From:	Steve Rosenstock
To:	FS-4FRI Comment Database
Cc:	Redman, Robbin - FS; Kruger, Jeremy - FS; Souther, John - FS
Subject:	Grand Canyon Trust Comments" 4FRI Rim Country DEIS
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Attachments:	Rim Country DEIS GCT Comments_011620.pdf

Robbin et al -

Attached please find Grand Canyon Trust comments on the 4FRI Rim Country DEIS.

Sincerely,

SR

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January 16, 2020

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

Comments sent via email: 4fri_comments@fs.fed.us

Dear Reviewing Official -

The Grand Canyon Trust ("the Trust") is a nonprofit conservation organization that focuses on safeguarding the wonders of the Grand Canyon and Colorado Plateau, while supporting the rights of its Native peoples. As a founding member of the Four Forest Restoration Initiative (4FRI) collaborative, signatory to the 4FRI Charter, and long-time advocate for landscape-scale restoration of Arizona Forests, the Trust is pleased to present comments on the draft version of the second 4FRI Environmental Impact Statement (DEIS) for Rim Country. The Trust has been fully engaged in Rim Country planning, including comments prepared by the 4FRI stakeholder group (SHG). The Trust fully concurs with those comments (Appendix A) and incorporates them by reference. The comments that follow articulate additional concerns of importance to our organization and membership, and fall into the following categories:

- DEIS emphasis on ponderosa pine
- Consistency with Collaborative Forest Landscape Restoration Program requirements
- Management for old growth and protection of old and large trees
- Uncertainties posed by the Flexible Toolbox approaches
- Intensity of mechanical thinning
- Management of Dwarf Mistletoe to maintain "Forest Health"
- Uncertainties associated with the scale of future mechanical thinning and removal of woody biomass
- Collaborative engagement in implementation

DEIS EMPHASIS ON PONDEROSA PINE

The Rim Country project encompasses a broad array of ecosystems including multiple forest cover types, mixed woodlands, grasslands, riparian habitats, streams, and springs. However, at multiple places within the DEIS, the purpose of Rim Country is defined very narrowly, for example in the Summary (p. i):

> *"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****..."* [emphasis added]

The Trust understands and agrees with the pressing need to restore Ponderosa Pine forests that are outside their natural range of variability and pose significant risks to communities and resource values. However, other forest types, as well as aquatic and riparian systems in Rim Country are likewise departed from desired conditions. Restoration of these systems will yield important ecosystem service, recreational, and economic benefits. We note that much of the DEIS information on current conditions, desired conditions, treatment design, and effects of the alternatives is specific to ponderosa-pine or lumps several target forest cover types into a single entity. This coarse approach is of uncertain validity from scientific and practical perspectives.

Concern: language and content of the DEIS must reflect diversity of ecosystem types within the planning area and similarly diverse planned restoration activities.

Recommendations

1. Language in any subsequent NEPA document prepared as part of the Rim Country analysis should reflect the broader ecosystem restoration goals appropriate to the Rim Country planning area.

2. Current conditions, desired conditions, treatments designs, and effects of the Alternatives should be presented separately for each of the target cover types.

3. Any subsequent NEPA document prepared as part of the Rim Country analysis should be consistent when identifying the "target" cover types (the list varies throughout the document).

Concern: restoration of aquatic systems must be a high priority for implementation on Rim Country.

Recommendations

1. The Trust understands that the Arizona Game and Fish Department, Forest Service, Trout Unlimited, and US Fish and Wildlife Service have identified priority aquatic habitat restoration needs within the Rim Country footprint. This list of projects and references to supporting documentation should be included in any subsequent NEPA document prepared as part of the Rim Country analysis.

2. Any subsequent NEPA document prepared as part of the Rim Country analysis should provide site-specific coverage for identified priority projects, but maintain flexibility for unforeseen circumstances, e.g., restoration needed following flood events triggered by future fires.

CONSISTENCY WITH COLLABORATIVE FOREST LANDSCAPE RESTORATION PROGRAM REQUIREMENTS

4FRI is the largest and highest-profile CFLRP project currently underway, with a renewal application covering Rim Country currently under review by the Forest Service. The Trust is

concerned that recent Forest Service actions within the 4FRI footprint and the overall focus of Rim Country reflect a drift away from core elements of CFLRP (2009, and as amended 2018), specifically, incorporating the best available science, reestablishing natural fire regimes, maintaining old growth, retaining large trees, and focusing mechanical harvest on small-diameter trees.

Our concerns were brought to the fore by a 2018 timber sale on the Apache-Sitgreaves NF (Little Creek) which was done under separate NEPA, but counted toward 4FRI accomplishments under the original CFLRP award. Little Creek ostensibly included old and large tree protections developed in the first 4FRI EIS, but actually resulted in extensive and disproportionate harvest of old growth and large trees (Appendix B). While a presumably isolated incident, Little Creek established a clear need to ensure that ongoing and future mechanical thinning done under 4FRI NEPA be fully compliant with CFLRP. Subsequently, when a pre-release draft of the Rim Country DEIS was provided to 4FRI stakeholders, the Trust and other stakeholders were dismayed to see only passing mention of CFLRP and apparent disconnects with the aforementioned program requirements.

Concern: the Rim Country effort must be fully consistent with the spirit and intent of CFLRP.

Recommendations

1. The Trust understands and appreciates that CFLRP language requested by the SHG has been added to the DEIS and requests that it be carried forward into any subsequent NEPA document prepared as part of the Rim Country analysis.

2. The Large Tree Retention Plan (LTIP, DEIS Appendix D, p. 626) includes the following ecological objective for "Heavily-Stocked Stands (with High Basal Area) Generated by a Preponderance of Large, Young Trees":

   "Fire may be used with other methods to maintain forest structure over time."

