in restoration ecology. *Restoration Ecology* 5: 338-349.

[148] Korb, J.E., P.Z. Fule, P.Z. and R. Wu. 2013. Variability of warm/dry mixed conifer forests in southwestern Colorado, USA: Implications for ecological restoration. *Forest Ecology and Management* 304:182-191.

not necessarily representative of the surrounding landscape.[149] Some extremely valuable and site-specific reference sites were notably excluded from GTR-310, such as the Long Valley Experimental Forest, which was established in 1936 as a comparison site to the much-studied Fort Valley unit. Long Valley "*contained some of the best stands of ponderosa pine on the Coconino and Sitgreaves National Forests,*[150]" but for an unknown reason it does not appear in GTR-310. The regional desired conditions document does mention this site (DC's, p. 14), noting that

"*On the Long Valley Experimental Forest (sedimentary soils on the Mogollon Rim, central Arizona), the sampled trees per acre (1938) ranged up to 99 trees per acre, with an estimated 75 trees per acre being present prior to the cessation of frequent fire (circa 1880-1900, USDA Forest Service, unpublished data from Long Valley Experimental Forest).*"

If Long Valley's pre-settlement trees per acre value (~75TPA) was included in GTR-310, it would have been more dense than any other ponderosa pine reference site cited in Arizona, with the exception of the four Grand Canyon sites studied by Fule and others (2002[151]; based on ranges provided in GTR-310), and would have been essentially equal to Williams and Bakers studies along the Mogollon Rim which have been widely criticized by the restoration science community.[152] Recent work on tree spatial patterns in old growth forests published by Iniguez et al (2019)[153] reported that Long Valley has 50% higher tree density, 25% fewer single trees per hectare, 10% more groups of trees per hectare, 67% more trees within groups per hectare, maximum group sizes 500% larger, and 50% larger mean tree group size than at Fort Valley. Clearly, basing treatment prescriptions on GTR-310, which is heavily reliant on studies published out of Fort Valley, does not account for very different forest structure that is displayed at the Long Valley site which we assert is a required local site for informing desired conditions.

LONG VALLEY EXPERIMENTAL FOREST

SUBSTANTIALLY DENSER THAN FORT VALLEY EXPERIMENTAL FOREST BUT EXCLUDED FROM GTR-310

[149] The reconstructions by ERI scientists on Woolsey plots have established a high bar for scientific integrity, but the plots were subjectively located by Woolsey and team as part of early silvicultural experiments, calling the usefulness of the results to be interpreted carefully and within a broader collection of multiple lines of evidence on representative sites.

[150] https://www.fs.usda.gov/main/longvalley/home

[151] Fulé, P.Z., W.W. Covington, M.M. Moore, T.A. Heinlein, and A.E.M. Waltz. 2002. Natural variability in forests of the Grand Canyon, USA. *Journal of Biogeography* 29:31-47.

[152] See Fule et al., 2014. Unsupported inferences of high-severity fire in historical dry forests of the western United States: a response to Williams and Baker. *Global Ecology and Biogeography* 23:825-830.

[153] Iniguez, J.M., J.F. Fowler, W.K. Moser, C.H. Sieg, L.S. Bagget, and P. Shin. 2019. Tree and opening spatial patterns vary by tree density in two old-growth remnant ponderosa pine forests in Northern Arizona, USA. *Forest Ecology and Management* 450: 117502.

The only site cited in GTR-310 that Long Valley would have been less dense than is Malay Gap, studied by Cooper (1960[154]), and this site was in fact not even as dense as Coopers Maverick study site that was not included in GTR-310. Also, Long Valley may have been even denser, assuming that not all of the remaining 24 post-fire suppression trees would have been killed by fire.

Cooper studied three sites on the White Mountain and San Carlos Apache Reservations in 1957. His paper is one of the most oft-cited sources of reference conditions data and descriptions for southwestern ponderosa pine, including GTR-310, and it is particularly valuable to consider. His Bog Creek site was selectively logged in the 1930's, but his Maverick and Malay Gap sites were unlogged, the latter also having never experienced fire suppression nor livestock grazing.

Of the Malay Gap site, Cooper (p. 139) wrote "*this is perhaps the closest approach to a truly primeval forest left in the Southwest*." Prior to 1910, the Malay Gap site had experienced wildfire on average every 7 years, and then burnt again in 1910, 1919, 1935, and lastly in 1943. By the time of his field work, in 1957, the fire regime was effectively uninterrupted. Cooper's extensive report is indeed one of the most essential studies to read and comprehend, and it is important to fully examine the breadth and depth of his analyses, as well as the photographs included therein, in order to responsibly reference this detailed work. It is a step backwards for restoration ecologists to dilute his work to a few numbers, such as his determination that mean basal area at Malay Gap, where a visitor "*is immediately struck by the open nature of the forest*", was 70 ft^2/acre[155] (photo at right).

The figure at right, taken directly from Cooper (1960: p. 150), shows an image that does not support most contemporary notions of an "open" forest, and in fact might be considered overly dense by many land managers.

FOREST CONDITIONS AT MAVERICK AND AT MALAY GAP

Although similar in basic composition and structure, the forests at Maverick and at Malay Gap are quite different in appearance. A visitor to Malay Gap, conditioned by acquaintance with the over-dense thickets characteristic of most of the Southwestern pine region, is immediately struck by the open nature of the forest (Fig. 20). The forest floor is carpeted with a deep layer of grass, and small discrete patches of young trees are dispersed among groups of stately pines. The pure beauty of the Malay Gap region more than compensates for its difficulty of access.

FIG. 20. Typical view of the ponderosa pine forest in the primitive area at Malay Gap.

[154] Cooper, C.F. 1960. Changes in vegetation, structure and growth of southwestern pine forests since white settlement. *Ecological Monographs* 30: 129-64.

[155] Interestingly, Reynolds et al. (2013) cite Malay Gap as a reference site, but ignore the results from the Maverick study location, which had a mean basal area of 102 ft^2/acre, to which Cooper (1960: p. 150) remarked: *"Although similar in basic composition and structure, the forests at Maverick and Malay Gap are quite different in appearance… The site at Malay Gap is clearly not as good as that at Maverick. The average height of mature dominants at Malay Gap is 95 ft, while those at Maverick average about 110 ft…The difference reflects inherent differences in site productivity*." The basal area of old growth at Maverick exceeds the range reported in Reynolds et al. (2013) and is outside of the basal area range given in Table 2 in the regional desired conditions document.

In addition to simple density metrics, Cooper reported on spatial arrangement, age/size distributions, regeneration patterns in time and space, fire effects on stand development, and many other important ecological processes that are still being debated. Of particular relevance to the current debate in ponderosa pine restoration are his observations on the grouping habits of this species.

The figure to the right (Cooper, 1960: p. 148) is a typical example of the "*conspicuous… grouped arrangement of the trees*." Similarly to the figure provided on the previous page, this image again contradicts the widespread contemporary notion of what constitutes a "*distinct group*". Nowhere in his report does Cooper specify how he determined what a "group" was, but it would seem apparent that his definition is markedly different than many offered today.

The concept of "interspaces" is a central tenet in the formulation of desired conditions by some within the U.S. Forest Service, wherein these "interspaces" are areas not occupied by trees and serve to define somewhat even-aged groups. The entire basis of the model promulgated in Reynolds and others is built around this notion. However, Cooper's analysis of Malay Gap might suggest that this model is not applicable to all areas. In discussing structural patterns in the virgin pine forest, he remarked (at p. 158): "*The relatively small size of the even-aged groups in the southwestern forest is due to the small size of the openings in which the groups can become established*."[156]

PATTERN

A conspicuous feature of the ponderosa pine forest is the grouped arrangement of the trees. It is obvious that the forest is composed of distinct groups, each made up of several trees similar in size and apparent age (Fig. 17). This fact has long been recognized, but surprisingly little attention has been given to the structure of these groups or to their mode of origin.

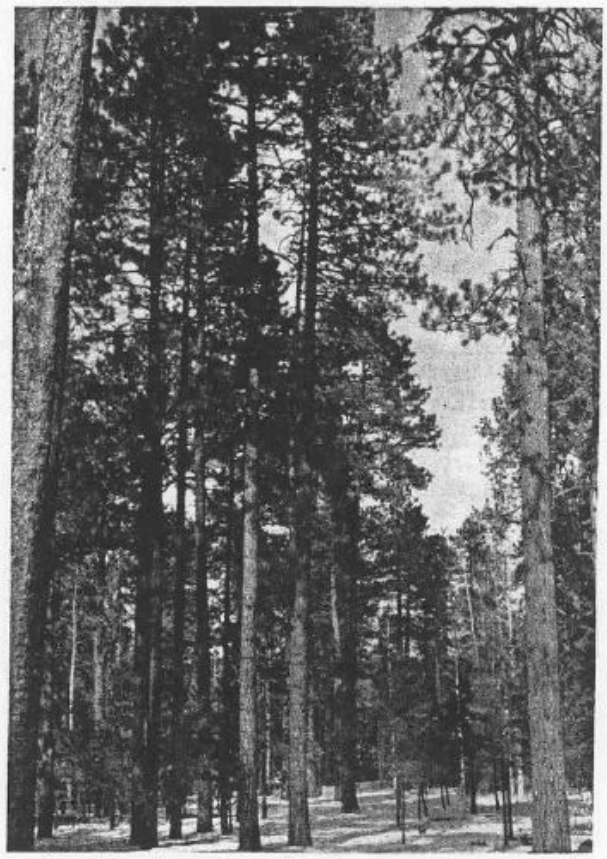

FIG. 17. Typical stand of mature ponderosa pine, showing grouped distribution of trees.

The next two pages describe reference sites from the North Rim of the Grand Canyon, which share similar soils and topographic position with the Rim Country landscape and as such provide more useful characteristics for developing desired conditions for Rim Country than do reference sites around Flagstaff, including the Fort Valley Experimental Forest. Collectively, the studies cited here suggest that desired conditions and treatment intensities for the Rim Country analysis area are biased towards the low end of the natural range of variability and overly representative of the "Flagstaff Model."

[156] Cooper's report does not specifically provide data as to how many trees occur per group, but he does state (at p. 149) that "*analysis indicates that the mature stands at both Maverick and Malay Gap are aggregated into groups with an area of .16 to .32* [acres]", within the range described by Reynolds et al. (2013). However, the definition of a "group" would seem to differ greatly between the two sources based on comparison of Cooper's example photos and observations at the Bluewater demonstration site and other contemporary treatments.

TYPICAL CONDITIONS AT POWELL PLATEAU, GRAND CANYON NATIONAL PARK

"To some extent, these sites may be rare representatives of nearly-natural conditions due to the relatively undisrupted fire regimes in a never-harvested forest setting" (Fule et al., 2003: p. 129).

Powell Plateau experienced fires in 1855, 1879, 1892, 1895, 1924, 1950, 1953, 1962, 1986, 1987, 1988, & 2003.

67% of trees at Powell Plateau predate 1800, and 22% predate 1700 (Fule et al., 2003)

Reconstructed 1879 forest structure at Powell Plateau (trees >2.5cm dbh; Fule et al., 2002):
63 TPA (mean), ranging from 8 to 261 TPA
17.9 m^2/ha BA, ranging from 4.7 to 77.3 (78 BAF, ranging from 20 to 335 BAF)

"A central theme of this paper is that Powell Plateau, Rainbow Point, and the western third of Fire Point, are currently in conditions similar to those which prevailed prior to European settlement, so contemporary characteristics of these sites can be used as points of reference of natural variability... Contemporary reference sites are unusually important because they show the variability in ecological conditions under today's climate" (Fule et al., 2002: p. 44)

"The patchy distribution of forest structure observed from the forests in the Sierra San Pedro Matir, Grand Canyon, and elsewhere argues against the application of uniform targets for snag retention, fuels, and live trees across similar forest landscapes. An improvement in management guidelines would be to manage for forest structures over moderate spatial scales (hundreds to thousands of acres) instead of on a stand basis" (Stephens & Fule, 2005: p. 361).

Powell Plateau Photos taken July 5, 2017

TYPICAL CONDITIONS AT FIRE POINT, GRAND CANYON NATIONAL PARK

"Fire sizes prior to European settlement reached at least hundreds of hectares, for fires scarring 25% or more of the samples distributed across the study areas, and probably reached many thousands to tens of thousands of hectares... These relatively uninterrupted fire regimes are highly unusual in the Southwest, even in comparison with the other large unharvested forest area, the Gila Wilderness...These sites may still be the best existing representatives of natural ponderosa pine forest landscapes in the Southwest" (Fule et al., 2003: pp. 142-143).

This forest isn't overly dense due to fire suppression: 93% of trees at Fire Point predate 1800; 20% predate 1700 (Fule et al., 2003)

Reconstructed 1879 forest structure at Fire Point (trees >2.5cm dbh; Fule et al., 2002):
61 TPA (mean), ranging from 16 to 125 TPA
20.5 m^2/ha BA, ranging from 6.5 to 30.2 (88 BAF/acre, ranging from 28 to 131.6)

Comparing Lang & Stewarts (1910) inventory to contemporary data *and* 1879 reconstruction, Fule et al (2002: p.40) concluded that at North Rim sites, *"there has been nearly no change in pine density over c. 120 years"* for trees over 6" dbh.

Fulé, P.Z., W.W. Covington, M.M. Moore, T.A. Heinlein, and A.E.M. Waltz. 2002. Natural variability in forests of the Grand Canyon, USA. *Journal of Biogeography* 29:31-47.

Fulé, P.Z., T.A. Heinlein, W.W. Covington, and M.M. Moore. 2003. Assessing fire regimes on Grand Canyon landscapes with fire-scar and fire-record data. *International Journal of Wildland Fire* 12: 129-145.

Stephens, S.L. and P.Z. Fule. 2005. Western pine forests with continuing frequent fire regimes: possible reference sites for management. *Journal of Forestry* October/November 2005: 357-362.

Fire Point Photos taken July 3, 2017

FIGURE 1: LOCATIONS OF CERTAIN REFERENCE SITES* USED IN GTR-310 (REYNOLDS ET AL., 2013)

*Specifically Tables 3, 6 and 9

Sites referenced by Reynolds et al (2013) are biased towards conditions at the Grand Canyon and Mogollon Plateau around Flagstaff. All sites shown for New Mexico are limited to original inventory by Woolsey (1909-1913) and subsequent re-measures of those sites (Moore et al. 2004). Polygons represent work by Abella and Denton (2009; square around Flagstaff) and Williams and Baker (2012; two polygons along Mogollon Rim). None of the studies assessed in GTR-310 include sites with ponderosa pine-evergreen oak or ponderosa pine-shrub types.

"The minimum diameters reported in Table 6 may also result in a source of error that can lead to small underestimates of historical tree densities reported in studies. Additional error may result from missing fully decomposed structures at time of measurement and reconstruction" (Reynolds et al., 2013: p.17).

"To date, only six studies report tree spatial reference conditions in the Southwestern ponderosa pine forests" (Reynolds et al., 2013: p.17).

*"Management informed by reference conditions and natural ranges of variability (the range of ecological and evolutionary conditions **appropriate for an area**) allow for the restoration of the characteristic composition, structure, spatial pattern, processes, and functions of ecosystems"* (Reynolds et al., 2013: p.2, emphasis added).

"Some dry mixed-conifer forests and ponderosa pine-shrub communities experienced mixed-severity fires, which included combinations of surface and crown fires, sometimes resulting in larger patches of tree aggregation" (Reynolds et al., 2013: p.1).