   Any subsequent NEPA document prepared as part of the Rim Country analysis should include more appropriate language, as appeared in the corresponding section of the first 4FRI EIS:

   "*Fire is the principle regulator of forest structure over time.*"

3. See sections below for specific comments related to the best available science, maintaining old growth, retaining large trees, and focusing mechanical thinning on small-diameter trees.

MANAGEMENT FOR OLD GROWTH AND PROTECTION OF OLD AND LARGE TREES

Management for old growth and protection of old and large trees are core principles for the 4FRI collaborative (as articulated in the "Old Growth Protection and Large Tree Protection" document

(OGPLTRS, Appendix C), an explicit requirement of projects funded under CFLRP, and central to the broader social license for landscape-scale forest restoration that includes mechanical thinning. There are two components to this strategy -- one is protecting existing and developing old growth stands, the other retention of old and large trees that add ecological value in younger stands of the same forest cover type or in other cover types. The Trust's concerns on this issue were brought to the fore by the aforementioned Little Creek Timber Sale, which represented blatant Forest Service failure to meet either objective.

For the first 4FRI EIS, the Forest Service translated the old growth component of the OGPLTRS into the "Old Tree Implementation Plan" (OTIP), much of which was brought forward into the Rim Country DEIS (DEIS Appendix D, p. 617-618). The Trust has two concerns with the new OTIP -- it lacks needed specificity for tree species other than Ponderosa Pine, which are common across Rim Country, and omits important details for classifying old Ponderosa Pine trees that were included in the first EIS.

Given the paucity of old growth on the 4FRI footprint, proper management of developing old growth is a critical concern on Rim Country. These stands are commonly referred to as "Stands with a Preponderance of Large Young Trees" (SPLYT). It is important that these stands be located prior to implementation and receive treatments that retain or enhance conditions beneficial to canopy-dependent wildlife species and development of old-growth attributes. In the first 4FRI EIS, SPLYT stands were identified by a relatively ad-hoc approach using Forest Service stand data, and, if targeted for mechanical thinning, received the lowest intensity treatment in the assigned range. A more formal approach was applied on Rim Country, where the Trust and other stakeholders have invested considerable effort working with the Forest Service to develop a more robust and field-tested methodology for identifying SPLYT stands. That collaborative effort was ostensibly successful and communicated to the Forest Service in October 2017 (Appendix D). However, the Forest Service subsequently informed stakeholders that this approach was not viable for implementation, as it could not be used to verify stand conditions on the ground, as will occur before assigning mechanical treatment via the Flexible Toolbox. The Forest Service agreed to collaborate with stakeholders to develop a new method for identifying SPLYT stands, an effort that has yet to be completed. The Trust considers development this methodology a top priority. Given our significant concerns about the intensity of mechanical thinning (see below), we also feel that SPLYT stands should be treated more conservatively than specified in the first 4FRI EIS.

With respect to large tree retention, much of the Large Tree Implementation Plan (LTIP) from the first 4FRI EIS has been brought forward into the Rim Country DEIS. This approach is very ponderosa-pine centric and does not provide needed guidance for other tree species present on the Rim Country analysis area, such as Douglas-Fir, White Fir, Southwestern White Pine, Arizona Cypress, Pinyon Pine, Gambel Oak, Emory Oak, Arizona White Oak, Alligator Juniper, and others. Of even greater concern to the Trust are a number of small, but significant changes to the LTIP that deemphasize the role of fire in forest restoration, do not focus harvest on small diameter trees, and open the door for increased harvest of large trees.

Concern: old tree protection and large tree retention criteria must individually address Ponderosa Pine and other tree species present in target cover types on the analysis area.

Recommendation

1. The Forest Service should work collaboratively with stakeholders to develop species-specific old tree protection and large tree retention guidelines. These should be included in Old Tree and Large Tree Implementation Plans in any subsequent NEPA document prepared as part of the Rim Country analysis.

Concern: the Rim Country EIS must provide a clear and consistent perspective on the ecological value of old trees.

Recommendation

1. The OTIP (DEIS Appendix D, p. 617) includes the following statement:

   "*Removal 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****."* [emphasis added]

   Any subsequent NEPA document prepared as part of the Rim Country analysis should include a revised statement that does not imply that old trees cause habitat degradation and provides specific examples of circumstances where removal of old trees would be warranted.

2. The OTIP (DEIS Appendix D, p. 617) includes the following statement:

   "*This 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*."

   According to a Forest Service NEPA specialist (Katherine Sanchez-Meador, personal communication to stakeholder DEIS Working Group), this statement is beyond the scope of the Rim Country EIS. Any suggestion of future old tree harvest is counterproductive and will only serve to perpetuate distrust of the Forest Service. This statement should be removed from any subsequent NEPA document prepared as part of the Rim Country analysis.

Concern: old tree protections for Ponderosa Pine must be consistent with those in the first 4FRI EIS.

Recommendation

1. For Ponderosa Pine, the OTIP in any subsequent NEPA document prepared as part of the Rim Country analysis should fully incorporate old-tree criteria and descriptions included in

the first 4FRI EIS. Specifically, the age definition (DEIS Appendix D, p. 617) defines old tree age as: "*Established prior to 1870, predating Euro-American settlement*" should be replaced with: "*Approximately 150 years and older*." The illustration of old trees (Figure 94 in that section) should also be updated to include Age Class 3 trees (per Thompson 1940) that are classified as "old" in the accompanying text.

Concern: SPLYT stands must be identified to the fullest extent possible and then receive appropriately light treatments.

Recommendations

1. The Forest Service should work with stakeholders to develop, test and gain concurrence on new methodology to identify SPLYT stands. The selected methodology should be applied across the Rim Country planning area and the results presented in map and tabular format in any subsequent NEPA document prepared as part of the Rim Country analysis.

2. During implementation, the Forest Service should conduct consistent and repeatable pre-treatment field verifications to identify stands or portions of stands that meet SPLYT criteria.

3. If assigned for mechanical treatment, SPLYT stands (or portions thereof) should receive the lowest intensity thinning (rather than the low end of the a-priori assigned treatment range).

Concern: the LTIP must provide clear context and consistent guidance for retention of large trees.

1. The LTIP in any subsequent NEPA document prepared as part of the Rim Country analysis should include an introductory paragraph that explains the ecological and social values of large trees and the need to retain them across the Rim Country landscape.

2. The following statement appears in the DEIS LTIP (p. 619):

> *"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."*

This "opt out" clause is vague, creates unnecessary process, and leaves the door open to widely different implementations across Rim Country. This statement should be removed from any subsequent NEPA document prepared as part of the Rim Country analysis. Potential conflicts with Forest Plans should be resolved via plan amendments that accommodate LTIP requirements.

3. The LTIP Exception Category "Heavily-Stocked Stands (with High Basal Area) Generated by a Preponderance of Large, Young Trees" (DEIS Appendix D, p. 625-626) is contradictory with SPLYT, creating situations where different treatment outcomes could be assigned to the same acres. This Exception Category should be removed from the LTIP.

4. The following assumption appears in the "Modeling Assumptions" section of the DEIS Silviculture Report (np):

   > *"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 will follow the Old Tree Implementation Plan (OTIP) and* ***trees larger than 18" that do not meet the OTIP criteria may be cut during implementation****."* [emphasis added].

   The stated assumption does not comport with the Large Tree Implementation Plan (LTIP), which retains all trees >16" dbh, with exceptions for specific circumstances. This statement should be corrected in any subsequent NEPA document prepared as part of the Rim Country analysis, to reflect the LTIP sideboards, with modeling redone if/as needed.

Concern: the LTIP must provide clear and consistent guidance that focuses mechanical thinning on small-diameter trees.

<u>Recommendation</u>

1. The LTIP Exception Category for "Within Stand Openings" (DEIS Appendix D, p. 624-625) includes the following statement:

   > *"Suitable openings for successful natural regeneration in this project would range in size from 3/10 to 8/10 of an acre."*

   The statement should be revised in any subsequent NEPA document prepared as part of the Rim Country analysis and replaced with language from the first 4FRI EIS:

   > *"Suitable openings for successful natural regeneration in this project would range in size from 3/10 to 8/10 of an acre.* ***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****"* [emphasis added]

Concern: LTIP guidance must reflect the diverse edaphic conditions on Rim Country and expected responses to restoration treatments.

Recommendation

1. The LTIP Exception Category for "Within Stand Openings" (DEIS Appendix D, p. 624-625) includes the following statement:

   "Pre-settlement openings can be identified by the lack of stumps, stump holes, and other evidence of pre-settlement tree occupancy (Covington et al. 1997). Current openings include fine-scaled canopy gaps. It is not necessary to have desired within-stand openings and groups located in the same location that they were in before settlement (the site fidelity assumption). Trees might be retained in areas that were openings before settlement, and openings might be established in areas which had previously supported pre-settlement trees."

   Soil type is an important factor affecting forest structure and regeneration. The Rim Country planning area has limestone and sandstone-derived soils to which this exception may not apply. Any subsequent NEPA document prepared as part of the Rim Country analysis should note limitations to this exception and replace the above statement with language from the first 4FRI EIS:

   "Pre-settlement openings can be identified by the lack of stumps, stump holes, and other evidence of pre-settlement tree occupancy (Covington et al. 1997). ***These openings are most pronounced on sites with heavy textured (e.g., silt-clay loam) soils (Covington and Moore 1994).*** *Current openings include fine-scaled canopy gaps. It is not necessary to have desired within-stand openings and groups located in the same location that they were in before settlement (the site fidelity assumption). Trees might be retained in areas that were openings before settlement, and openings might be established in areas which had previously supported pre-settlement trees."* [emphasis added]

UNCERTAINTIES POSED BY THE FLEXIBLE TOOLBOX APPROACHES

The Flexible Toolbox Approaches (FTA) in Rim Country are examples of "Conditions-based Management", a new paradigm for Forest Service planning that has yet to be vetted through the scientific and resource management literature and that has created considerable concern within the conservation community. The proposed FTA approach for Rim Country - particularly the toolbox for mechanical treatments - is rife with uncertainties. As currently presented, it is complex, confusing, incomplete, and open to broad interpretation -- thereby creating significant potential for controversy, not to mention inconsistent application with the inevitable turnover of field personnel. While the Trust understands that data limitations (particularly with respect to stand exams) create circumstances where mechanical treatments must be modified to fit conditions on the ground, examples like the Little Creek Timber Sale create discomfort with the notion of providing additional flexibility when implementing Rim Country NEPA. Given these circumstances, full disclosure and robust sideboards are essential to ensure stakeholder support for the final Record of Decision (ROD).

The Forest Service has verbally communicated that each treatment type in the Mechanical Treatments FTA has a fixed acreage limit, however these limits are not clearly spelled out in the Implementation Plan (DEIS Appendix D). It is also unclear how those limits would be affected when acres initially assigned a higher intensity treatment receive a lower-intensity one, as well as what options would be available once the acreage allocated to a particular treatment type is expended.

Perhaps the greatest challenge posed by the FTA is effective allocation of treatments across target cover types, Forests/Districts, and over time. The Trust understands there are reporting processes in place that collect some of the needed data, but these are not standardized across Forests/Districts nor sufficiently integrated to meet this need. It is entirely conceivable that the acreage allocation for particular treatments could be expended well before work is completed across the planning area and those acres concentrated on small areas, leaving less-than-optimal treatments for the remainder. There is also potential for exceeding individual or cumulative impacts analyzed and described in the NEPA.