Figure 2: Locations Of Studies Cited In Reynolds et el. (2013) *see GTR-310 for full citations	
General Location of Referenced Literature	**Literature cited for that location in GTR-310** **Bold** denotes measurements at historic Woolsey plots Underline denotes study specific to Gus Pearson Natural Area, Coconino NF
New Mexico	**Moore et al., 1994 (Gila & Zuni Mtns Woolsey remeasures); Woolsey, 1911 (Carson, Zuni, Gila, Alamo, Jemez sites);** Allen, 2007 (northern NM); Brown et al., 2001 (Sacramento Mountains); Conklin & Geils, 2008 (Jemez & Manzano Mountains); Kaye & Swetnam, 1999 (Sacramento Mountains); Negron, 1997 (Sacramento Mountains); Romme et al., 1999 (Carson & Santa Fe NF's); Swetnam & Dieterich, 1985 (Gila Wilderness); Touchan et al., 1996 (Jemez Mountains)
North Rim Grand Canyon/Kaibab Plateau/Uinkaret Plateau	Covington & Moore, 1994; Fule et al., 2002; Fule et al., 2003; Fule & Laughlin, 2007; Heinlein et al., 1999; Lang & Stewart, 1910; Rasmussen, 1941; Roccaforte et al., 2010; Waltz & Fule, 1998; White & Vankat, 1993
South Rim Grand Canyon	Fule et al., 2002; Harrington & Hawksworth, 1980; **Woolsey, 1911**
Mogollon Plateau (Flagstaff Area)	Abella & Denton, 2009; Abella et al., 2011; Biondi et al., 1994; Biondi, 1996; Cocke et al., 2005; Covington & Sacket, 1986; Covington & Moore, 1994a&b; Covington et al., 1997; Dieterich, 1980; Fule et al., 1997; Heinlein et al., 2005; Hoffman et al., 2007; Mast et al., 1999; Menzel & Covington, 1997; Pearson, 1950; White, 1985; **Sanchez Meador et al., 2011; Sanchez Meador & Moore, 2010; Woolsey, 1911;** Schneider, 2012; Williams & Baker, 2012
Mogollon Rim (Apache-Sitgreaves NF, White Mtn. Apache Reservation)	Cooper, 1960, 1961; Greenamyre, 1913; Lynch et al., 2010; Williams & Baker, 2012; **Woolsey, 1911**
Colorado	Binkley et al., 2008 (Uncompahgre Plateau); Boyden et al., 2005 (Front Range); Brown & Wu, 2005 (SW of Pagosa Springs); Ehle & Baker, 2003 (RMNP); Fornwalt et al., 2002 (Front Range); Fule et al., 2009 (San Juan Mountains); Grissino-Mayer et al., 2004 (San Juan Mountains); Korb et al., 2012 (San Juan Mountains); Mast et al., 1998 (Front Range); Mast & Veblen, 1999 (Front Range); Romme et al., 1999 (SW Colorado)
Southwestern Utah	Madany & West (Zion National Park)
Pacific and Inland Northwest/Northern Rocky Mountains/Black Hills (South Dakota)	Agee, 2003; Arno et al., 1995; DeLuca & Sala, 2006; Franklin et al., 2002 (incorrectly cited as 2012); Harrod et al., 1999; Hessberg et al., 1994, 2004, 2005; Lundquist, 1995; Nacify et al., 2010; Taylor, 2010; Taylor & Skinner, 2003; Von Schrenck, 1903; West, 1969; Wickman, 1963; Youngblood et al., 2004
Mexico/Baja California	Minnisch et al., 2000; Stephens et al., 2008
California	Fettig, 2012; Parsons & DeBenedetti, 1979 (Sequoia & Kings Canyon NP); Scholl & Taylor, 2010 (Yosemite NP)
Sky Islands Region	Barton, 2002; Grissino-Mayer et al., 1995
Illinois	Dhillon & Anderson, 1993
Macro-scale studies (west-wide/regional) * denotes utilization of Gila NF data	Bentz et al., 2010; Drummond, 1982; Littell et al., 2009; Maffei & Beatty, 1988; Moeck et al., 1981; Negron et al., 2009; Swetnam & Baison, 1996*; Savage & Mast, 2005*; Swetnam & Betancourt, 1990*; Wood, 1983
Review Reports, books, or general literature inappropriately cited as reference-site studies or original research	Abella, 2008; Abella, 2009; Castello et al., 1995; Edmunds et al., 2000; Ferry et al., 1995; Fitzgerald, 2005; Friederici, 2004; Goheen & Hansen, 1993; Hart et al., 2005; Hawksworth & Weins, 1996; Jenkins et al., 2008; Larson & Churchill, 2012; Miller & Keen, 1960; Miller, 2000; Rippy et al., 2005; Smith, 2006a,b,c; Stevens & Hawksworth, 1984; Tainter & Baker, 1996; Weaver, 1950

CONCERN: The DEIS improperly generalizes natural range of variability in dry mixed conifer forests using overly narrow scientific information.

In describing dry mixed conifer forests, the DEIS cites GTR-310, Rodman et al (2016) and Huffman et al (2018) when claiming that pre-settlement dry mixed conifer forests were dominated by ponderosa pine in an open forest structure "*with minor occurrence of aspen (Populus tremuloides), Douglas-fir (Pseudotsuga menziesii), white fir (Abies concolor), and Southwestern white pine (Pinus strobiformis*)."[157]

We are concerned that the basis for the desired conditions for mixed conifer is overly narrow and does not address the uncertainty in pre-settlement conditions. The results reported in Rodman et al (2016) do *generally* support the Forest Service's desired conditions and the statement above, but this is just one study, with only four 100m X 100m plots. The authors even admit that their results have limitations due to the small sample size, and also the degree to which pre-settlement evidence had rotted or was destroyed by past logging. We contest the statement claiming that aspen, Douglas-fir, white fir and southwestern white pine were minor occurrences, though. Rodman et al (2016) report that those species, combined, provided comparable trees per acre and basal area to ponderosa pine, meaning that their occurrence was ecologically significant when considering the biodiversity values of those species.[158]

Of more concern though, is that neither the DEIS nor the Silviculture Report provides the full citation for Huffman et al (2018), and a search of the Ecological Restoration Institute library returned no such publication. We are not aware of any recent Huffman publication that would shed light on mixed conifer conditions, as much of his recent work has been focused on reconstructions below the Rim in ponderosa pine-evergreen oak forests.

Lastly, citing GTR-310 is inherently problematic when it comes to mixed conifer. In GTR-310, Reynolds et al admit uncertainty in their recommendation of desired conditions for dry conifer forest resulting from a paucity of supporting information and geographic imbalance of accessible data:

"*There is a clear need for additional reference condition data sets, including sites from a wider spectrum across environmental gradients (e.g., soils, moisture, elevations, slopes, aspects) occupied by frequent-fire forests in the Southwest,* ***especially in dry mixed-conifer****. While the quantity of reference data sets is increasing, existing data represent a largely unbalanced sampling across gradients (e.g., most data sets are from basaltic soils and on dry to typic plant associations), and there have been few studies quantitatively*."[159]

RECOMMENDATION: Any subsequent NEPA document prepared for the Rim Country analysis should include more supporting information for the Forest Service's assertions regarding pre-settlement conditions, natural range of variability, and historical forest structure in dry mixed conifer forest. If additional scientific information is not available, then disclosure of uncertainty should be more apparent.

[157] Rim Country DEIS, Vol. 1, at 207.
[158] See Table 2 and Figure 2 in Rodman et al, 2016, *Forest Science*.
[159] GTR-310 at 12. **(emphasis added)**

3.3. THE FOREST SERVICE IS PROMOTING A FALSE NARRATIVE ABOUT FIRE

CONCERN: The Rim Country DEIS promotes a false narrative about fire.

The DEIS seems to tell a confusing story about fire. On one hand, the written narrative tells a tale of imminent threat of stand replacing fire destroying the landscape. For example, the claim that "[e]*xisting conditions, which are currently prone to high severity crown fire would only worsen*."[160] On the other hand, the reported data tells the story of the expansion of ecologically appropriate fires burning at predominantly low severity.

Figure 46[161] is as compelling of a chart as one could see, clearly illustrating that the vast majority of the fires since 1993 have burned at low severity. While the narrative doesn't explicitly say, it appears that the statement that "[o]*f the annual acres burned by large fires since 1992, about 73 percent burned at low severity on average, and 27 percent burned at moderate to high severity*"[162] is a description of Figure 46. As the DEIS states, "*it is primarily those areas that burn with uncharacteristic severity that are of concern*,"[163] so we wonder why the Forest Service seems intent on telling a narrative that the system is so far out of balance?

The current condition and trend, as displayed in Figure 46, is not very far from Rim Country's stated desired conditions, which are "*for no more than 15 percent of the ponderosa pine (under conditions modeled) in the treatment area to be prone to crown fire or high-severity fire, with areas of potential high severity spatially distributed. For the dry mixed conifer cover type, Forest Plan direction is to allow fire to play its natural role, with high frequency (averaging about 12 years) and mostly low severity (less than 20 percent high severity under modeled conditions)*."[164] The values reported in Table 29 reinforces this. For example, Table 29 states that in Dry Mixed Conifer, the desired condition is for less than 20% of acres to burn at high severity and recent fires have burned at 19% high severity.[165] And even two recent Rim Country suppressed fires that burned with undesirable impacts on human life and property were within desired conditions for fire severity (2017 Highline fire was 18% high severity) or just over desired conditions (2018 Tinder Fire was 27% high severity).[166]

Of added significance are the trends shown in Figure 46, with fires burning at increasingly more proportion of low intensity, and decreasing in proportion of moderate and high severity. This data, made clear in graphical form, contrasts with the claim in the DEIS that "[c]*urrent conditions inhibit the survival and recruitment of large trees by fueling* ***increasingly extensive*** *high severity fires*."[167] If it's true that "[c]*onditions across 80% of the project area would be capable of supporting active or passive crown fire under extreme fire weather conditions,*"[168] then why don't actual observations of actual fires over the past 25+ years support that modelling result? And even after fulfilling the thinning and burning

[160] Rim Country DEIS, Vol. 1, at 70.
[161] Rim Country DEIS, Vol. 1, at 199.
[162] Rim Country DEIS, Vol. 1, at 198.
[163] Rim Country DEIS, Vol. 1, at 198.
[164] Rim Country DEIS, Vol. 1, at 17.
[165] Rim Country DEIS, Vol. 1, Table 29, at 203.
[166] Rim Country DEIS, Vol. 1, at 263.
[167] Rim Country DEIS, Vol. 1, at 200.
[168] Rim Country DEIS, Vol. 1, at 70.

proposed in Alternative 2, a whopping 69% of the project area would still support active and passive crown fire?[169]

The DEIS states that "[o]*verall, the annual acres burned by large fires has increased since 1992 (Figure 45), while the proportion of acres burned in each severity class has remained about the same (Figure 46). If these patterns continue into the near future (10 years), the total acres of high severity fire is likely to increase proportional to fire size increases*." [170]

We strongly contest the conclusions drawn in this statement. The pattern over the past 28 years is clearly a reduction in moderate and high severity fire proportions and an increase in low severity proportions (again, refer to Figure 46). This contrasts with the claim that proportions have stayed the same. Furthermore, if the past decade is precedent to the next decade, things look even better. An estimate of severity trends as shown in the black circled areas on Figure 46 below suggest that the past decade has seen a roughly 20% increase in areas burned at low severity, while moderate and high severity decreased by the same amount.

The DEIS largely fails to tell the more important story, the story of the successful reintroduction of fire across a tremendous amount of the landscape, and with predominantly good results within the NRV. The growth in fire sizes as reported in Figure 45 is largely attributed to large managed wildfires, which are a major success for the 4FRI Forests. This is supported in the DEIS where it states that "[m]*any of the wildfires that burned within the project area in the last 10 years were managed primarily for beneficial resource objectives* [accounting for] *38 wildfires totaling 126,310 acres burned within the project area… The fire severity of the 38 wildfires managed primarily for resource benefit was mostly low and moderate*."[171]

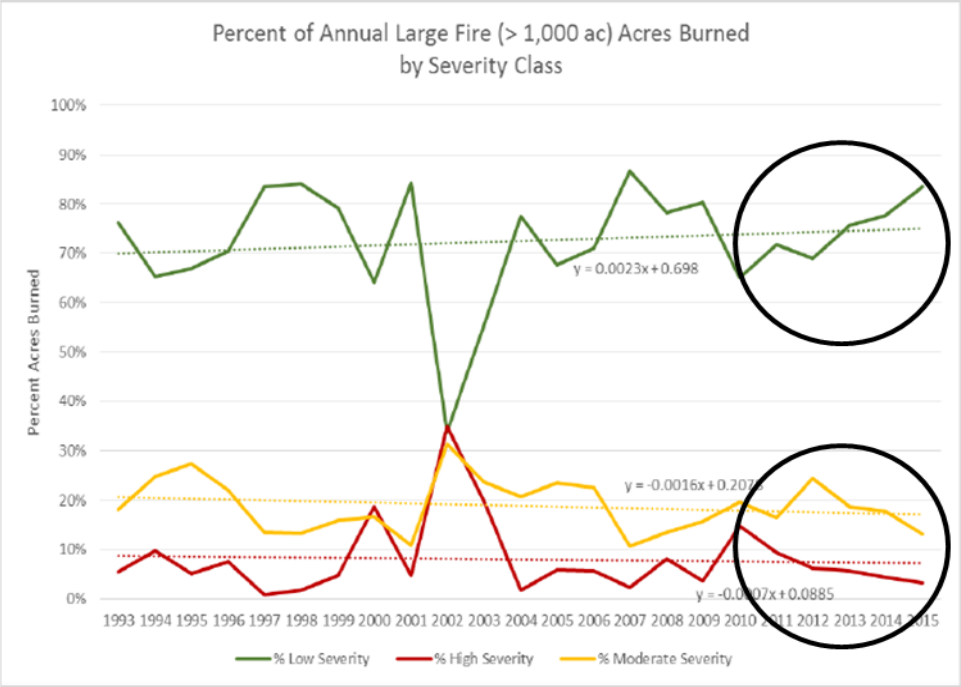

Figure 46. Percent of annual large fires burned by severity class

[169] Rim Country DEIS, Vol. 1, at 70, in column describing effects of the preferred alternative.
[170] Rim Country DEIS, Vol. 1, at 198.
[171] Rim Country DEIS, Vol. 1, at 262.

3.4. THE STFU ALTERNATIVE WOULD ACCOMPLISH THE PURPOSE AND NEED

CONCERN: The Strategic Treatments for Fire Use Alternative proposes a science based solution to maximize the use of scarce resources and limited industry capacity while accomplishing the project purpose.

As described in our proposal, the Strategic Treatments for Fire Use Alternative would utilize a modified version of the methodology developed by the Hurteau lab and used by Krofcheck and colleagues.[172,173] Their research has developed "*prioritization strategies for implementing fuel treatments … with the goal to maximize treatment efficacy using optimal placement and prescription options under typical and extreme fire weather conditions*." [174]

Their optimization model, under which the land manager would mechanically treat only the operable areas with the highest probability of mixed- and high-severity fire, was shown in multiple fire simulations to be as effective as thinning all operable acres at reducing wildfire burn severity and facilitating landscape scale low-severity fire restoration. This approach could inform landscape-scale restoration planning nationwide, as "*Testing of strategic placement of treatments by resource managers will add data in the years ahead and provide information that can be shared and applied in other locations*."[175]

Optimizing spatial prioritization of non-commercial mechanical treatments reflects an evolution of fire management, placing emphasis on restoring fire as a natural process, rather than simply disrupting fire spread and protecting areas from burning.[176] The result of a strategic approach is to move away from managing for short-term outcomes and towards achievement of long-term restoration goals and objectives, consistent with calls from the scientific community to increase the use of prescribed and managed wildfires for resource benefit.[177] In a review of optimization strategies, Collins and colleagues stated that "*The basic idea is that an informed deployment of treatment areas, a deployment that covers only part of the landscape, can modify fire behavior for the entire landscape.*"[178]

We assert, as we did in our proposal, that this approach in combination with the suite of comprehensive restoration activities that are included in both action alternatives will meet the projects needs to increase forest resilience and sustainability, reduce hazard of undesirable fire effects, improve terrestrial and aquatic species habitat, improve the condition and function of streams, springs and other aquatic and hydrological resources, restore riparian vegetation, preserve cultural resources, and support sustainable forest products industries.

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[172] Krofcheck, D.J., M.D. Hurteau, R.M. Scheller, and E.L. Loudermilk. 2017. Prioritizing forest fuels treatments based on the probability of high-severity fire restores adaptive capacity in Sierran forests. Global Change Biology DOI: 10.1111/gcb.13913.