The two Flexible Toolboxes (Mechanical Treatments and Watershed and Aquatic) are presented as largely discrete decision processes, which may complicate prioritization of projects, decrease efficiency, and potentially compromise outcomes on the ground. For example, there may be situations where successful restoration of a stream reach will require application of a particular type and timing of mechanical treatment in the adjacent forest; however, the DEIS lacks a mechanism to address this.

Concern: the treatment assignment process for the Mechanical Treatments FTA must be clearly articulated and understandable to stakeholders, the public, and implementers.

Recommendations

1. The Implementation Plan in any subsequent NEPA document prepared as part of the Rim Country analysis should include more detailed explanations of the overall FTA approach and its three "modules" (habitat and cover filters, decision matrices, and decision modifiers). The narrative should describe when, how, and by whom the FTA will be used and clearly indicate how each "module" can (or cannot) change treatment type and intensity.

2. Graphics illustrating FTA decision flow (e.g., DEIS Figures 95-97) in any subsequent NEPA document prepared as part of the Rim Country analysis should encompass the entire decision process and range of potential outcomes.

3. In meetings with stakeholders, the Forest Service has indicated that treatment intensity can always be decreased at the implementer's discretion. This should be clearly stated in the Implementation Plan included in any subsequent NEPA document prepared as part of the Rim Country analysis.

Concern: the logic and science underlying the decision matrices for the Mechanical Treatments FTA must be clearly articulated.

Recommendation

1. The Implementation Plan in any subsequent NEPA document prepared as part of the Rim Country analysis should include complete text description of variables in the two decision matrices (SDI Max, Site Index, Dominant Diameter Class, etc.), explaining the rationale for inclusion and how their respective quantitative or qualitative decision points were derived. This should be accompanied by appropriate supporting citations from the scientific and professional literature.

Concern: the Mechanical Treatments FTA must distinguish between cover types and include clear sideboards for the various treatment types and intensities.

Recommendation

1. The Implementation Plan in any subsequent NEPA document prepared as part of the Rim Country analysis should include acreage allocations and operational elements of the Mechanical Treatments FTA that are specific to the target cover types.

Concern: the Mechanical Treatments FTA must have a robust framework for allocating and tracking treatments that ensures predictable, reliable, and repeatable implementation over the lifespan of the ROD.

Recommendations

1. With stakeholder input, the Forest Service should allocate needed resources to develop a viable treatment allocation and tracking framework, with appropriate coordination at Regional, Forest, and District levels. The 4FRI Planning Team could be well positioned to transition into a coordination role post-ROD.

2. This framework should be incorporated in any subsequent NEPA document prepared as part of the Rim Country analysis and: (a) effectively allocate treatments with fixed acreage limits across Forests and Districts; (b) ensure that treatment acreages do not exceed sideboards in the ROD; (c) ensure consistent interpretation of decision criteria and treatment application over the shelf-life of the Rim Country ROD; (d) allow tracking of accomplishments in near-real time, and (e) provide regular, timely updates to stakeholders and the public.

Concern: restoration efforts in aquatic systems and proximate uplands must be effectively integrated.

Recommendation

1. The Forest Service should work with stakeholders and key partners to develop an effective bridge between the two Flexible Toolboxes and include this in any subsequent NEPA document prepared as part of the Rim Country analysis.

INTENSITY OF MECHANICAL THINNING

Ponderosa Pine forests across Rim Country will receive extensive mechanical thinning, with the intention of returning these areas to their Natural Range of Variation (NRV). As stated in the Purpose and Need (DEIS, p. 21):

> *"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 to conditions within the natural range of variation, thus moving the project area toward the desired conditions..."*

The Trust understands and supports this fundamental notion, but along with other stakeholders, has expressed concerns about limitations in the available science that inform this element of the Rim Country effort. Current understanding of NRV hinges largely on studies of reference conditions (Silviculture Report, np), the majority of which were conducted outside the Rim Country area. Consequently, there are legitimate questions about the extent to which these NRV estimates, which in turn inform Desired Conditions and treatments intended to reach said conditions, can be extrapolated across Ponderosa Pine forests on Rim Country. A preliminary GIS analysis based on Forest Service Terrestrial Ecosystem Survey Units suggested that existing reference condition data apply to approximately 25% of the Rim Country area open to mechanical treatment (Appendix E).

The intensity of mechanical thinning was a significant and controversial issue in the first 4FRI EIS, one that has likewise clouded collaborative efforts on Rim Country. Early iterations of the Rim Country Proposed Action included proposals for extremely aggressive mechanical thinning treatments outside the WUI -- aka "Full Restoration," "Extended Duration Restoration," etc. These were developed independently by the Forest Service and added to the Proposed Action without stakeholder concurrence, which in itself created considerable consternation. The Trust and other stakeholders also expressed concern that excessively intense mechanical treatments would adversely impact habitat for canopy-dependent wildlife species, have negligible long-term efficacy in meeting desired conditions, and facilitate proliferation of undesirable ladder fuels.

The Trust understands that mechanical thinning is an integral component of forest restoration on Rim Country, but has concerns about treatment intensity, especially given the scale of the project. The total 4FRI footprint is approximately 2.4 million acres, of which approximately 1,880,000 acres (78%) would be cleared for mechanical treatment between the first EIS and Rim Country. These concerns are exacerbated by a lack of clarity in the DEIS about pre- and post-

treatment stand conditions as well as modeling results supporting the effects analysis. For example, Figure 28 in the Silviculture Report (np) indicates that the percent of acres **below** the desired condition for basal area **increases** over the 20-year modeled lifespan of the project. A similar pattern is evident for trees per acre (Silviculture Report, Figure 27). For Stand Density Index (Silviculture Report, Figure 29) a whopping 73% of stands would be **below** desired condition by 2039. Collectively, these modeling results imply that the Preferred Alternative actually trends **away** from desired conditions with outcomes that appear indicative of excessively intense mechanical thinning.

Concern: there are significant limitations and uncertainty in the available science that informs the expected Natural Range of Variation of Rim Country Forests, associated Desired Conditions, and treatment design for mechanical thinning.

Recommendation

1. Any subsequent NEPA document prepared as part of the Rim Country analysis should adopt a more conservative approach to mechanical thinning in Ponderosa Pine cover types, one that acknowledges uncertainty and better addresses desired conditions.

Concern: mechanical treatment designs and associated analyses of their effects must be clearly interpretable and supported by stakeholders.

Recommendations

1. Mechanical treatment designs and outcomes (including the effects analysis) should be expressed in terms of "openness" (the inverse of canopy cover) rather than "interspace" in any subsequent NEPA document prepared as part of the Rim Country analysis. These documents should also clearly explain how these and related metrics were calculated.

2. The Forest Service should develop crosswalks between openness and interspace, as needed for use by implementers on the ground.

3. The Forest Service should work with stakeholders to develop consensus on the application of mechanical treatments of varying intensity across target cover types on the Rim Country landscape. These sideboards should be included in any subsequent NEPA document prepared as part of the Rim Country analysis.

Concern: the Mechanical Treatments FTA contains treatment modifiers that increase the intensity of mechanical thinning, which have uncertain effects or are unjustified.

Recommendations

1. Post-treatment openness is significantly increased by the addition of "regeneration openings" -- which have no basis in restoration science for frequent-fire forests. The Forest Service should remove regeneration openings from all prescriptions in the target cover types from any subsequent NEPA document prepared as part of the Rim Country analysis.

2. The "Open Reference Condition" modifier presented in the DEIS has no scientific rationale, is open to broad interpretation, and is functionally impossible to implement on areas not previously mapped in the appropriate (mollic-intergrade) soil type. This modifier should be removed from any subsequent NEPA document prepared as part of the Rim Country analysis.

3. The contribution of WUI treatments to net openness across the Rim Country landscape is not clearly disclosed in the DEIS. The Forest Service needs to share this information with stakeholders and include in any subsequent NEPA document prepared as part of the Rim Country analysis.

MANAGEMENT OF DWARF MISTLETOE TO MAINTAIN "FOREST HEALTH"

Since the initiation of Rim Country planning, there have been ongoing conversations about management of Ponderosa Pine Dwarf Mistletoe, an endemic, natural disturbance agent, which the Forest Service continues to portray as a serious threat to forest health. The Trust understands that there are Ponderosa Pine stands with high levels of Dwarf Mistletoe; however data presented in the DEIS do not make a compelling case that infections across the Rim Country landscape are significantly outside the natural range of variability. For example, the Silviculture Report (np) states that "*75 percent of the area is not infected or has a low infection level, 22 percent has a moderate severity rating and 4 percent has a high severity rating..."* and that "*most of the analysis area meets the desired condition of having a low or no dwarf mistletoe severity*." The report (np) further indicates that under the No Action alternative, the area with "severe" infection would slightly more than double, to 9%.

Despite the low incidence of "severe" infection on Rim Country, the Forest Service has proposed a variety of aggressive treatment regimes to address this mistletoe "problem" -- including even-aged management (aka clearcutting) and extensive, high-intensity mechanical thinning (55-70% Interspace) outside the WUI. The notion of trying to remove or control Dwarf Mistletoe by aggressive mechanical harvest has been controversial and scientifically indefensible for decades, particularly when used to justify cutting of old growth (the aforementioned Little Creek Timber Sale on the Apache-Sitgreaves NF is a recent and egregious example in the 4FRI footprint).

While the even-aged and high-intensity treatments have been dropped from the Preferred Alternative, efforts to control mistletoe remain a focus of Rim Country. The DEIS presents a "one size fits all" approach that does not distinguish between the various Dwarf Mistletoes and host tree species other than Ponderosa Pine, and relies on highly subjective field assessments of mistletoe infection. The Trust consider this strategy wholly inappropriate for a project ostensibly focused on ecological restoration rather than sustained-yield timber production. We also note that the DEIS does not reference a number of pertinent references on Dwarf Mistletoe and that some of the information presented does not accurately reflect source materials.

These issues notwithstanding, the Preferred alternative also appears to have negligible effect on reducing infection of Ponderosa Pine by Dwarf Mistletoe. For example, per Figures 18 and 31 in the Silviculture Report (np), by 2039, the acreage with "none or low" mistletoe infection is the

same as under the No Action Alternative, while the area with "severe" infection **decreases** by a mere 1% -- an amount likely well within the margin of error for these model estimates.

Concern: the DEIS places unnecessary emphasis on Dwarf Mistletoe, while the Proposed Action does little, if anything to address a largely nonexistent problem.

Recommendations

1. Language in any subsequent NEPA document prepared as part of the Rim Country analysis should not identify control of Dwarf Mistletoe as a priority for restoration of Ponderosa Pine cover types.

2. Ponderosa Pine Dwarf Mistletoe should be managed by restoration-based mechanical thinning followed by regular application of prescribed or managed fire, as articulated in the April 4, 2017 letter from the 4FRI SHG to the Forest Service (Appendix F).

Concern: the Rim Country treatment design must be consistently and predictably applied across Forests/Districts and over time.

Recommendation

1. The Dwarf Mistletoe infection FTA decision variable should be removed from any subsequent NEPA document prepared as part of the Rim Country analysis.

Concern: management of Dwarf Mistletoes on Rim Country must reflect the best available science.

Recommendations

1. The management approach for Dwarf Mistletoes in any subsequent NEPA document prepared as part of the Rim Country analysis should reflect information in key references provided in 4FRI stakeholder comments (Appendix A). Cited information should accurately reflect content of the primary sources.