[173] Krofcheck, D.J., M.D. Hurteau, R.M. Scheller, and E.L. Loudermilk. 2017. Restoring surface fire stabilizes forest carbon under extreme fire weather in the Sierra Nevada. *Ecosphere* 8(1): 1-18.

[174] http://www.hurteaulab.org/

[175] Peterson, D. L. and M.C. Johnson. 2007. Science-based strategic planning for hazardous fuel treatment. *Fire Management Today* 67(3):13-18, at 15.

[176] Ager, A.A., N.M. Vaillant, and A. McMahan. 2013. Restoration of fire in managed forests: a model to prioritize landscapes and analyze tradeoffs. *Ecosphere* 4(2): 1-19.

[177] Stephens, S.L., B.M. Collins, E. Biber, and P.Z. Fulé. 2016. U.S. federal fire and forest policy: emphasizing resilience in dry forests. *Ecosphere* 7(11): 1-19.

[178] Collins *et al.* 2010. Challenges and approaches in planning fuel treatments across fire-excluded forested landscapes. *Journal of Forestry* Jan/Feb 2010: 24-31, at 25.

3.5. THE STFU ALTERNATIVE IS A CLIMATE CHANGE SOLUTION

CONCERN: The Strategic Treatments for Fire Use Alternative proposes a planning and implementation framework that maximizes carbon storage and minimizes risk of high-severity fire.

Krofcheck and colleagues have recently completed similar optimization simulations for the Santa Fe Fireshed,[179] which should provide additional direction for utilizing such an approach in the ponderosa pine and mixed conifer forests of Rim Country. A significant added benefit of the optimization strategies developed by the Hurteau lab is the increased carbon that is retained on the landscape through minimizing logging and maximizing the use of fire to achieve restoration objectives. In a briefing paper summarizing this recent research, Krofcheck and colleagues wrote that

"*Prioritizing the allocation of thinning treatments to areas with the greatest chance of burning under high-severity wildfire and treating the rest of the land-scape with prescribed burning, can substantially reduce the area requiring thinning. Optimally locating thinning treatments can result in greater carbon storage across the landscape, with less risk of stand-replacing wildfire. The benefits of treatment optimization persist even as fire weather becomes more severe with changing climate. Restoring high-frequency fire regimes is critical for reducing the risk of high-severity wildfire and stabilizing carbon*."

Furthermore, they wrote that they:

"*…found that mechanically treating areas with the highest risk of high-severity wildfire and using prescribed fire to treat the unthinned areas (optimized scenario),* [they] *could reduce the area mechanically treated when all operable areas were thinned (prioritized scenario) by 54%. This outcome required a 27% increase in the area treated with prescribed burning. Both scenarios reduced high-severity wildfire when compared to the no-management scenario, as well as a significant reduction in wildfire carbon emissions. However, the optimized scenario did so at a considerable carbon savings in the short term, yielding a significant reduction in carbon lost from the system. Both of* [their] *scenarios achieved a reduction in high-severity fire and stabilized the remaining carbon. However, in both the management scenarios, maintaining carbon stability under changing climate and increasingly severe fire weather was contingent on the regular application of prescribed fire at return intervals that are consistent with historic fire regimes*."[180]

[179] Krofcheck, D.J., C.C. Remy, A.L. Keyser, and M.D. Hurteau. 2019. Optimizing forest management stabilizes carbon under projected climate and wildfire. *Journal of Geophysical Research: Biogeosciences* 10.1029/2019JG005206.

[180] Briefing paper on Krofcheck et al 2019.

3.6. THE STFU ALTERNATIVE IS NOT REMOTE, SPECULATIVE, IMPRACTICAL OR INEFFECTIVE

CONCERN: The Strategic Treatments for Fire Use Alternative Is Not Remote, Speculative, Impractical or Ineffective.

The Strategic Treatments for Fire Use Alternative is not remote, speculative, impractical or ineffective. In fact, based on scientific studies, the alternative would meet the purpose and need for the project with less cost, and fewer adverse environmental impacts, than the preferred alternative.

As we described in the proposal, and again here, treatment optimization is a long-studied management tool which the Forest Service has made available for use in NEPA projects. One common fundamental similarity between all optimization models is that they seek to reduce fire-severity or minimize wildfire risk, balancing tradeoffs between the size of treatment units, the placement of treatments, and the proportion of the landscape treated.[181,182,183] Collins and colleagues[184] reviewed fuel treatment strategies, including much of Finney and Ager's work, and arrived at some basic parameters for optimizing fuel reduction treatments at the landscape scale that provide some guidance for those evaluating tradeoffs and can be used as guidelines in the Strategic Treatments for Fire Use Alternative:

> • Treating 10% of the landscape provides notable reductions in modeled fire size, flame length, and spread rate across the landscape relative to untreated scenarios, but treating 20% provides the most consistent reductions in modeled fire size and behavior across multiple landscapes and scenarios.
>
> • Increasing the proportion of area treated generally resulted in further reduction in fire size and behavior, however, the rate of reduction diminishes more rapidly beyond 20% of the landscape treated.
>
> • Random placement of treatments requires substantially greater proportions of the landscape treated compared with optimized or regular treatment placement.
>
> • The improvements offered by optimized treatments are reduced when 40-50% of the landscape is unavailable for treatment due to land management constraints.
>
> • Treatment rates beyond 2% of the landscape per year yield little added benefit.

As we reviewed at length in the Strategic Treatments for Fire Use Alternative proposal, Forest Service and academic scientists have been providing mangers with analytical and planning tools for years to encourage informed deployment of mechanical thinning. Projects like 4FRI are exactly where these tools should be utilized. Because our proposed alternative is not remote, speculative, impractical or ineffective, it is a reasonable alternative that the agency must consider in detail.

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[181] Collins *et al.* 2010.

[182] Chung 2015. Optimizing fuel treatments to reduce wildland fire risk. *Current Forestry Reports* 1: 44-51.

[183] Krofcheck, D.J., M.D. Hurteau, R.M. Scheller, and E.L. Loudermilk. 2017. Prioritizing forest fuels treatments based on the probability of high-severity fire restores adaptive capacity in Sierran forests. *Global Change Biology DOI: 10.1111/gcb.13913.*

[184] Collins *et al.* 2010.

3.7. THE ACTION ALTERNATIVES ARE NOT SURROGATES FOR THE STFU ALTERNATIVE

CONCERN: The Strategic Treatments for Fire Use Alternative Is Significantly Distinguishable from the Action and No Action Alternatives.

The Forest Service may not fail to analyze the Strategic Treatments for Fire Use Alternative on the grounds that it cannot be distinguished from the other alternatives. The Strategic Treatments for Fire Use Alternative in fact would result in numerous differences in on-the-ground treatments.

The primary manner by which the Strategic Treatments for Fire Use Alternative is distinguishable from the proposed action is that the Strategic Treatments for Fire Use Alternative would identify thinning treatment areas based on an informed, landscape level optimization analysis, consistent with the best available science, rather than leave decisions for treatment locations up for spur-of-the-moment judgements within a conditions-based management approach, or under the influence of economic factors and potential for projects paying their way.

The DEIS does not actually identify where mechanical thinning treatments would be placed. It just assigns vast acreages to each treatment type, to the sum of 93% of the forested Rim Country landscape in Forest Service ownership. We have not been able to determine what the last 7% is, but based off of maps we assume these are areas that have zero potential for timber income or are extremely difficult to access.

In contrast, the Strategic Treatments for Fire Use Alternative would evaluate the landscape, including existing holding features, and identify the subset of the landscape that, if thinned, would allow use of prescribed or managed wildfire across a broader area. Thus, the Strategic Treatments for Fire Use Alternative has the added advantage of resulting in disclosure of site-specific impacts of the project, as NEPA mandates.

3.8. DISMISSING THE STFU ALTERNATIVE IS ARBITRARY AND CAPRICIOUS

CONCERN: The Forest Service's Failure to Analyze the Strategic Treatments for Fire Use Alternative Is Arbitrary and Capricious.

Because the Strategic Treatments for Fire Use Alternative alternative meets the project purpose and need, would effectively move the forest in the desired direction, and differs from the proposed alternative in critical ways, it is a reasonable alternate that the Forest Service must consider in any subsequently prepared NEPA document. Failure to consider this reasonable, middle ground alternative would violate the "heart" of the NEPA process.

CEQ regulations which apply to all NEPA documents, and not just EISs, require that agencies "*to the fullest extent possible* . . . [i]*mplement procedures . . . to emphasize real environmental issues and alternatives*" and to "*use the NEPA process to identify and assess the reasonable alternatives to proposed actions that will avoid or minimize adverse effects of these actions upon the quality of the human environment*."[185]

For decades, the Ninth Circuit and district courts therein have explicitly held that the alternatives requirement applies equally to EAs and EISs. "*Any proposed federal action involving . . . the proper use of resources triggers NEPA's consideration of alternatives requirement, whether or not an EIS is also required*."[186] Other courts agree.[187]

NEPA requires that federal agencies consider alternatives to recommended actions whenever those actions "*involve*[] *unresolved conflicts concerning alternative uses of available resources*."[188] "*NEPA's requirement that alternatives be studied, developed, and described both guides the substance of the environmental decisionmaking and provides evidence that the mandated decisionmaking process has actually taken place*."[189] In taking the "*hard look*" at impacts that NEPA requires, an EA must "*study,*

[185] 40 C.F.R. § 1500.2(b), (e).

[186] *Bob Marshall Alliance v. Hodel*, 852 F.2d 1223, 1229 (9th Cir. 1988), cert denied, 489 U.S. 1066 (1988). *See also W. Watersheds Project v. Abbey*, 719 F.3d 1035, 1050 (9th Cir. 2013) (in preparing EA, "an agency must still give full and meaningful consideration to *all* reasonable alternatives" (emphasis added) (internal quotation and citation omitted)); *Te-Moak Tribe v. Interior*, 608 F.3d 592, 601-602 (9th Cir. 2010) ("Agencies are required to consider alternatives in both EISs and EAs and must give full and meaningful consideration to all reasonable alternatives."); *Native Ecosystems Council v. U.S. Forest Service,* 428 F.3d 1233, 1245 (9th Cir. 2005) ("alternatives provision" of 42 U.S.C. § 4332(2)(E) applies whether an agency is preparing an EIS or an EA and requires the agency to give full and meaningful consideration to all reasonable alternatives); *Gifford Pinchot Task Force v. Perez*, 2014 U.S. Dist. Lexis 90631, No. 03:13-cv-00810-HZ (D. Or. July 3, 2014) (finding agency failed to consider range of reasonable alternatives in an EA); *Envtl. Prot. Info. Ctr. v. Blackwell*, 389 F. Supp. 2d 1174, 1199 (N.D. Cal. 2004) (stating that "an EA must consider a reasonable range of alternatives"); *Or. Natural Desert Ass'n v. Singleton*, 47 F. Supp. 2d 1182, (D. Or. 1998) ("The requirement of considering a reasonable range of alternatives applies to an EA as well as an EIS" (citing 40 C.F.R. § 1508.9(b)).

[187] *See Davis v. Mineta*, 302 F.3d 1104, 1120 (10th Cir. 2002) (granting injunction where EA failed to consider reasonable alternatives); *Diné Citizens Against Ruining Our Env't v. Klein*, 747 F. Supp. 2d 1234, 1254 (D. Colo. 2010) (alternatives analysis "is at the heart of the NEPA process, and is 'operative even if the agency finds no significant environmental impact.'" (quoting *Greater Yellowstone Coal. v. Flowers*, 359 F.3d 1257, 1277 (10th Cir. 2004)).

[188] 42 U.S.C. § 4332(2)(E). *See also* 40 C.F.R. § 1501.2(c) (agencies must "study, develop, and describe appropriate alternatives to the recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources as provided by section 102(2)(E) of the Act.").

[189] *Bob Marshall Alliance*, 852 F.2d at 1228 (citation omitted).

develop, and describe" reasonable alternatives to the proposed action.[190] CEQ regulations explicitly mandate that an EA "[s]*hall include brief discussions . . . of alternatives*."[191] The purpose of the multiple alternative analysis requirement is to insist that no major federal project be undertaken without intense consideration of other more ecologically sound courses of action, including shelving the entire project, or of accomplishing the same result by entirely different means.[192]

Reasonable alternatives must be analyzed for an EA even where a FONSI is issued because "*nonsignificant impact does not equal no impact. Thus, if an even less harmful alternative is feasible, it ought to be considered*." When an agency considers reasonable alternatives, it "*ensures that it has considered all possible approaches to, and potential environmental impacts of, a particular project; as a result, NEPA ensures that the most intelligent, optimally beneficial decision will ultimately be made.*" [193,194] In determining whether an alternative is "*reasonable*," and thus requires detailed analysis, courts look to two guideposts: "*First, when considering agency actions taken pursuant to a statute, an alternative is reasonable only if it falls within the agency's statutory mandate. Second, reasonableness is judged with reference to an agency's objectives for a particular project*."[195]

Additionally, the Court recognizes two exceptions under which an agency may decline to consider an alternative: where it has in "*good faith*" found the alternative to be "*too remote, speculative, or impractical or ineffective*,"[196], or where the alternative is not "*significantly distinguishable from the alternatives already considered*."[197] When an alternative meets the guideposts, and is not subject to the exceptions, an agency must consider it in detail.[198] Any alternative that is unreasonably excluded will invalidate the NEPA analysis. "*The existence of a viable but unexamined alternative renders an EA inadequate*."[199] The agency's obligation to consider reasonable alternatives applies to citizen-proposed alternatives.[200] "*In respect to alternatives, an agency must on its own initiative study all alternatives that appear reasonable and appropriate for study at the time, and must also look into other significant alternatives that are called to its attention by other agencies, or by the public during the comment period afforded for that purpose*."[201]

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[190] 42 U.S.C. § 4332(2)(C) & (E).
[191] 40 C.F.R. § 1508.9(b).
[192] *Environmental Defense Fund v. Corps of Engineers*, 492 F.2d 1123, 1135 (5th Cir. 1974); *Methow Valley Citizens Council v. Regional Forester*, 833 F.2d 810 (9th Cir. 1987), *rev'd on other grounds*, 490 U.S. 332 (1989) (agency must consider alternative sites for a project).
[193] *Ayers v. Espy*, 873 F. Supp. 455, 473 (D. Colo. 1994) (internal citation omitted).
[194] *Wilderness Soc'y v. Wisely*, 524 F. Supp. 2d 1285, 1309 (D. Colo. 2007) (quotations & citation omitted).
[195] *Diné Citizens Against Ruining Our Env't*, 747 F. Supp. 2d at 1255 (quoting *New Mexico ex rel. Richardson*, 565 F.3d at 709). *See also Idaho Conservation League v. Mumma*, 956 F.2d 1508, 1520 (9th Cir. 1992) ("nature and scope of proposed action" determines the range of reasonable alternatives agency must consider).
[196] *Richardson*, 565 F.3d at 708 (quoting *Colo. Envtl. Coal. v. Dombeck*, 185 F.3d 1162, 1174 (10th Cir. 1999)).
[197] *Id*. at 708-09 (citing *Westlands Water Dist. v. U.S. Dep't of the Interior*, 376 F.3d 853, 868 (9th Cir. 2004)).
[198] *Id*. at 711.
[199] *Western Watersheds v. Abbey*, 719 F.3d. at 1050; *see also Diné Citizens Against Ruining Our Env't*, 747 F. Supp. 2d at 1256 ("The existence of a viable but unexamined alternative renders an alternatives analysis, and the EA which relies upon it, inadequate.").
[200] *See Ctr. for Biological Diversity v. Nat'l Highway Traffic Safety Admin*., 538 F.3d 1172, 1217-19 (9th Cir. 2008) (finding EA deficient, in part, for failing to evaluate a specific proposal submitted by petitioner); *Colo. Envtl. Coal. v. Dombeck*, 185 F.3d 1162, 1171 (10th Cir. 1999) (agency's "[h]ard look" analysis should utilize "*public comment* and the best available scientific information") (emphasis added).
[201] *Dubois v. U.S. Dept. of Agric*., 102 F.3d 1273, 1291 (1st Cir. 1996) (quoting *Seacoast Anti-Pollution League v. Nuclear Regulatory Comm'n,* 598 F.2d 1221, 1230 (1st Cir. 1979).

Courts hold that an alternative may not be disregarded merely because it does not offer a complete solution to the problem.[202] Even if additional alternatives would not fully achieve the project's purpose and need, NEPA "*does not permit the agency to eliminate from discussion or consideration a whole range of alternatives, merely because they would achieve only some of the purposes of a multipurpose project*."[203] If a different action alternative "*would only partly meet the goals of the project, this may allow the decision maker to conclude that meeting part of the goal with less environmental impact may be worth the tradeoff with a preferred alternative that has greater environmental impact*."[204]

Further, courts reviewing EAs have consistently found them lacking where there existed feasible mid-range or reduced-impact alternatives failing between the extremes of granting in full or denying in full the proposed action, but the agency opted not to analyze them in detail.[205] The courts also require that an agency adequately and explicitly explain in the EA any decision to eliminate an alternative from further study.[206]

RECOMMENDATION: In sum, the Strategic Treatments for Fire Use Alternative, compared to the preferred alternative, would utilize the best available science, stay true to core 4FRI social agreements and foundational documents, follow policy recommendations, use process-driven modalities to achieve ecological restoration outcomes; result in less disturbance from mechanical treatment; require fewer scarce Forest Service and industry resources; maintain the same comprehensive restoration objectives, and better protect our shared climate. For all these reasons, the Forest Service must consider the Strategic Treatments for Fire Use Alternative in any subsequently prepared NEPA document.

[202] *Natural Resources Defense Council, Inc. v. Morton*, 458 F.2d 827, 836 (D.C. Cir. 1972).

[203] *Town of Matthews v. U.S. Dep't. of Transp.*, 527 F. Supp. 1055 (W.D. N.C. 1981). *See also Citizens Against Toxic Sprays v. Bergland*, 428 F. Supp. 908, 933 (D. Or. 1977) ("An alternative may not be disregarded merely because it does not offer a complete solution to the problem.").

[204] *North Buckhead Civic Ass'n v. Skinner*, 903 F.2d 1533, 1542 (11th Cir. 1990).

[205] *See, e.g.*, *W. Watersheds Project v. Abbey*, 719 F.3d at 1050 (finding EA arbitrary and capricious where it failed to consider "reduced-grazing" alternatives); *Pac. Coast Fed'n of Fishermen's Ass'ns v. Dep't of Interior*, 655 F. App'x 595, 599 (9th Cir. 2016) (holding that agency's "decision [in EA] not to give full and meaningful consideration to the alternative of a reduction in maximum interim contract water quantities was an abuse of discretion, and the agency did not adequately explain why it eliminated this alternative from detailed study"); *Wild Fish Conservancy v. Nat'l Park Serv.*, 8 F. Supp. 3d 1289, 1300 (W.D. Wash. 2014) (finding agency's EA deficient because the "conclusion that there is not a meaningful difference, or viable alternative, between 0% and 90% [of fish survival] [was] suspect"), aff'd, 687 F. App'x 554 (9th Cir. 2017); *Native Fish Soc'y v. Nat'l Marine Fisheries Serv.*, 992 F. Supp. 2d 1095, 1110, (D. Or. 2014) (holding that agency "erred in failing to consider a reasonable range of alternatives" in EA, and finding that "[g]iven the obvious difference between the release of approximately 1,000,000 smolts and zero smolts, it is not clear why it would not be meaningful to analyze a number somewhere in the middle").

[206] *See Wilderness Soc'y*, 524 F. Supp. 2d at 1309 (holding EA for agency decision to offer oil and gas leases violated NEPA because it failed to discuss the reasons for eliminating a "no surface occupancy" alternative); *Ayers*, 873 F. Supp. at 468, 473.

4. THE FLEXIBLE TOOLBOX APPROACH: MANY QUESTIONS REMAIN

As we established in our Stakeholder comments, there are substantial concerns with the Flexible Toolbox Approach (FTA). We strongly support the concerns and recommendations described in the Stakeholders comments, and incorporate those by reference into our organizations comments additional comments presented here.

CONCERN: The FTA uses a legally questionable Condition-based Management approach.

The DEIS states that "[t]*he flexible toolbox approach is a condition-based management strategy that allows predetermined treatments to be aligned, prior to implementation, with current conditions on the ground*."[207] It should be reiterated that the Stakeholders have commented that the "*Conditions-based Management approach is complex, controversial among 4FRI stakeholders, and, to our knowledge, has yet to be evaluated in a rigorous scientific framework.*"[208] We stand by that statement.

The Forest Service risks potential legal complications by pursuing a Conditions-based Management approach in Rim Country. On September 23, the U.S. District Court for the District of Alaska issued a preliminary injunction halting implementation of the Prince of Wales Landscape Level Analysis Project. The court did so because the Forest Service's failure to disclose the site-specific impacts of that logging proposal raised "*serious questions*" about whether that approach violated NEPA.

Because the Rim Country Project DEIS takes an approach to NEPA compliance similar to the agency's with respect to the Prince of Wales Project, the Rim Country Project risks violating NEPA and could be enjoined. We therefore urge the Forest Service to modify its approach for the Rim Country Project and ensure that it discloses site-specific details about road use, road construction and decommissioning, locations of proposed mechanical thinning activities, and locations of other proposed, but thus far undefined watershed and landscape restoration activities such as exclosures, riparian and spring restoration, and other comprehensive restoration activities. To do otherwise risks violating the law and squandering significant agency resources.

The district court explained the approach the Forest Service took in the Prince of Wales EIS:

"*each alternative considered in the EIS "describe[d] the conditions being targeted for treatments and what conditions cannot be exceeded in an area, or place[d] limits on the intensity of specific activities such as timber harvest." But the EIS provides that "site-specific locations and methods will be determined during implementation based on defined conditions in the alternative selected in the . . . ROD . . . in conjunction with the Activity Cards . . . and Implementation Plan . . . ." The Forest Service has termed this approach "condition-based analysis*."[209]

The Prince of Wales EIS made assumptions "*in order to consider the 'maximum effects' of the Project*."[210] It also identified larger areas within which smaller areas of logging would later be identified, and

[207] Rim Country DEIS, Vol. 1, at 42.
[208] 4FRI Stakeholders comments on the Rim Country DEIS, 1/13/2020, at 3.
[209] See Se. Alaska Conservation Council v. U.S. Forest Serv., No. 1:19-cv-00006-SLG, 2019 U.S. Dist. LEXIS 161639 (D. Ak. Sep. 23, 2019) at 4 (citations omitted).
[210] *Ibid* at 5.

approved the construction of 164 miles of road, but "*did not identify the specific sites where the harvest or road construction would occur*."[211]

The Court found the Forest Service's approach contradicted Ninth Circuit precedent, *City of Tenakee Springs v. Block*, 778 F.2d 1402 (9th 1995), concerning logging on the Tongass National Forest. There, the appellate court set aside the Forest Service's decision to authorize pre-roading in the Kadashan Watershed, without specifically evaluating where and when on approximately 750,000 acres of land on Baranof and Chichagof Islands it intended to authorize logging to occur. The district court evaluating the Prince of Wales project found the Forest Service's condition-based analysis there was equivalent to the deficient analysis found unlawful by the Ninth Circuit nearly a quarter-century ago in *City of Tenakee Springs.*

The "[p]*laintiffs argue that the Project EIS is similarly deficient and that by engaging in condition-based analysis, the Forest Service impermissibly limited the specificity of its environmental review. The EIS identified which areas within the roughly 1.8-million-acre project area could potentially be harvested over the Project's 15-year period, but expressly left site-specific determinations for the future. For example, the selected alternative allows 23,269 acres of old-growth harvest, but does not specify where this will be located within the 48,140 acres of old growth identified as suitable for harvest in the project area. Similar to the EIS found inadequate in City of Tenakee Springs, the EIS here does not include a determination of when and where the 23,269 acres of old-growth harvest will occur. As a result, the EIS also does not provide specific information about the amount and location of actual road construction under each alternative, stating instead that "[t]he total road miles needed will be determined by the specific harvest units offered and the needed transportation network."*[212]

The Court concluded that plaintiffs in the Southeast Alaska Conservation Council case raised "*serious questions*" about whether the Prince of Wales EIS violates NEPA because "*the Project EIS does not identify individual harvest units; by only identifying broad areas within which harvest may occur, it does not fully explain to the public how or where actual timber activities will affect localized habitats*."[213] After finding the plaintiffs also met the other factors for preliminary injunction, the court enjoined all logging until a decision on the merits.[214] The court expects to issue a final decision on the merits by March 31, 2020.

This decision demonstrates that the Forest Service's condition-based management approach conflicts with NEPA's "*hard look*" mandate, and that where the Forest Service employs it, the agency risks projects being set aside and subject to further, compliant NEPA review. The Forest Service is in just that precarious position with respect to the Rim Country Project, which is proposed to follow the Flexible Toolbox Approach.

RECOMMENDATION: Any subsequent NEPA document prepared as part of the Rim Country analysis should provide a thorough explanation of how the condition-based management framework used in the Flexible Toolbox Approach satisfies NEPA's "hard look" mandates for analysis of site-specific impacts.

[211] *Ibid* at 6.
[212] *Ibid* at 13-14 (citations omitted).
[213] *Ibid* at 16, 18.
[214] *Ibid* at 19-23.

CONCERN: Numerous questions about the FTA remain unanswered.

During the past two years of Planning Workgroup and DEIS Workgroup sessions, some key questions have been asked of the Forest Service regarding the mechanical FTA, many of which are also relevant to the Aquatic and Watershed Toolbox too. These included:

• What is the process to addresses spatial and temporal components of FTA?

• What is the process that insures that FTA is implemented spatially and temporally in a consistent manner?

• What are the feedback mechanisms to report stands being reclassified and treatment modified?

• Will there be a database of record for the reclassification and treatments modifications?

• How will FTA be applied consistently across the landscape and over the duration of the project?

• What is the Forest Service's quantitative process to characterize how FTA will be implemented?

• What do we do when the cap or quota of acres for a specific type of treatment is reached?

• Is the FTA a process of management by exception or a standard operating process to be applied to all stands?

• Does the FTA stop applying if a number of acres is reached for each treatment type, without offsetting acres?

• Who will have what authority to reclassify acres?

• What authority is delegated to whom in the FTA implementation?

• How do we insure that the process is predictable and has a high consistency and low variance, i.e. different people examining the same stand will come to identical conclusions regarding validation, classification, and if appropriate, treatment modification?

• What are the sideboards / processes that insure that the FTA is a low deviation / low variance process?

• What sideboards operate for the FTA?

• How are FTA decisions made by implementers fed back into the collaborative process?

• How is the FTA approach not a "carte blanche" given to implementers?

• Are there thresholds to determine when the FTA changes the scope of the NEPA analysis? How are these thresholds identified? By whom? When?

• What happens if/when the thresholds are met?

• Is it realistic / desirable to expect a reanalysis or supplemental analysis?

• Is it appropriate to stop the FTA if/when thresholds are met?

• What are the feedback mechanisms to ensure that reclassifications and treatments modification are reported and integrated in the monitoring plan and adaptive management plan?

• It's unclear how acreages assigned to each treatment type will be allocated across multiple forests or districts, and tracked over time, and still remain within boundaries of the final ROD.

• How does the FTA approach mesh with monitoring and adaptive management?

• It seems like the FTA does not allow horizontal movement between vegetation types, as if it's written purely for ponderosa pine. How does the FTA respond when a stand is found to be a different vegetation type?

• What happens when ground inspection indicates that a stand not classified as SPLYT turns out to be SPLYT during ground inspection, or how does FTA address portions of stands which have SPLYT structure?

• Even if the ground verification approach is simple and relatively idiot-proof, it adds work (measurements of some sort) which is another layer of complexity that District Staff will likely resent and apply inconsistently, if at all. How do we ensure that district staff implement the FTA consistently?

Unfortunately, it appears that almost none of these questions are answered in the DEIS.

RECOMMENDATION: Any subsequent NEPA document prepared as part of the Rim Country analysis should provide a thorough explanation for all of these critically important questions.

CONCERN: Some FTA modifiers are inconsistently described.

In the initial description of the Flexible Toolbox Approach, the DEIS states that decision matrices include the modifiers of "*MSO Recovery Habitat, NOGO Nest Stands, NOGO PFAs, SPLYT, and Sensitive Soils*."[215] However, the full description of the Flexible Toolbox Approach in Section F of Appendix D does not mention sensitive soils at all. In fact, the term sensitive soil is not used once in the entirety of Appendix D. In addition, the Flexible Toolbox Approach as described in Section F of Appendix D makes clear that MSO foraging/non-breeding recovery habitat is a decision matrix modifier, but the initial description in the DEIS does not make this clear. Also, northern goshawk nest stands are described as a decision matrix modifier, but not shown on Figure 95 in Appendix D or Figure 9 in Volume 1 of the DEIS. More examples may exist that we have not identified.

RECOMMENDATION: Any subsequent NEPA document prepared as part of the Rim Country analysis should ensure consistency in describing all aspects of the FTA.

CONCERN: The functional relationship between the mechanical and aquatic FTA's is unclear.

Aquatic ecosystems are integrally linked to upland forest conditions. The DEIS assumes that restoration treatments in the uplands will improve both aquatic and watershed health and that efforts will be made to synergize treatments between areas. But the relationship between the two toolboxes is not readily apparent.

RECOMMENDATION: Any subsequent NEPA document should provide an explanation of how the Aquatic and Watershed toolbox will maximize efficiencies by coordinating with mechanical treatments.

[215] Rim Country DEIS, Vol. 1, at 43.

CONCERN: Key details are missing regarding the Aquatic/Watershed Restoration FTA.

We recognize the need for aquatic, watershed, and riparian restoration treatments, and believe that restoring these systems should be a high priority for 4FRI. The DEIS states that 184 springs will be restored, along with 777 miles of stream with 200 protective barriers around springs and wetland vegetation. Based on our understanding of the planning process thus far, the Forest Service, Fish and Wildlife Service, Game and Fish and Trout Unlimited have identified certain areas where restoration is urgently needed. However, the DEIS does not include any such list nor does it adequately describe where the impaired locations are, what treatments would occur, or what the cause of impaired functions are.

The DEIS provides a table that describes considerations for prioritizing aquatics and watershed restoration activities in two locations, each with slightly different names.[216] These tables list the first prioritization factor to consider as whether areas are within existing Watershed Restoration Action Plans. However, Watershed Restoration Action Plans are never defined, listed, described, or even mentioned again in the entire DEIS.

RECOMMENDATION: Any subsequent NEPA document should provide a list of specific streams, springs, or other aquatic features that are in need of restoration and documentation to support that need, and list and describe Watershed Restoration Action Plans and priority watershed areas.

5. LIVESTOCK GRAZING: AN UNTOUCHABLE TOPIC?

In our scoping comments on the Rim Country project, the Center established that:

"*Active livestock grazing allotments are ubiquitous in the project area. Grazing concurrent with the proposed action may adversely impact forest resilience and undermine the purpose and need. It directly contributes to fire hazard by altering vegetation communities, delaying fire rotations, increasing forest density, and reducing forage opportunities for herbivorous species and. Potentially significant cumulative effects to soil productivity, plant communities, fire regime and wildlife may result from vegetation treatments in combination with livestock grazing. Livestock also facilitate the spread of exotic species, particularly in combination with fire, and reduce the competitive and reproductive capacities of native species. Exotic plant species, once established, can displace native species, in part, because native grasses are not adapted to frequent and close grazing in combination with fire disturbance. Exotic plant spread is a potentially significant cumulative impact of the proposed action. Treatments similar to the proposed action left forest sites overrun with cheatgrass (Bromus tectorum). Exotic grass invasion is foreseeable and has important long-term implications for native plant communities in fire-adapted ecosystems and wildlife*."[217]

Continued livestock grazing threatens the success of restoring diverse wildlife habitats and improving watershed conditions. Grazing of the most nutritious plants by livestock results in a loss of forage for native species and can alter habitat or insect prey base.[218/219] A decrease in prey base inevitably leads to

[216] Rim Country DEIS, Vol. 1, at 45, Vol. 2, and Appendix D, Section F, Table 116, at 645.
[217] Letter from Todd Schulke to US Forest Service, 8/10/2016.
[218] Donahue, D. 1999. The Western Range Revisited: Removing Livestock from Public Lands to Conserve Native Biodiversity. Norman, OK: University of Oklahoma Press. 338 pages.

a decrease in carnivores in the area, which are also eliminated by the government at the request of the livestock community. "*The productivity, diversity, and species richness of native grasslands are threatened by competition from noxious and invasive weeds/grasses. Productivity is threatened by other factors including drought, soil erosion, fire suppression, and improper livestock management practices.*"[220] Grazing also has negative effects on songbirds, reptiles and other mammals especially if their habitat is close to the ground.[221] Rosenstock and Van Riper reported that "*Livestock grazing and fire suppression commonly are cited as causes of woodland expansion.*"[222]

Key concerns with the manner in which the Rim Country DEIS addresses livestock grazing are:

• The role of livestock grazing in current degraded upland and riparian conditions is not meaningfully addressed in the DEIS, and restoration will not be successful if livestock impacts are not reduced.
• Livestock grazing effects on understory plant restoration are ignored.
• The DEIS presents incomplete baseline data for cattle stocking.
• High intensity treatments are being used to benefit the livestock industry.