2. Any subsequent NEPA document prepared as part of the Rim Country analysis should clearly distinguish between the various species of Dwarf Mistletoes present on the analysis area, noting relevant differences in their ecology and implications for forest restoration and management.

3. The Implementation Plan in any subsequent NEPA document prepared as part of the Rim Country analysis should clearly identify deferral or "burn-only" as preferred options for Ponderosa Pine stands with "severe" levels of Dwarf Mistletoe.

Concern: Dwarf Mistletoe infection must not be used as an excuse to cut large trees.

Recommendation

1. Any subsequent NEPA document prepared as part of the Rim Country analysis should include LTIP language paralleling that in the OTIP, indicating that "*large trees will not be cut for forest health reasons.*"

UNCERTAINTIES ASSOCIATED WITH THE SCALE OF FUTURE MECHANICAL THINNING AND REMOVAL OF WOODY BIOMASS

Economics, industry capacity, and a host of other factors present significant challenges to mechanical thinning on the 4FRI footprint, a reality borne out by assessments of past performance. For example, a review of restoration projects done prior to 4FRI (as cited in the 2008 "Analysis of Small-diameter Wood Supply in Northern Arizona") indicated that approximately 63% of the area cleared by 25 Environmental Assessments actually received planned mechanical thinning. To date, Forest Service contracts for mechanical thinning on the first 4FRI EIS area have treated only a tiny fraction of the allocated acreage, far below the foundational goal of 50,000 acres/year, due to non-performance by the selected contractors. A second Request for Proposals (RFP) for Stewardship Contracting on 4FRI is currently on the street, with potential award expected in 2020. This is a critical step to increase industry capacity, particularly on the western portion of the 4FRI footprint. However, the outcome of that solicitation process is uncertain, as is development of additional capacity needed to handle the large volumes of woody biomass produced by mechanical thinning at landscape scale. Collectively, these circumstances suggest that only a portion of the acres cleared under the completed and planned 4FRI NEPA may actually receive mechanical treatment. The Trust feels it is essential that the Rim Country NEPA provide sufficient flexibility to address these contingencies.

While not expressly framed around industry capacity, Alternative 3 in the Rim Country DEIS would focus mechanical thinning on areas that are most highly departed from NRV. However, this alternative would also dramatically decrease the acreage allocation for prescribed fire, and perhaps most importantly, does not include a spatially-explicit framework for treatment allocation. Such a framework was proposed in the Strategic Treatments for Fire Use (STFU) Alternative submitted by the Center for Biological Diversity, which was considered but eliminated from detailed study (DEIS, p. 57).

With respect to biomass removal, there is an apparent disconnect between the DEIS and the RFP. Specifically, one of the modeling assumptions for the DEIS effects analysis (DEIS, p. 142) is:

> *"All 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****."* [emphasis added]

However, the slash removal/on-site disposal requirements in the RFP (Executive Summary, p. 13-14) 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."*

At best, this remnant slash material represents additional post-treatment work and cost that must be borne by the Forest Service. At worst there is potential for outcomes on the ground to be beyond the scope of the effects analysis and the final NEPA decision.

Concern: the Rim Country EIS must accommodate variable industry capacity for mechanical thinning and biomass removal, while maximizing community protection and restoration accomplishments on the ground.

Recommendations

1. Any subsequent NEPA documents prepared as part of the Rim Country analysis should expressly cover the use of prescribed or managed fire as an alternate "first-entry" on acres that are initially targeted for mechanical thinning. These documents should also facilitate or include a spatially-explicit decision framework for allocating mechanical treatments and prescribed/managed fire across the analysis area, as proposed in the STFU Alternative.

2. The effects analysis and implementation plans in any subsequent NEPA document prepared as part of the Rim Country analysis should reflect varying levels of potential biomass removal.

COLLABORATIVE ENGAGEMENT IN IMPLEMENTATION

As a CFLRP project, the Forest Service is mandated to facilitate stakeholder engagement in all phases of 4FRI. The 4FRI stakeholder group has a formal Multi-Party Monitoring Board (MPMB). However, unlike on other CFLRP projects, the MPMB is largely focused on long-term data collection to assess ecosystem responses (effectiveness) rather than implementation. Our experience on the first 4FRI EIS area has shown that the existing social license is fragile and contingent upon adherence to key collaborative agreements, such as those providing protection for old growth and retention of large trees. The Rim Country project brings new and similarly fraught elements into the decision space, including prioritizing treatment types and locations under uncertain capacity for mechanical thinning, and the numerous complexities associated with the Flexible Toolboxes. Rim Country also brings opportunities for stakeholders to engage with Forests/Districts and local communities who have been largely removed from 4FRI efforts to date. There is also a pressing need to incorporate real-time learning into the adaptive management process. Given these circumstances, the Trust feels that stakeholder engagement in implementation will be critical to success of the Rim Country project and 4FRI as a whole. Our preliminary discussions with the Forest Service and other stakeholders indicate strong support for this concept.

Concern: a framework is needed to facilitate collaborative engagement during Rim Country implementation.

Recommendations

1. The Forest Service should work with stakeholders to develop a formal framework for collaborative engagement and adaptive management decision-making during Rim Country implementation. A recent, informative example is attached in Appendix G (Spruce Beetle Epidemic-Aspen Decline EIS, Grand Mesa, Uncompahgre, and Gunnison National Forest).

2. The framework should be memorialized in any subsequent NEPA document prepared as part of the Rim Country analysis, in a manner that is binding and ensures follow through by the Forest Service.

3. The Forest Service should work with stakeholders to develop additional mechanisms for collaborative engagement and decision-making during implementation, including, but not limited to, revision of the 4FRI MOU.