CONCERN: Role of livestock grazing in current degraded upland and riparian conditions is not meaningfully addressed in the DEIS.

Logging, livestock grazing and fire exclusion created the conditions that now require ecological restoration.[223] The existing conditions section in Chapter 1 of the DEIS does not adequately describe the cause of impaired ecological function or departed structure in grasslands and savannas. The Range Specialist Report is clear that "[l]*ivestock grazing can affect vegetation by reducing plant height, plant canopy cover, and ground cover, and can compact soils*"[224] and that "*changes in the soil's surface structure and its ability to accept, hold, and release water may be affected by compaction caused by trampling*."[225]

The DEIS also states that:

"*The grasslands have impaired soil conditions due to inadequate protective ground cover, compacted soil surfaces, and encroaching pines and junipers. In many meadows, vegetative ground cover is low, hydrologic soil function is reduced from compaction, groundwater levels have dropped below root zones due to gully formation, and encroaching upland tree species are competing with desired species*."[226]

Many of these issues can be traced to livestock grazing, but the DEIS fails to admit this.

The DEIS also states that:

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[219] Kie, John G., Charles J. Evans, Eric R. Loft, and John W. Menke. 1991. Foraging behavior by mule deer: the influence of cattle grazing. *The Journal of Wildlife Management* 55(4):665-674.
[220] Central Arizona Grasslands Conservation Strategy, page 21.
[221] Finch, D.M., and W. Block, technical editors. 1997. Songbird ecology in southwestern ponderosa pine forests: a literature review. Gen. Tech. Rep. RM-GTR-292. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 152 p.
[222] Rosenstock, S. S. and Van Riper III, C. (2001) Breeding Bird Responses to Juniper Woodland Expansion. *Journal of Range Management*, 54:226-232.
[223] Covington, W.W., and M.M. Moore. 1994. Southwestern ponderosa forest structure: Changes since Euro-American settlement. *Journal of Forestry* 92: 39-47.
[224] Rim Country DEIS, Range Specialist Report, at 9.
[225] Rim Country DEIS, Range Specialist Report, at 10.
[226] Rim Country DEIS, Vol. 1, at 15.

"*Grasslands were designated a priority habitat in the Arizona Partners In Flight Bird Conservation Plan, with the objective to permanently protect, enhance, and/or restore over 500,000 acres of grassland in northern Arizona. Grasslands and meadows should have satisfactory soil conditions, with vegetative cover adequate to prevent erosion above tolerance conditions, uncompacted soil surfaces that allow for satisfactory hydrologic function and desirable vegetation, and little to no tree encroachment*."[227]

Many of these issues can be traced to livestock grazing, but again, the DEIS fails to admit this.

In explaining why the proposed alternative that would eliminate the use of prescribed fire was eliminated from detailed study, the DEIS admits that livestock grazing "*would remove the herbaceous vegetation that helps carry a fire across the majority of the project area*."[228] We are pleased that the DEIS admits that increased livestock stocking or and increased area available to livestock would likely lead to a "*decline in herbaceous species production and diversity, and possibly an increase in soil compaction across the project area* … [which is] *contrary to the purpose and need to improve the abundance, diversity, distribution, and vigor of native understory vegetation to provide food and cover for wildlife, as well as move toward the desired conditions of improved condition and function of streams and springs, grasslands and connected montane meadows, watersheds, and forest ecosystems*."[229]

However, the DEIS fails to address the issue of overgrazing of upland and riparian ecosystems, despite admitting that "[c]*onifer tree removal, restoration of fire, and* ***appropriate livestock numbers*** *are all necessary to restore structure and function of native grasslands*."[230] At least the DEIS suggests that livestock numbers won't increase as a result of treatments.[231]

Livestock are one of the key drivers of ecosystem dysfunction in fire-adapted ecosystems and riparian/aquatic ecosystems. The Forest Service will fail to restore the Rim Country landscape if livestock management is not part of a comprehensive restoration package.

More than a century of livestock grazing in western ecosystems has led to a decline in insect, fish, reptile, amphibian, bird, mammals, ground cover, biomass, and native vegetation,[232] making grazing the most destructive widespread activity wrought on Western rivers and watersheds since the arrival of American settlers. Decades of scientific research comparing grazed and ungrazed areas have documented that livestock grazing in the arid west negatively effects water quality and quantity, stream channel morphology, hydrologic function, soil stability, streambank vegetation, aquatic and riparian wildlife, and upland soil and forage conditions - proving that livestock grazing is an ecological catastrophe.[233]

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[227] Rim Country DEIS, Vol. 1, at 18.
[228] Rim Country DEIS, Vol. 1, at 55.
[229] Rim Country DEIS, Vol. 1, at 56.
[230] Rim Country DEIS, Vol. 2, Appendix D, Section C, at 622. **(emphasis added)**
[231] Rim Country DEIS, Vol. 1, at 135: "*Overall, in combination with ongoing livestock grazing and* ***in the absence of increasing livestock numbers being grazed****, Alternative 2 would benefit soils and watershed conditions to a greater extent than alternative* 3." **(emphasis added)**
[232] Krueper, D.J. 1996. Effects of livestock management on Southwestern riparian ecosystems. Pp 281-301 in Shaw, D.W., and D.M. Finch. 1996. Desired future conditions for Southwestern riparian ecosystems: bringing interests and concerns together. Gen. Tech. Rep. RMRS-GTR-272. USDA Forest Service, Fort Collins, CO. 359 p.
[233] Belsky, A.J., A. Matzke, and S. Uselman. 1999. Survey of Livestock Influences on Stream and Riparian Ecosystems in the Western United States. *Journal of Soil and Water Conservation* 54: 419-431.

The DEIS states:

"*Desired conditions for riparian zones along streams are that they are capable of filtering sediment, capturing and/or transporting bedload (aiding floodplain development, improving flood-water retention, improving or maintaining water quality), and providing ground water recharge within their natural potential. Their necessary physical and biological components provide habitat for a diverse community of plant and wildlife species including cover, forage, available water, microclimate, and nesting/breeding/transport habitat. Stream habitats and aquatic species depend upon perennial streams or reaches and their habitat is maintained by the watershed, soil, and riparian conditions within the ecosystem*."[234]

A Forest Service review and assessment of grazing impacts on terrestrial wildlife in Region 3[235] found that grazing has multiple negative effects on native species. This incredibly useful and regionally specific document (GTR-142), assessed the ecological interactions among native wildlife species of the Southwest and grazing and range management practices, and was designed to provide an informational tool for the region's land managers and biologists.

A database developed to compliment the GTR-142 assessment (provided on a companion CD) contains accounts for 305 terrestrial species and subspecies (note, the assessment did not address fish) believed to be potentially vulnerable to both short-term and long-term effects of native and domestic ungulate grazing.

The assessment exhaustively details the effects of livestock grazing on wildlife, and includes statements like the two below:

In a section discussing birds of wetland/marsh habitats, GTR-142 states (page 29) that livestock use has "*a consistently negative impact and therefore to be generally incompatible with habitat maintenance*."

In a section discussing mammals of riparian and wet meadow habitats, including the masked and water shrews and the New Mexico meadow jumping mouse, GTR-142 states (page 34) that "… *such wetlands are generally incompatible with livestock use.*"

In addition to GTR-142, we also request that the Rim Country interdisciplinary team review Poff et al (2012) - GTR-269 - "Threats to western United States riparian ecosystems."[236] In this comprehensive review and bibliography of threats to riparian areas, the Forest Service authors reviewed "*453 journal articles, reports, books, and book chapters addressing threats to riparian ecosystems in western North America were analyzed to identify, quantify, and qualify the major threats to these ecosystems as represented in the existing literature*."[237] Poff and colleagues write (page 8) that "*most of the*

[234] Rim Country DEIS, Vol. 1, at 18.

[235] Zwartjes, P.W., J.E. Cartron, P.L.L. Stoleson, W.C. Haussamen, and T.E. Crane. 2005. Assessment of Native Species and Ungulate Grazing in the Southwest: Terrestrial Wildlife. Gen. Tech. Rep. RMRS-GTR-142. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 74 p. plus CD. https://www.fs.fed.us/rm/pubs/rmrs_gtr142.pdf

[236] Poff, B., K.A. Koestner, D.G Neary, and D. Merritt. 2012. Threats to western United States riparian ecosystems: A bibliography. Gen. Tech. Rep. RMRS-GTR-269. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 78 p. https://www.fs.fed.us/rm/pubs/rmrs_gtr269.pdf

[237] Poff, B., K.A. Koestner, D.G. Neary, and V. Henderson, 2011. Threats to Riparian Ecosystems in Western North America: An Analysis of Existing Literature. Journal of the American Water Resources Association (JAWRA) 1-14. DOI: 10.1111/j.1752-1688.2011.00571.x. https://www.fs.fed.us/rm/pubs_other/rmrs_2011_poff_b001.pdf

publications in this bibliography that address a single threat discuss grazing" and on page 11 "*the two topics with the most individual references are grazing and invasive species.*"

The DEIS states:

"*Many riparian streams in the Rim Country project area, particularly within the Rodeo-Chediski Fire area, are currently non-functioning or functioning-at-risk, with accelerated erosion and increased peak flows*." Non-functioning "*riparian areas clearly are not providing adequate vegetation, landform, or woody material to dissipate stream energy associated with moderately high flows, and thus are not reducing erosion or improving water quality*, " and functioning-at-risk "*riparian areas are in limited functioning condition: however, existing hydrologic, vegetative, or geomorphic attributes make them susceptible to impairment*."[238]

US Forest Service scientists have concluded that grazing is the most studied threat to riparian areas in the American West[239] and that livestock use is incompatible with maintenance of habitat for wetland and riparian wildlife.[240] Livestock grazing effects have contributed to the listing of many threatened and endangered species, including the yellow-billed cuckoo,[241] spikedace and loach minnow,[242] Northern Mexican and narrow-headed gartersnakes,[243] and others southwestern species found in Rim Country.

Grazing impacts on riparian areas fall into four categories: impacts on streamside vegetation, stream channel morphology, water quality/quantity, and streambanks.[244] Collectively, these impacts to vegetation, soils, and water lead to losses of wildlife habitat, reduced stream flow, increased pollution, and eradication of plant and animal species.[245] Grazing on riparian plants reduces vegetative cover and exposes soil to erosion, which in combination with streambank trampling leads to increased erosion and turbidity.[246] Grazing animals congregating in riparian areas feed on native tree and shrub regeneration,

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[238] Rim Country DEIS, Vol. 1, at 15.

[239] Poff, B., K.A. Koestner, D.G Neary, and D. Merritt. 2012. Threats to western United States riparian ecosystems: A bibliography. Gen. Tech. Rep. RMRS-GTR-269. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 78 p.

[240] Zwartjes, P.W., J.E. Cartron, P.L.L. Stoleson, W.C. Haussamen, and T.E. Crane. 2005. Assessment of Native Species and Ungulate Grazing in the Southwest: Terrestrial Wildlife. Gen. Tech. Rep. RMRS-GTR-142. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 74 p. plus CD.

[241] 60 Fed. Reg. at 10707 ("*Overuse by livestock has been a major factor in the degradation and modification of riparian habitats in the United States … Livestock grazing in riparian habitats typically results in reduction of plant species diversity and density, especially of palatable plants like willow and cottonwood saplings*.")

[242] 77 Fed. Reg. at 10,818 ("*Impacts associated with roads and bridges, changes in water quality, improper livestock grazing, and recreation have altered or destroyed many of the rivers, streams, and watershed functions in the ranges of the spikedace and loach minnow*.")

[243] 79 Fed. Reg. at 38718 ("*We found numerous effects of livestock grazing that have resulted in the historical degradation of riparian and aquatic communities that have likely affected northern Mexican and narrow-headed gartersnakes.*")

[244] Kauffman, J.B., and W.C. Krueger. 1984. Livestock impacts on riparian plant communities and streamside management implications-a review. *Journal of Range Management* 37(5): 430-438.

[245] Armour, C.L., D.A. Duff, and W. Elmore. 1991. The effects of livestock grazing on riparian and stream ecosystems. *Fisheries* 16(1): 7-11.

[246] Trimble, S.W., and A.C. Mendel. 1995. The cow as a geomorphic agent - a critical review. *Geomorphology* 13(1995): 233-253

disrupting their reproductive cycle and leading to destabilized streambanks,[247] increased water temperatures, loss of hiding and breeding cover, and defecation and urination directly in the water. Reduced rainfall infiltration into soil[248] and increased sediment loads combine to exacerbate riparian ecosystem decline and increase stream down-cutting.[249]

The DEIS states:

"*Desired conditions for streams and aquatic habitats are to support native fish and other aquatic species, providing the quantity and quality of aquatic habitat within the natural range of variation. This includes increasing habitat complexity such as pools and large woody debris, reducing downcutting and sedimentation, improving riparian areas that provide channel stability and leaf litter, and stream shading to maintain water temperatures*."[250]

Researchers realized decades ago that habitat loss driven by livestock grazing is primary threat to native fish in northern New Mexico. As much as fifty years ago, Behnke and Zarn,[251] Sublette et al., and Behnke[252] concluded that livestock grazing on National Forests and other lands was harming Rio Grande cutthroat trout populations. They wrote that:

"*Livestock grazing in riparian areas has contributed to the decline in quality of many aquatic habitats and in some instances has been a major factor in eliminating native fishes from portions of their historic ranges. Livestock trample and consume vegetation that maintains stream bank integrity, hoof action destroys undercut banks and accelerates erosion, and feces elevate nutrients unnaturally, particularly in spring habitats… Livestock grazing has contributed to increased erosion in many watersheds and thus elevated sediment loads in virtually all river systems*."[253]

Similar impacts have affected fish in Rim Country streams.

Prominent fish scientists have concluded that "*habitat degradation as a result of excessive grazing pressure can most easily be reversed by excluding livestock from the riparian area*."[254] Parson and Wilson (1991) determined that Apache trout were ten times more abundant on ungrazed streams on the Apache- Sitgreaves National Forest and other areas in the White Mountains, AZ than on grazed streams. Rinne and LaFayette (1991) found that ungrazed streams on the Tonto and Santa Fe National Forests had twice as many trout, trout populations, and trout biomass than grazed streams.[255] Propst and McInnis (1975) found that Santa Fe National Forest streams with little riparian habitat and erosion

[247] Patten, D.T. 1998. Riparian ecosystems of Semi-Arid North America: Diversity and Human Impacts. *Wetlands* 18(4): 498-512.

[248] Gifford, G.F., and R.H. Hawkins. 1978. Hydrologic Impact of Grazing on Infiltration: A Critical Review. *Water Resources Research* 14(2): 305-313.

[249] Obedzinski, R.A., C.G. Shaw, and D.G. Neary. 2001. Declining woody vegetation in riparian ecosystems of the Western United States. *Journal of Applied Forestry*. 16(4): 169-181.

[250] Rim Country DEIS, Vol. 1, at 19.

[251] Behnke, R.J. and M. Zarn. 1976. Biology and management of threatened and endangered western trouts. Gen. Tech. Rep. USDA Forest Service, RM-28: 1-45. Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO.

[252] Behnke, R.J. 1992. Native Trout of Western North America. American Fisheries Society, Monograph No. 6.

[253] Propst, D.L. 1999. Threatened and endangered fishes of New Mexico. Tech. Rpt. No. 1. New Mexico Department of Game and Fish, Santa Fe, NM at page 15.

[254] Pritchard and Crowley 2006 at 50.

[255] Rinne, J.N. and R.A. Lafayette 1991. Southwestern Riparian-Stream Ecosystems: Research Design, Complexity, and Opportunity. USDA Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO. 9pp.

problems, such as degraded banks or sign of rapid run-off, sustained few or no cutthroat trout.[256] Platts (1991) reviewed 21 studies, finding only one that did not concluded that cattle degrade trout populations and habitat.[257] Chaney et al. (1990) reported 1) that degraded cutthroat spawning habitat in Mahogany Creek, ID recovered when cattle were removed from the riparian area, 2) that populations of cutthroat trout in Huff Creek, Wyoming increased from 36 per mile to 444 per mile when cattle were excluded from the stream area, as a result of better in-stream cover lower water temperature, and decreased sedimentation, and 3) that cattle exclusion from the riparian zone of Bear Creek in Oregon converted an ephemeral reach of the stream into a permanent flow supporting a wild trout population.[258] Similarly, twenty years of cattle exclosure on Camp Creek in central Oregon turned an ephemeral wash into permanent stream capable of supporting redband trout.[259]

Grazing in adjacent uplands and river terraces is equally as disastrous, with impacts to biological soil crusts, vegetation, soils, and wildlife.[260] A comprehensive review of grazing impacts in the Southwest concluded that no current grazing management system used by land managers is appropriate for the Sonoran Desert, so as climate changes this must be considered.[261] Livestock grazing is a primary driver of fire regime disruption. Livestock grazing decreases understory biomass and density, reducing competition with conifer seedlings and reducing the ability of the understory to carry low-intensity fire, contributing to dense forests with altered species composition.[262] Livestock grazing directly contributes to fire hazard in the project area by impairing soil productivity and altering vegetation communities, which indirectly contribute to delayed fire rotations, increased forest density, and reduced forage opportunities for herbivorous species and predators. Cattle grazing also negatively impacts high elevation montane riparian meadows and creeks through hydrologic changes, soil compaction, erosion, bank instability, and siltation.[263] Often, these impacts can have greater effects on wildlife than do wildfires.[264]

Continued livestock grazing risks post-treatment invasion of exotic plants. Livestock facilitate the spread of exotic species, particularly in combination with fire, and reduce the competitive and reproductive capacities of native species.[265] Exotic plant species, once established, can displace native species, in part,

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[256] Propst, D.L. and M.A. McInnis 1975. An analysis of streams containing native Rio Grande cutthroat in the Santa Fe National Forest. WICHE Report for the Santa Fe National Forest, Region 3, Albuquerque, NM.

[257] Platts, W.S. 1991. Livestock grazing. Pp. 389- 423 In: W.R. Meehan, editor. Influences of Forest and Rangeland Management on Salmonids Fishes and their Habitats. Amer. Fish. Soc. Spec. Pub. 19: 389-423. Bethesda, MD. 751 pp.

[258] Chaney, E., W. Elmore, and W.S. Platts 1990. Livestock Grazing on Western Riparian Areas. EPA report. 14-7, 26-7.

[259] Hunter, C.J. 1991. Better Trout Habitat. Island Press, Washington, D.C.

[260] Jones, A. 2000. Effects of cattle grazing on North American arid ecosystems: a quantitative review. *Western North American Naturalist* 60(2): 155-164.

[261] Hall, J.A., S. Weinstein, and C.L. McIntyre. 2005. The Impacts of Livestock Grazing in the Sonoran Desert: A Literature Review and Synthesis. The Nature Conservancy in Arizona, Tucson.

[262] Belsky A.J. and D.M. Blumenthal. 1997. Effects of livestock grazing on stand dynamics and soils in upland forests of the Interior West. *Conservation Biology* 11:316-27.

[263] Federal Register Vol. 57 No. 225, November 20, 1992, Endangered and Threatened Wildlife and Plants; Proposed Endangered Status for the Plant "*Salix arizonica*" (Arizona willow), with Critical Habitat.

[264] Horncastle, V.J., C.L. Chambers, and B.G. Dickson. 2019. Grazing and Wildfire Effects on Small Mammals Inhabiting Montane Meadows. Journal of Wildlife Management 83(3): 534-543.

[265] Brooks, M.L., C.M. D'Antonio, D.M. Richardson, J. B. Grace, J.E. Keeley, J. M. DiTomaso, R.J. Hobbs, M. Pellant and D.Pyke. 2004. Effects of invasive alien plants on fire regimes. *BioScience* 54(7):677-688.

because native grasses are not adapted to frequent and close grazing in combination with fire disturbance.[266/267/268]

Livestock disturb soil, enable seeds of exotic species to spread, and reduce the competitive and reproductive capacities of native species. Exotic plant species, once established, can displace native species, in part, because native grasses are not adapted to frequent and close grazing in combination with fire disturbance.

Exotic plant spread is a potentially significant cumulative impact of the proposed action. Treatments similar to the proposed action in northern Arizona left forest sites overrun with cheatgrass (*Bromus tectorum*). Exotic grass invasion is foreseeable and has important long-term implications for native plant communities in fire-adapted ecosystems and wildlife. Melgoza and others (1990[269]) studied cheatgrass soil resource acquisition after fire and noted its competitive success owing to its ability suppress the water uptake and productivity of native species for extended periods of time. They further showed that cheatgrass dominance is enhanced by its high tolerance to grazing. Its annual life-form coupled with the abilities to germinate readily over a wide range of moisture and temperature conditions, to quickly establish an extensive root system, and to grow early in the spring contribute to its successful colonization. In addition, Melgoza and others showed that cheatgrass successfully competes with the native species that survive fire, despite these plants being well-established adult individuals able to reach deeper levels in the soil. This competitive ability of cheatgrass contributes to its dominance when lands experience synergistic disturbances from grazing, mechanical treatments, and fire.

The DEIS describes one objective of Grassland and Wet Meadow Restoration treatments as "[m]*echanical and fire treatments to reduce or eliminate woody species encroachment*."[270] This seems to conflict with other desired conditions that state the need for increasing woody vegetation, such as "*There is a need to restore native riparian vegetation, including large conifers and willows in some cover types, to reduce sedimentation to stream habitat, provide stream shading, maintain cool-water conditions, and provide large wood recruitment to streams to improve habitat complexity*,"[271] as well as the statement that "*Bebb's willows and bigtooth maples, tree species that provide habitat for songbirds and small mammals, as well as soil and stream bank stability, are declining in health, vigor, and number in the project area*."[272]

In a review of the endangered Arizona willow, the U.S. Fish and Wildlife Service stated that:

"*Historic and current livestock grazing in the high elevation riparian meadows on the [Apache-Sitgreaves National] Forest has contributed to habitat degradation. Livestock have had less of a recent effect on Reservation riparian areas because no livestock grazing has occurred there for a number of years. Livestock overuse of riparian meadows affects the habitat through hydrologic changes, soil compaction, erosion, bank instability, and siltation. Repeated habitat overuse by cattle results in reduced plant vigor*

[266] Mack, R. N., and J. N. Thompson. 1982. Evolution in steppe with few large, hooved mammals. *American Naturalist* 119:757-72.

[267] Melgoza, G., R.S. Nowak and R.J. Tausch. 1990. Soil water exploitation after fire: competition *between Bromus tectorum* (cheatgrass) and two native species. *Oecologica* 83:7-13.

[268] Belsky, A.J., and J.L. Gelbard. 2000. Livestock Grazing and Weed Invasions in the Arid West. Oregon Natural Desert Association: Portland, OR. April. 31 pp.

[269] Citation above.

[270] Rim Country DEIS, Vol. 1, Table 10, at 34.

[271] Rim Country DEIS, Vol. 1, at 22.

[272] Rim Country DEIS, Vol. 1, at 16.

and reproductive success, shifts in relative abundance of plant species, and localized loss of plant species. The adverse effects of livestock on the habitat are believed to be the most important factor affecting the populations on the Forest."[273]

Forest Service ecologists have established that livestock grazing has exacerbated riparian ecosystem decline and stream down- cutting associated with multiple concurrent factors.[274] Likewise, New Mexico Department of Game and Fish has recognized that the effects of livestock grazing are compounded by extended drought and altered hydrological function.[275] Additionally, the Forest Service has written on this issue in a climate assessment of the middle Rio Grande in New Mexico, stating that

"*For many species, reducing non climate-related threats during restoration is important. For example, herbicides pose high risks to amphibians (USACE 2001). Grazing may exacerbate disturbance related to restoration treatments. Warming conditions and increased variability to river flow will reduce the capacity of the riparian habitats and individual species to recover from disturbances. Decisions on land use and conversion should consider the overall effect of human activities plus potential consequences of climate change for habitat loss*."[276]

As Smith and Keinath wrote regarding the northern leopard frog, synergistic effects of climate change and drought are exacerbated by grazing, as depleted water sources cause grazers to congregate on remaining water sources, "*especially by introduced grazers like cattle*."[277] Likewise, regarding Arizona Willow, Decker wrote that "[a]*n important consideration in the evaluation and management of grazing impacts is the additive effect of herbivory from a variety of sources. Although S. arizonica certainly evolved with native herbivores, the effect of domestic livestock in combination with increasing pressure from wildlife means that the plants may frequently be exposed to levels of herbivory beyond their presumed tolerance*."[278]

In the DEIS, the summary of the water and riparian cumulative effects analysis concluded that "*the intensity of coincidental watershed activities … could potentially lead to negative effects, including unstable hydrologic and sediment delivery regimes, and subsequent impacts to riparian vegetation*."[279] Forest Service ecologists have cautioned against analyses that ignore synergistic and additive effects. Poff and colleagues concluded, in GTR 269, that "[i]*n most cases, it is difficult to deal with isolated threats as most occur in combination with other threats. Land managers need to be aware of the multiple threats and their interactions in order to successfully manage riparian ecosystems in the western United States*."[280]

The DEIS states that "[s]*tream and riparian area restoration would have a long-term benefit to livestock grazing management by increasing forage, by improving bank stability, and by decreasing the amount of sediment to downstream stock tanks. Excluding livestock from these restoration areas would be short*

[273] Federal Register Vol. 57 No. 225, November 20, 1992, Endangered and Threateneed Wildlife and Plants; Proposed Endangered Status for the Plant "*Salix arizonica*" (Arizona willow), with Critical Habitat.

[274] Obedzinski, R.A.; Shaw, C.G.; Neary, D.G. 2001. Declining woody vegetation in riparian ecosystems of the Western United States. Journal of Applied Forestry. 16(4): 169-181.

[275] New Mexico Department of Game and Fish. 2006. Comprehensive Wildlife Conservation Strategy for New Mexico. New Mexico Department of Game and Fish. Santa Fe, New Mexico. 526 pp + appendices.

[276] Friggens et al. 2013 at 58.

[277] Smith and Keinath 2007 at 3.

[278] Decker 2006 at 29.

[279] Rim Country DEIS, Vol. 1, at 117.

[280] Poff et al. 2012 at 11.

term."[281] This surprising revelation contrasts with the need for widespread and permanent removal of livestock from riparian areas and springs. The Range Specialist Report even admits that:

"*Domestic cattle grazing has the potential to affect soil and hydrologic functions that are important in the maintenance of long-term productivity and favorable conditions of water flow. Specifically, changes in the soil's surface structure and its ability to accept, hold, and release water may be affected by compaction caused by trampling. The nutrient cycling function of the soil may be interrupted by removal of vegetation that affects above ground nutrient inputs into the system. Finally, the soil's resistance to erosion is affected by changes in plant density, composition, and protective vegetative ground cover that are part of the organic components in the soil*."[282]

The DEIS states that:

"*The benefits of riparian areas in the project area cannot be over emphasized. Riparian areas help capture pollutants including sediment and nutrients, contribute to channel stability by providing protective vegetative cover and root biomass that anchors soils, regulate water temperatures by providing shade, provide areas for floodwater storage and dissipation and are important wildlife habitat features*."[283]

The DEIS explains that direction contained in the Watershed Conservation Practices Handbook (FSH 2509.25) are protection measures applied to this project.[284] The Watershed Conservation Practices Handbook describes the "water influence zone" as the area that includes the geomorphic floodplain (the valley bottom), the riparian ecosystem, and the inner gorge of perennial and intermittent streams, lakes, and wetlands.[285] The water influence zone "*protects interacting aquatic, riparian, and upland functions by maintaining natural processes and resilience of soil, water, and vegetation systems*"[286] and is the location of most proposed aquatic and riparian restoration activities included in the 4FRI preferred alternative and the focused restoration alternative. If followed, the design criteria and management measures provided in the Watershed Conservation Practices Handbook are sure to support successful implementation of watershed restoration projects.

Certain management measures are particularly important as they relate to how the 4FRI project will modify livestock grazing practices. The Watershed Conservation Practices Handbook directs the Forest Service to "[e]*xclude livestock from riparian areas and wetlands that are not meeting or moving towards desired condition objectives where monitoring information shows continued livestock grazing would prevent attainment of those objectives.*"[287]

The Watershed Conservation Practices Handbook directs the Forest Service to:

"*Design grazing systems to limit utilization of woody species. Where woody species have been historically suppressed, or where the plant community is below its desired condition and livestock are a key contributing factor, manage livestock through control of time/timing, intensity, and*

[281] Rim Country DEIS, Vol. 1, at 302.
[282] Rim Country DEIS, Range Specialist Report, at 10.
[283] Rim Country DEIS, Vol. 1, at 122.
[284] Rim Country DEIS, Vol. 1, at 58.
[285] FSH 2509.25 – Watershed Conservation Practices Handbook Chapter 10 – Management Measures and Design Criteria, 12.1, at 8.
[286] *Ibid.*
[287] *Ibid, 12.1.1(f)* at 9.

duration/frequency of use so as to allow for riparian hardwood growth extension and reproduction. Manage woody species in riparian areas to provide for stream temperature, bank stability and riparian habitat."[288]

The DEIS states that:

"*There are approximately 411 known springs in the Rim Country project area. A limited number have been assessed, but these assessments indicate that springs in the project area have been adversely affected by human activities such as flow regulation through installation of spring boxes and piping of discharge to off-site locations, recreation, and urbanization and other construction activities, as well as grazing by wild and domestic herbivores. Approximately 184 springs in the Rim Country project area exhibit declining or degraded conditions where restoration treatments may be applied*."[289]

The degraded condition of springs can largely be attributed to cattle damage and ranching-related water developments over the past 150 years. The only is widely accepted way to eliminate cattle impacts and restore springs, streams and upland health is the exclusion of domestic grazers. Consider the following:

• An example of where removal of cattle from rangelands for 35 years led to the disappearance of rabbitbrush from previously shrub-dominated communities - and native grasses regained dominance;[290]

• An example of where Forest Service scientists at the Intermountain Forest and Range Experiment Station found that protection of an Idaho range from grazing increased grass and forb production by 30% and decreased shrub production by 20%.[291]

• An example of where University of Idaho range scientists documented a 20-fold increase in perennial grass cover after 25 years of grazing exclusion while shrub cover only increased by 1.5-fold, attributing the grass response to "*the availability of seeds as formerly depleted populations increase in size*." [292]

• An example of where in a southeastern Arizona rangeland excluded from cattle grazing for 14 years, grass cover was 45% higher, the grass community was more heterogeneous, herb cover was higher, and rodent and bird numbers were higher than grazed comparison areas.[293]

• USDA research has found that excluding cattle from a landscape for five growing seasons "*significantly increased: (1) total vegetative cover, (2) native perennial forb cover, (3) grass stature, (4) grass flowering stem density, and (5) the cover of some shrub species and functional groups.*"[294]

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[288] FSH 2509.25 – Watershed Conservation Practices Handbook Chapter 10 – Management Measures and Design Criteria, 12.1.1(j), at 10.

[289] Rim Country DEIS, Vol. 1, at 15.