In closing, the Trust has greatly appreciated the opportunity to provide a leadership role in 4FRI and present comments on the Rim Country DEIS. We look forward to continued collaboration that yields a robust ROD and ultimately, successful restoration of our Arizona forests.

Sincerely,

S Rosenstock

Steve Rosenstock
Restoration and Stewardship Liaison

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APPENDIX A

4FRI STAKEHOLDER COMMENTS

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TO: 4FRI Executive Board and Planning Team

DATE: January 16, 2020

RE: Stakeholder Comments: 4FRI Rim Country Draft Environmental Impact Statement

The Four Forest Restoration Initiative (4FRI) is a collaborative, landscape-scale restoration project intended to restore lands across portions of four National Forests (Apache-Sitgreaves, Coconino, Kaibab, and Tonto). The collaborative component of 4FRI is managed by a Stakeholder Group (SHG), which was formally chartered in 2010 and has been heavily engaged in the initiative since its inception. Per that Charter, the mission of 4FRI is to: *(1) integrate comprehensive restoration, fire management, and community protection planning at the landscape scale; (2) strategically prioritize and place restoration treatments; (3) safely re-establish natural fire regimes at the landscape scale; (4) identify and implement sustainable cost offset opportunities through wood and biomass utilization; (5) employ monitoring and adaptive management supported by the best available science; (6) build public support for accomplishing restoration and community protection through public education; and, (7) support land use policies that enable landscape-scale restoration while meeting the ecological goals of the 4FRI.*

The SHG collaborative has broad representation from state and local government, utilities, non-governmental organizations, private industry, academic institutions, and private citizens. Working relationships between the SHG and Forest Service were formalized in a Memorandum of Understanding (dated March 8, 2011), which stipulated that the 4FRI Collaborative shall be fully engaged in all phases of the NEPA process, including efforts to:

> *A. Develop agreement-based recommendations that are intended to inform and build agreement on: the purpose and needs statement, alternatives, collection and use of data, impact analysis, development of a preferred alternative, and/or recommendations regarding mitigation of environmental impacts;*
>
> *B. Provide input to the U.S. Forest Service in a timely manner that matches the needs of an efficient NEPA and implementation timeline;*

Pursuant to the MOU, the SHG is pleased to provide comments on the Draft Environmental Impact Statement for Rim Country (RC DEIS). Please note that individual stakeholders will also be providing separate comments as they see fit.

STAKEHOLDER REVIEW PROCESS

4FRI stakeholders worked closely with the Rim Country Planning Team through most of the EIS process. Much of the initial work was undertaken by the Planning Work Group, which was chartered in 2015 then put on hiatus in mid-2018. In December 2018, the SHG chartered a new DEIS Work Group (DEIS WG), tasked to continue collaboration with the Forest Service in developing the DEIS, review the draft document, and prepare comments on behalf of the full SHG. Between January and November 2019, the DEIS WG (Appendix I) held numerous meetings with the 4FRI Planning Team and Executive Board while also soliciting input from the 4FRI Multiparty Monitoring Board and other stakeholders. The 4FRI DEIS Working Group acknowledges and thanks the Forest Service for this collaborative effort to provide clarity on the DEIS and listen to SHG concerns. We thank the Forest Service Executive Board for the incorporation of key changes that, while delaying the release of the DEIS, provided increased trust for these collaborative efforts.

These efforts were distilled into draft comments that were provided to the full SHG for review and consideration. Following a final revision, these comments were approved by full consensus with no reservations, by the SHG on January 8, 2020. There is concurrence between stakeholders and the Forest Service on many aspects of the RC DEIS. In the interest of streamlining the Forest Service's content analysis, we have focused our comments on elements of the RC DEIS requiring additional information, analysis, or clarity. We also recommend modifications of treatment designs in order to reflect the best available science and maintain the social license developed through the 1st 4FRI EIS process. Per our discussions and verbal agreement with the 4FRI Planning Team, we anticipate continued collaborative work on a number of these issues, which will occur concurrently as the Forest Service completes the Rim Country EIS.

Our comments fall into eight major categories: (1) Flexible Toolboxes (aka Condition-based Management), (2) the degree of openness pre- and post-treatment, (3) old-growth protection and large tree retention, (4) management of dwarf mistletoe, (5) description of pre-treatment conditions, (6) role of the collaborative in implementation, (7) adaptive management and monitoring, and (8) issues previously discussed with the Forest Service and resolved in the published DEIS.

KEY ISSUE 1: FLEXIBLE TOOLBOXES

The RC DEIS encompasses a vast planning area of considerable biological complexity, for which existing data can be limited and sometimes inaccurate—stand exams being a prime example. The SHG understands this creates a need for flexibility during implementation, in order to ensure that a particular unit of the landscape receives the appropriate restoration treatment. To address this need, the RC DEIS includes a Flexible Toolbox Approach with two Flexible Toolboxes—one for mechanical treatments in terrestrial uplands and one for work done to restore watersheds and aquatic systems. Both are examples of "Conditions-based

Management," an emerging paradigm for Forest Service projects across the western US. The SHG understands the intent of Flexible Toolboxes on Rim Country, but has numerous outstanding questions and concerns about the Flexible Toolbox Approach presented in the DEIS. At this point, we are not in a position to present a consensus statement on this approach. We also note 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. Under these circumstances, the SHG feels that the Forest Service must proceed cautiously, articulating the RC DEIS Flexible Toolboxes as clearly as possible, with inclusion of appropriate sideboards to maintain stakeholder support.

Concerns and Recommendations Applicable to Both Flexible Toolboxes

1. CONCERN: Restoration efforts in aquatic systems and terrestrial uplands (through the two Flexible Toolboxes) should be effectively integrated. The RC DEIS treats the two Flexible Toolboxes as discrete entities and decision processes, which may complicate prioritization/implementation of projects, decrease efficiency, and potentially compromise outcomes on the ground. For example, there are situations where needed or planned restoration of an aquatic system will influence treatment selection in the adjacent uplands and vice versa; however, the RC DEIS lacks a mechanism to address this.