[290] Austin, D.D., and P.J. Urness. 1998. Vegetal change on a northern Utah foothill range in the absence of livestock grazing between 1948 and 1982. *Great Basin Naturalist* 58(2): 188-191.

[291] Laycock, W.A. 1967. How heavy grazing and protection affect sagebrush-grass ranges. *Journal of Range Management* 20: 206-213.

[292] Anderson, J.E., and K.E. Holte. 1981. Vegetation development over 25 years without grazing on sagebrush-dominated rangeland in southeastern Idaho. *Journal of Range Management* 34:25-29.

[293] Bock, C.E., J.H. Bock, W.R. Kenney, and V.M. Hawthorne. 1984. Responses of birds, rodents, and vegetation to livestock exclosure in a semidesert grassland site. *Journal of Range Management* 37(3): 239-242.

[294] Kerns, B. K., M. Buonopane, W.G. Thies, and C. Niwa. 2011. Reintroducing fire into a ponderosa pine forest with and without cattle grazing: understory vegetation response. *Ecosphere* 2(5):1-23.

The DEIS states:

"*Springs exhibiting degraded or declining condition and function need to be improved to sustain these important ecological features. Spring restoration would include reducing tree encroachment and noxious weeds, returning fire to the system (through prescribed fire), placing protective barriers, restoring flow to historic areas of influence, restoring or repairing damaged infrastructure, and removing dilapidated or non-functioning infrastructure where appropriate*."[295]

When maintained, grazing exclosure fencing protects riparian areas and leads to rapid recovery of vigorous native vegetation[296] which is critical to maintain streambank stability and provide habitat to riparian and aquatic wildlife.[297] Prominent fish scientists have concluded that livestock grazing has been a major factor in eliminating native fishes from portions of their historic ranges[298] and that habitat degradation is most easily reversed by excluding livestock from the riparian area.[299] Furthermore, removal of livestock from sensitive ecosystems such as arid-lands riparian areas is a critical component of adapting to climate change.[300]

RECOMMENDATIONS: 1) Livestock need to be permanently excluded from riparian areas. The DEIS states that "[s]*tream and riparian area restoration would have a long-term benefit to livestock grazing management by increasing forage, by improving bank stability, and by decreasing the amount of sediment to downstream stock tanks.* ***Excluding livestock from these restoration areas would be short term***."[301] This statement is a shocking discovery and conflicts with the statement in the DEIS that "*Installation of protective exclosures around restored sites would reduce browsing and trampling by both domestic and wildlife ungulates*."[302] The near-complete and permanent removal of livestock from all riparian areas is necessary to ensure full restoration of these crucial habitats and scenic recreational gems. 2) Upland stocking rates and allowable grazing areas must be evaluated, and stocking rates should be reduced as a result of restricted access to riparian areas which are artificially propping up the perceived capacity of the range.

CONCERN: Livestock grazing effects on understory restoration are ignored.

We appreciate that the range analysis includes our concern of how "*livestock grazing affect the restoration of understory species?*"[303] However, the DEIS says nothing more of the matter. Instead, the

[295] Rim Country DEIS, Vol. 1, at 18.

[296] Schulz, T.T., and W.C. Leininger. 1990. Differences in riparian vegetation structure between grazed areas and exclosures. *Journal of Range Management* 43(4): 295-299.

[297] Sarr, D.A. 2002. Riparian Livestock Exclosure Research in the Western United States: A Critique and Some Recommendations. *Environmental Management* 30(4): 516-526.

[298] Propst, D.L. 1999. Threatened and endangered fishes of New Mexico. Tech. Rpt. No. 1. New Mexico Department of Game and Fish, Santa Fe, NM at page 15.

[299] Pritchard, V.L. and D.E. Crowley. 2006. Rio Grande Cutthroat Trout (*Oncorhynchus clarkii virginalis*): A Technical Conservation Assessment. Prepared for the USDA Forest Service, Rocky Mountain Region, Species Conservation Project. Department of Fishery and Wildlife Sciences, New Mexico State University, Las Cruces, NM.

[300] Beschta, R.L., D.L. Donahue, D.A. DellaSala, J.J. Rhodes, J.R. Karr, M.H. O'Brien, T.L. Fleischner, and C.D. Williams. 2013. Adapting to climate change on western public lands: addressing the ecological effects of domestic, wild, and feral ungulates. *Environmental Management* 51: 474-491.

[301] Rim Country DEIS, Vol. 1, at 302. **(emphasis added)**

[302] Rim Country DEIS, Vol. 1, at 130.

[303] Rim Country DEIS, Vol. 1, at 299.

DEIS makes clear that restoration treatments will be designed to minimize negative impacts on the beef industry and to increase forage for their benefit while not reducing stocking rates.

RECOMMENDATION: Any subsequent NEPA document prepared for the Rim Country analysis must answer the question of how does livestock grazing affect the restoration of understory species. This concern is not solely related to whether or not there are sufficient fine fuels to carry a fire (which the Range Specialist Report briefly addresses), but whether the species composition, structure, and function are restored to the natural range of variability and resilient to the effects of climate change under the influence of increased cattle grazing that will be allowed as forage production increases.

CONCERN: The DEIS presents incomplete baseline data for cattle stocking.

The Range Specialist Report lists numbers of livestock on the Coconino National Forest in Tables 2 and 3. The data stops at 2010. As it is 2020, these tables should include up to date numbers. Additionally, the Tonto and Apache-Sitgreaves National Forests should be included, too.

"*In analyzing the affected environment, NEPA requires the agency to set forth the baseline conditions.*"[304] Specifically, NEPA requires agencies to "*succinctly describe the environment of the area(s) to be affected or created by the alternatives under consideration*."[305] The Council on Environmental Quality, the agency charged with interpreting NEPA, has explained that "*[t]he concept of a baseline against which to compare predictions of the effects of the proposed action and reasonable alternatives is critical to the NEPA process*."[306] Federal courts hold that "*[w]ithout establishing ... baseline conditions ... there is simply no way to determine what effect [an action] will have on the environment and, consequently, no way to comply with NEPA*."[307]

Without baseline data, neither the public nor the agency can understand the effects of the proposed action or craft and analyze alternatives and mitigation measures to protect these values. As such, the Forest Service must identify the environmental baseline and affected environment, as well as the scope of impacts and where those impacts are most likely to be felt. The vague "conditions-based" approach does not satisfy this requirement.

NEPA requires federal agencies to take a "*hard look*" at the environmental impacts of proposed actions.[308] To do so, federal agencies must prepare an environmental impact statement (EIS) for all "*major Federal actions significantly affecting the quality of the human environment*."[309] An EIS must "*provide [a] full and fair discussion of significant environmental impacts*" associated with a federal decision and "*inform decisionmakers and the public of the reasonable alternatives which would avoid or minimize adverse impacts or enhance the quality of the human environment*."[310] Taking the required

[304] *Western Watersheds Project v. BLM*, 552 F.Supp.2d 1113, 1126 (D. Nev. 2008)
[305] 40 C.F.R. § 1502.15.
[306] Council on Environmental Quality, Considering Cumulative Effects Under the National Environmental Policy Act 41 (1997), https://ceq.doe.gov/publications/cumulative_effects.html (last visited July 5, 2019).
[307] *Half Moon Bay Fishermans' Mktg. Ass'n v. Carlucci*, 857 F.2d 505, 510 (9th Cir. 1988); *see also N. Plains Res. Council, Inc. v. Surface Transp. Bd.*, 668 F.3d 1067, 1084–85 (9th Cir. 2011) (holding that agency did not take a sufficiently "hard look" at environmental impacts because it did not collect baseline data).
[308] *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 350 (1989).
[309] 42 U.S.C. § 4332(2)(C); *see also* 40 C.F.R. § 1501.4.
[310] 40 C.F.R. § 1502.1.

"*hard look*" requires agencies to "*utiliz[e] … the best available scientific information*."[311]

NEPA's review obligations are more stringent and detailed at the project level, or "*implementation stage*," given the nature of "*individual site specific projects*."[312] "[G]*eneral statements about possible effects and some risk do not constitute a hard look, absent a justification regarding why more definitive information could not be provided*."[313]

Analyzing and disclosing site-specific impacts is critical because where (and when and how) activities occur on a landscape strongly determines that nature of the impact. As the Tenth Circuit Court of Appeals has explained, the actual "*location of development greatly influences the likelihood and extent of habitat preservation. Disturbances on the same total surface area may produce wildly different impacts on plants and wildlife depending on the amount of contiguous habitat between them*."[314] The Court used the example of "*building a dirt road along the edge of an ecosystem*" and "*building a four-lane highway straight down the middle*" to explain how those activities may have similar types of impacts, but the extent of those impacts – in particular on habitat disturbance – is different.[315] Indeed, "*location, not merely total surface disturbance, affects habitat fragmentation*,"[316] and therefore location data is critical to the site-specific analysis NEPA requires.

NEPA further mandates that the agency provide the public *"'the underlying environmental data' from which the Forest Service develop[ed] its opinions and arrive[d] at its decisions*."[317] "*The agency must explain the conclusions it has drawn from its chosen methodology, and the reasons it considered the underlying evidence to be reliable*."[318] In the end, "*vague and conclusory statements, without any supporting data, do not constitute a 'hard look' at the environmental consequences of the action as required by NEPA*."[319]

CEQ's regulations establish specific ways agencies must analyze proposed actions, including project-level decisions, including a detailed discussion of direct, indirect, and cumulative impacts and their significance; and an analysis of reasonable alternatives to the proposed action. Such analysis is required for both environmental assessments and EIS's.

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[311] *Colo. Envtl. Coal. v. Dombeck*, 185 F.3d 1162, 1171 (10th Cir. 1999).

[312] *Ecology Ctr., Inc. v. United States Forest Serv*., 192 F.3d 922, 923 n.2 (9th Cir. 1999); *see also Friends of Yosemite Valley v. Norton*, 348 F.3d 789, 800-01 (9th Cir. 2003); *New Mexico ex rel Richardson v. Bureau of Land Management*, 565 F.3d 683, 718-19 (10th Cir. 2009) (requiring site-specific NEPA analysis when no future NEPA process would occur); *Colo. Envtl. Coal. v. Ofc. of Legacy Mgmt*., 819 F. Supp. 2d 1193, 1209-10 (D. Colo. 2011) (requiring site-specific NEPA analysis even when future NEPA would occur because "environmental impacts were reasonably foreseeable").

[313] *Or. Natural Res. Council Fund v. Brong*, 492 F.3d 1120, 1134 (9th Cir. 2007) (citation omitted); *see also Or. Natural Res. Council Fund v. Goodman*, 505 F.3d 884, 892 (9th Cir. 2007) (holding the Forest Service's failure to discuss the importance of maintaining a biological corridor violated NEPA, explaining that "[m]erely disclosing the existence of a biological corridor is inadequate" and that the agency must "meaningfully substantiate [its] finding").

[314] *New Mexico ex rel Richardson*, 565 F.3d at 706.

[315] *Id*. at 707.

[316] *Id*.

[317] *WildEarth Guardians v. Mont. Snowmobile Ass'n*, 790 F.3d 920, 925 (9th Cir. 2015).

[318] *N. Plains Res. Council, Inc. v. Surface Transp. Bd.*, 668 F.3d 1067, 1075 (9th Cir. 2011) (citation omitted).

[319] *Great Basin Mine Watch v. Hankins*, 456 F.3d 955, 973 (9th Cir. 2006).

RECOMMENDATION: Consistent with NEPA requirements to document baseline conditions, any subsequent NEPA document prepared for the Rim Country analysis must include 2020 data for range stocking, and complete the tables to include all 4FRI Forests.

CONCERN: High intensity treatments are being used to benefit the livestock industry.

One of our key concerns is that forest restoration will lead to increases in cattle stocking due to increased forage production and availability. The DEIS makes statements that increase of level of concern. The discussion of effects on range resources common to both alternatives[320] includes several statements that seem to indicate that treatment intensity is related to an unstated agency desire to produce more forage for livestock. For example, the DEIS states that:

"*In research near the project area, herbaceous production dropped from greater than 650 pounds per acre to 100 pounds per acre when basal area increased above 50 square feet/acre (Pearson and Jameson 1967). In another study, grasses increased by more than 470 percent cover in high-intensity harvest units compared to a 53 percent increase in pre-treatment control units (Stoddard et al. 2011). Griffis et al. (2001) also found that the abundance of native grasses increased significantly along with treatment intensity throughout thinned and burned stands… The increase in forage within treatment areas would improve allotment conditions and allow for more flexibility in grazing management systems. Livestock distribution would improve because forage is more available in uplands. An increase in pasture graze periods would allow for additional pasture rest or deferment in other pastures within an individual allotment*."[321]

This statement clearly asserts that higher intensity treatments will benefit the beef industry, and they would be rewarded with "*increased flexibility*," which is likely to mean higher stocking rates, especially since "[a]*daptive management would continue to be used to adjust livestock management to meet annual forage production.*" [322] Based on these statements, it is clear to us that as more forage is produced following restoration, adaptive management will be used to adjust stocking numbers up.

An additional line of support for our concern that high intensity treatments are being overly applied to the landscape is the DEIS's statement that "[t]*reatments in the 40 to 55 percent and the 55 to 70 percent interspace ranges would result in an increase in herbaceous cover and production, and the treatments in 10 to 25 percent, 10 to 40 percent, and 25 to 40 percent interspace ranges would still result in an increase in herbaceous cover and production, but less of an increase than the higher interspace treatments.*"[323] As we have discussed elsewhere in these comments, we believe that too many high intensity treatments are being assigned, and this issue of benefit to livestock adds to our concern.

[320] Rim Country DEIS, Vol. 1, at 301-302.
[321] Rim Country DEIS, Vol. 1, at 301.
[322] *Ibid.*
[323] *Ibid.*

6. MEXICAN SPOTTED OWL

In scoping, the Center argued that the effects of mechanical thinning on the Mexican spotted owl have not been extensively studied and are not well understood. Prominent owl scientists have recently stated that "*Existing studies on the effects of fuels reduction treatments on spotted owls universally suggest negative effects from these treatments*"[324] and that "*forest restoration and thinning activities also may threaten owls and their existing habitat*."[325] Unfortunately the DEIS assumes that treatments will yield desired results despite the stark fact that "*No empirical studies have evaluated these management activities* [restoration thinning or logging] *on the Mexican spotted owl.*"[326] As is implied in the Notice of Intent to sue filed against the Forest Service by WildEarth Guardians, the current iteration of the monitoring plan does not provide adequate assurances that real science-based learning will be achieved.

Some relevant studies from dry, frequent fire adapted forests of southern California have published findings indicating deleterious effects of thinning of spotted owls. Stephens and colleagues[327] reported that in the Plumas National Forest of California, spotted owl territorial sites declined 43% within 3-4 years of landscape-scale thinning treatments, and following treatment owls redistributed across the landscape. A study by Lee and colleagues[328] reported that in the San Bernardino and San Jacinto of southern California, post-fire salvage logging further reduced California spotted owl occupancy rates beyond the initial impacts of wildfire, leading the authors to recommend that burned stands be monitored for occupancy prior to salvage logging. Elsewhere in the Sierra Nevada, Tempel and colleagues[329] found that, as expected, canopy cover and demographic rates were strongly positively related, and that medium intensity fuels reduction harvest were negatively related to owl reproduction. Other researchers have concluded that thinning effects would be less impactful than severe wildfire,[330] leading to uncertainty of the true impacts of thinning on spotted owls.

The Forest Service also has information—based on recent monitoring of Mexican spotted owls in the area of the Nuttall-Gibson Fire of 2004 in the Coronado National Forest—that Mexican spotted owls appear to survive and thrive in a post-fire environment.[331] This information directly undercuts the 2012

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[324] Page 11 in Ganey, J.L., H.Yi Wan, S.A. Cushman, And C.D. Vojta. 2017. Conflicting Perspectives on Spotted Owls, Wildfire, and Forest Restoration. *Fire Ecology* 13(3) doi: 10.4996/fireecology.130318020.

[325] Page 8 in Yi Wan, H., J.L. Ganey, C.D. Vojta, and S.A. Cushman. 2018. Managing emerging threats to spotted owls. *The Journal of Wildlife Management.* DOI: 10.1002/jwmg.21423.

[326] Id at 8.

[327] Stephens, S.L., S.W. Bigelow, R.D. Burnett, B.M. Collins, C.V. Gallagher, J. Keane, D.A. Kelt, M.P. North, L.J. Roberts, P.A. Stine, and D.H. Van Vuren. 2014. California Spotted Owl, Songbird, and Small Mammal Responses to Landscape Fuel Treatments. *BioScience* 64(10): 893-906.

[328] Lee, D.E., M.L. Bond, M. I. Borchert, and R. Turner. 2012. Influence of fire and salvage logging on site occupancy of spotted owls in the San Bernardino and San Jacinto Mountains of southern California. *The Journal of Wildlife Management* 77(7):1327-1341.

[329] Tempel, D.J., R.J. Gutierrez, S.A. Whitmore, M.J. Reetz, R.E. Stoelting, W.J. Berigan, M.E. Seamans, and Z. Peery. 2014. Effects of forest management on California spotted owls: implications for reducing wildfire in fire-probe forests. *Ecological Applications* 24(8):2089-2106.

[330] Lee, D.C., and L.L. Irwin. 2005. Assessing risks to spotted owls from forest thinning in fire-adapted forests of the western United States. *Forest Ecology and Management* 211:191-209.

[331] See "Occupancy and Reproductive Success of Mexican Spotted Owls in the Pinaleno Mountains, Safford Ranger District, Arizona: 2011" ("the owl population in the Pinaleno Mountains has demonstrated the capability of reproducing well, despite of or even with the aid of effects promulgated by the large, and in some areas, severely burning Nuttall-Gibson fire of 2004").

Mexican spotted owl revised Recovery Plan's assumptions with respect to Mexican spotted owl responses to fire and, more importantly, the conclusion that the risk to Mexican spotted owl habitat posed by the threat of fire justifies large-scale restoration projects which is itself associated with significant negative effects to the Mexican spotted owl and its habitat. Indeed, the evidence suggests that wildfire may actually promote the recovery of the Mexican spotted owl despite the 2012 Revised Recovery Plan's suggestion to the contrary.

A recent paper published by owl experts asserts that the 'debate' over the impacts of fire or logging to spotted owls is not settled:

"*Here, we argue that the existing literature is not sufficient to unambiguously quantify the response of spotted owls to high-severity wildfire, and that high-severity fire is pervasive enough within the range of the spotted owl to constitute a potential threat to owl habitat. We also provide evidence that forest restoration and fuels reduction treatments can mitigate fire behavior, but acknowledge that these treatments also can degrade spotted owl habitat. Based on these findings, we argue for cautious implementation of restoration treatments in or near spotted owl habitat, with the goal of identifying treatment types that successfully reduce fire risk while maintaining suitable habitat conditions for spotted owls*."[332]

A similar meta-analysis concluded that "*mixed-severity fire does not appear to be a serious threat to owl populations; rather, wildfire has arguably more benefits than costs for Spotted Owls*."[333] In another recent paper, scientists reiterate our concern that: "*Commercial timber harvesting remains a potential threat for all 3 spotted owl subspecies, but effects from forest thinning may be increasing because of the heightened emphasis on fuels reduction and forest restoration treatments on public lands. Owl response to mechanical tree removal, especially forest thinning, remains understudied.*"[334]

Notably, these researchers identified that threats to Mexican spotted owl are comparatively less studied than for other spotted owl subspecies: "*Mexican spotted owl papers represented a small fraction of manuscripts among major research topics, except for habitat selection … Because the Mexican spotted owl was listed as Threatened primarily because of concerns over habitat loss, it is understandable that a relatively high proportion of Mexican spotted owl studies have focused on characterizing habitat. The general lack of population dynamics studies for the Mexican spotted owl, however, is notable, and severely limits our understanding of factors causing population fluctuations in this owl and how it might respond to emerging threats*."[335]

Clearly, there is much to be learned about fie and logging effects on the MSO. We are concerned that the monitoring framework that was to be crafted as result of the first 4FRI objection will not become the robust process and product that was intended. We anticipate clear communication between the Forest Service and the Fish and Wildlife Service to ensure that obligations are adhered to.

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[332] Page 4 in Ganey, J.L., H. Yi Wan, S.A. Cushman, and C.D. Vojta. 2017. Conflicting Perspectives on Spotted Owls, Wildfire, and Forest Restoration. *Fire Ecology* 13(3) doi: 10.4996/fireecology.130318020.

[333] Page 1 in Lee, D.E. 2018. Spotted Owls and forest fire: a systematic review and meta-analysis of the evidence. *Ecosphere* 9(7):e02354. 10.1002/ecs2.2354.

[334] Page 1 in Yi Wan, H., J.L. Ganey, C.D. Vojta, and S.A. Cushman. 2018. Managing emerging threats to spotted owls. *The Journal of Wildlife Management.* DOI: 10.1002/jwmg.21423.

[335] Id at 7.

7. OTHER COMMENTS

CONCERN: Modelling assumptions for slash and biomass removal are incongruous with possible actions under the pending Request for Proposals (RFP).

In discussion of the effects of past logging practices on wildfire and fuels, the DEIS states that "*accumulation of fuel, through litter-fall, logging debris, and development of ladder fuels that can initiate crown fire made fire suppression more difficult*."[336] The DEIS also states that: "*Mechanical treatment alone has the potential to alter fire behavior primarily through a reduction of CBD, but it can also increase surface fuel loadings through the placement of slash on the ground (Carey and Schuman, 2003). Carey and Schumann (2003) further note that the use of mechanical thinning alone has a varied effect on modifying fire behavior, primarily because of the created slash*."[337] The DEIS also states that: "*Additionally, areas with large amounts of slash remaining post treatment are at risk for ips beetles*."[338]

Clearly, logging related slash leads to increased fire intensity and heightened fire and bark beetle risk. That is why so much energy has gone into trying to establish restoration industries that can utilize slash and biomass. But what if this didn't pan out for Rim Country? What if more slash was left behind than we want to admit could happen?

The DEIS states that in modeling the effects of treatments that "[a]*ll cutting simulations assume 15 percent of the cut stems are left on site and 10 percent of the branchwood from the cut and removed stems are left on site. All other biomass resulting from the cutting is assumed to be removed*."[339] However, the slash removal and on-site disposal requirements in the RFP[340] allow 10-50% of this material to be left in place by the contractor, and further indicate that: "*The slash removal and/ or on-site disposal percentages can vary on Task Orders or Sub-Areas, as long as the average percentages across all proposed acres meet the removal and/or on-site disposal requirements*." The RFP Executive Summary further explains this:

"*Additionally, each proposal will be evaluated on the ability to meet the slash removal and/ or on-site disposal requirements as follows*:

Removal and/or on-site disposal of slash:
a. 90% or greater: Exceptional
b. 80% - 89%: Very good
c. 70% - 79%: Satisfactory
d. 50% - 69%: Marginal
e. Less than 50%: Unsatisfactory"

While we aren't able to crosswalk the modelling assumptions with the criteria in the RFP, we are nonetheless concerned that it is very likely that a contract could be granted that does not meet the thresholds for slash removal that were used in the modelling. If this happens, then the validity of the modelling and predictions for reduction in fire risk are all completely invalid. The issue is further complicated by the possible scenario that an awarded contract thins to the high intensities critiqued

[336] Rim Country DEIS, Vol. 1, at 204. (original in text citation omitted)
[337] Rim Country DEIS, Vol. 1, at 229.
[338] Rim Country DEIS, Vol. 1, at 162.
[339] Rim Country DEIS, Vol. 1, at 142.
[340] RFP Executive Summary, at 13-14.

throughout these comments, then removes the merchantable material, but leaves as much as 50% of the slash. This possible undesirable fire effects resulting from this scenario is aptly described in the DEIS:

"*Decreasing the horizontal and vertical continuity of canopy fuels is a direct effect of the proposed treatments that would allow sunlight to reach the surface, increasing surface temperatures, and decreasing dead fuel moisture content at the surface. This, combined with increased surface winds with fewer trees blocking the wind, could increase surface fire intensity, flame length, and rate of spread even if surface fuels were the same before and after thinning. Therefore, canopy fuel treatments reduce the potential for crown fire (indirect effect) at the expense of slightly increased surface fire behavior….*"[341]

This scenario would prove true that "[m]*echanical thinning alone can contribute significantly to decreasing the potential for crown fire by breaking up vertical and horizontal canopy fuel continuity, but does little, in the long run, to decrease surface fuel loading*."[342]

RECOMMENDATION: Any subsequent NEPA analysis should model treatment outcomes based on the worst case scenario of 50% slash left on site, to match the worst case scenario of what might be an outcome of the RFP.

CONCERN: Severe Disturbance Area and Facilitative Operations Treatments are too open-ended.

The DEIS describes Severe Disturbance Area Treatments as a "[c]*ombination of restoration treatments: reforestation, prescribed fire, lopping/scattering, mastication,* ***and other mechanical methods***."[343] Facilitative operations would also have the liberty of using mechanical thinning. We are concerned with the vast uncertainty, flexibility, and open-endedness in these two treatment categories which account for 255,940 acres in Alternative 2.

The objective of Severe Disturbance Area Treatments "*is to identify treatments that would be effective in restoring the fuel structure that produces the types of fire to which ponderosa pine is adapted*."[344] As we discussed early in these comments, some disturbances have shifted vegetation mosaics in time and space, and efforts to reclaim timbered lands may prove futile. Also, novel vegetation types may be more climate resilient.

The DEIS states that "*The expectation is that most FO treatments would be only prescribed fire with no mechanical treatments. Mechanical FO treatments would be the exception*"[345] and that "*FO treatments would not have to be implemented to meet Rim Country objectives, but would be available as needed to facilitate the use of prescribed fire*."[346] This is reassuring, but as we have expressed numerous times, we are uncomfortable with so much flexibility.

Severe disturbance area treatments may be the biggest treatment category where there is vast uncertainty, as the Forest Service has indicated to us that these treatments could apply to fires, windthrow, tornados, or other disturbances after the ROD is signed. Typically, Chapter 18 review would be needed for future unexpected changes like this, but the FTA seems to be crafted to avoid that need.

[341] Rim Country DEIS, Vol. 1, at 230.
[342] Rim Country DEIS, Vol. 1, at 231.
[343] Rim Country DEIS, Vol. 1, Table 10, at 33, emphasis added.
[344] Rim Country DEIS, Vol. 1, Table 10, at 33.
[345] Rim Country DEIS, Vol. 1, at 46.
[346] Rim Country DEIS, Vol. 1, at 45.

RECOMMENDATION: These treatment categories deserve additional discussion with Stakeholders to identify appropriate sideboards and management guidelines.

CONCERN: Incorrect mileage listed in alternatives comparison section.

In the initial section describing Alternative 2, the DEIS states that both Alternative 2 and 3 include *"…approximately 330 miles of temporary roads (new and/or occurring on existing unauthorized roads) to facilitate mechanical treatments; decommission all temporary roads when restoration treatments are completed*."[347] This appears to be a mistake, as other sections of the EIS state that Alternative 3 would only construct 170 miles of road.[348] Furthermore, in the initial section describing Alternative 3, the DEIS states that both Alternative 2 and 3 include *"…approximately 170 miles of temporary roads (new and/or occurring on existing unauthorized roads) to facilitate mechanical treatments; decommission all temporary roads when restoration treatments are completed*."[349] These two sections appear to have been accidentally included under the heading of additional actions common to both alternatives.

RECOMMENDATION: Correct the sections describing additional actions common to both alternatives so that road mileage is not described as the same between Alternatives 2 and 3.

CONCERN: Statements in alternatives comparison section.

Soils and watershed cumulative effects section claims that "[s]*ince Alternative 3 results in greater areal extent of areas that remain untreated, these areas will remain at risk of high severity wildfire, concentrated recreational uses,* ***and erosion and sediment delivery from roads that are not decommissioned****.*"[350] These statements are unsubstantiated. Since Alternative 3 would treat the areas most departed from NRV, untreated areas are by nature those areas which are at the least risk of high severity fire. Fire modelling by the Hurteau Lab at University of New Mexico has shown that treating only the most at-risk areas (or those furthest departed from NRV) has the effect of reducing fire severity in adjacent untreated areas.[351] Also, road decommissioning is the same between alternatives,[352] so to conclude that the less intensive treatment would have greater erosion and sediment delivery impacts is not accurate. In fact, the opposite oculd be true as alternative 2 would create about 160 miles more temporary roads. Also in this section, we don't understand the statement "[a]*dd a one or two sentences that clarify the substantially reduced areal extent blurb*."

RECOMMENDATION: Please clarify how fewer roads and more strategically placed thinning treatments would lead to increased erosion rates.

CONCERN: Model runs shoud be updated to represent the current year.

The DEIS states that: "*All tree cutting and removal was modeled in the year 2019 as 2019 is the earliest anticipated first year of treatments*."[353]

RECOMMENDATION: In the Final EIS, modelling should start at 2021 and grow out to 2031 and 2041.

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[347] Rim Country DEIS, Vol. 1, at 31.
[348] See, for example, Table S-1 on page v of the DEIS, Vol. 1.
[349] Rim Country DEIS, Vol. 1, at 40.
[350] Rim Country DEIS, Vol. 1, at 136. **(Emphasis added)**
[351] Krofcheck citations provided earlier in these comments.
[352] The DEIS admits this in the following paragraph: "*Other restoration actions (stream channel restoration, spring restoration,* ***road decommissioning****, etc. would be the same as Alternative 2*." (Rim Country DEIS, Vol. 1, at 136).
[353] Rim Country DEIS, Vol. 1, at 141.

CONCERN: Tonto Forest Plan Amendments.

The DEIS states that several amendments to the 1985 Tonto Forest Plan must be made. The amendments are inconsistent with those described in the Proposed Action. The Proposed Action proposes these amendments (summarized):[354]

1) Removal of the Forest Plan requirement to achieve a "no effect" determination for cultural resources.
2) Add desired conditions and definitions for interspace and openings in uneven-aged management.
3) Incorporate management direction from the 2012 Mexican Spotted Owl Recovery Plan revision.

Instead of analyzing these proposed amendments, the DEIS drops the cultural resources amendment and replaces it with an elimination of 40% slope restrictions on mechanical harvesting machinery. No disclosure of this addition has been made to 4FRI stakeholders prior to the publication of the DEIS.

It does not appear that public comment during scoping led to the addition of this amendment. The DEIS states that:

"*Modifications to the Proposed Action include dropping the even-aged shelterwood treatments originally proposed and replacing them with regular restoration treatments, modifying to propose treatments with a broader range of openness in some stands, defining the proposed treatments and terms in more detail, and detailing the acreages and miles of proposed treatments*."[355]

The DEIS affirms these limited modifications again:

"*Changes made to the Proposed Action in response to public comment include:*

> *1. Modifications to acreages and mileage of treatments based on additional modeling.*
> *2. Additional clarity, details, and definitions of key terms used.*
> *3. Elimination of even-aged shelterwood silvicultural prescriptions to address dwarf mistletoe infections, replaced with regular restoration treatments.*

In addition, the proposal to mechanically thin trees and implement prescribed fire on approximately 1,260 acres in the Long Valley Experimental Forest was dropped from this alternative, as well as from the Rim Country Project. In discussions with researchers with the Rocky Mountain Research Station, it was decided that experimental treatments for the experimental forest would be analyzed in a separate NEPA analysis."

In addition, the order of the amendments as presented in the DEIS is confused in some locations. For example, in the DEIS, amendment 1 is described as being the GTR-310 amendment,[356] but in Appendix B[357] amendment 1 is described as both the MSO recovery plan amendment and the GTR-310 amendment, depending on what section. We advise that a review of these references is made for consistency throughout the document.

RECOMMENDATIONS: Because Amendment 3, Mechanical Treatments on Steep Slopes, was not included in the Proposed Action, it should be removed from any subsequent NEPA document prepared for the 4FRI project.

[354] Rim Country Proposed Action, Appendix A, at 29-32.
[355] Rim Country DEIS, Vol. 1, at 29.
[356] Rim Country DEIS, Vol. 1, at vi.
[357] Rim Country DEIS, Vol. 2, Appendix B, at 530.