   RECOMMENDATION: the SHG recommends that the Forest Service work with stakeholders to develop an effective bridge between aquatic and terrestrial restoration efforts and their respective Flexible Toolboxes, and include this in the Final EIS.

2. CONCERN: The RC DEIS lacks a robust framework for allocating and tracking treatment application temporally and spatially. The overarching concern is that flexibility provided by the Flexible Toolboxes could inadvertently result in an overall action with individual and/or cumulative effects that are different or in excess of those analyzed and disclosed in the EIS. The SHG is also concerned that treatments be applied across the four-forest footprint in a manner that is predictable, reliable, and repeatable over the lifespan of the EIS. These concerns are most critical for the Mechanical Treatments Flexible Toolbox, but apply to the Watershed and Aquatics Flexible Toolbox as well. Assuming that the Flexible Toolbox cannot result in more acres than analyzed in the NEPA decision for each type or intensity of treatments, the Mechanical Treatments Toolbox poses particular challenges for implementation—one can envision scenarios under which the acreage limit for a particular thinning treatment is reached well before work is completed across the planning area or where the acreage allocated to that treatment is concentrated on a relatively small area. The SHG understands that the Forest Service has processes and reporting in place that collect some of the data needed to track implementation, but these are not standardized across Forests/Districts nor integrated in a manner that can support all four forests.

RECOMMENDATION: The SHG recommends that the Forest Service allocate sufficient resources to develop an appropriate tracking system, with coordination at the Region, Forest, and District levels. We request that this tracking system be incorporated in the Final EIS (FEIS) Implementation Plan and: (a) effectively allocate treatments with fixed acreage limits across Forests and Districts; (b) ensure that treatment acreages do not exceed sideboards in the ROD; (c) ensure consistent interpretation of decision criteria and treatment application over shelf-life of the Rim Country ROD with a mind toward the inevitable staff turnover; (d) allow tracking of accomplishments in near-real time, and last but not least (e) provide regular, timely updates to the SHG and interested members of the public. Accurate tracking of what treatments are actually implemented will be critical to the validity of the monitoring and adaptive management framework, and will ensure compliance with the ROD.

Concerns and Recommendations Applicable to the Mechanical Treatments (Terrestrial) Flexible Toolbox

1. CONCERN: The treatments' decision process should be clearly interpretable and understandable to stakeholders, the public, and implementers. As presented in the RC DEIS, the SHG finds the Flexible Toolbox framework for Mechanical Treatments complex and extremely confusing, thereby potentially leading to inconsistent and unpredictable treatment decisions. We also note that the text narrative (RC DEIS Appendix D, Section F) is sparse on details and does not directly correspond to the decision process illustrated in the graphics and decision matrices. Most importantly, we are concerned that this process appears open to interpretation and may not provide an adequate road map for repeatable application over the expected implementation time period of this EIS.

   RECOMMENDATION: To address these shortcomings, the SHG recommends that the FEIS include a reliable implementation process that includes more complete explanations of the overall approach, filters, and decision criteria. If included, graphic illustrations of the Flexible Toolbox decision flow should be complete and correspond 1:1 with the narrative description presented in the text.

2. CONCERN: The logic framework and science underlying the decision parameters and their quantitative thresholds in the Decision Matrices (DEIS Appendix D, Section F) are not clearly articulated. The Forest Service provided a verbal explanation to the DEIS WG on October 7, 2019.

   RECOMMENDATION: The SHG recommends that this information be added to the FEIS along with appropriate citations from the scientific and professional literature.

3. CONCERN: There is uncertainty whether or not acreages for each treatment type represent fixed ceilings. In meetings with the DEIS WG, the Forest Service has indicated that the

acreage allotted to a particular treatment can be decreased, but cannot be increased, as the EIS Effects Analysis is bounded by the upper amount. This suggests a "trade-off" process is relied upon for the implementation of the Flexible Toolbox; any such process needs to be captured more fully in the FEIS. The SHG is most concerned about higher-intensity mechanical treatments; however, the RC DEIS does not provide sufficient information for us to comment on the net acreage assigned to them (see Key Issue #2, below).

RECOMMENDATION: The SHG recommends that operational elements of the Mechanical Treatments Flexible Toolbox be clearly explained in the FEIS and that the Forest Service work with stakeholders to develop collaboratively supported treatment acreage allocations for inclusion in the ROD.

4. CONCERN: There is insufficient clarity on the criteria used to determine changes in treatment intensity, i.e., the degree to which intensity can increase or decrease on a particular area (the former being of greatest concern to stakeholders) and specific circumstances under which such adjustments can occur. This element of the Flexible Toolbox is likewise complex and not easily understood, even for those well-versed in forest management practices. The potential for confusion among the public (and Forest Service implementers at District level) is huge, as is the negative response that could occur. In discussions with the DEIS WG, the Forest Service has explained the difference between "hard" Habitat and Forest Cover Filters and "soft" Decision Modifiers included in the Flexible Toolbox. The SHG understands that "hard" Filters can change treatment type, but "soft" Modifiers only allow changes in treatment intensity. We also understand that the assigned treatment intensity can only increase when ground conditions do not match those described in the stand data, but treatment intensity can always be decreased at the implementer's discretion.

   RECOMMENDATION: The SHG recommends that these operational elements of the Flexible Toolbox be described in greater detail in the FEIS/Implementation Plan, along with specific examples of circumstances under which treatment intensity could be adjusted up or down. These could include, but not be limited to: an area found to have different site index than indicated in the stand data, triggering a more intense treatment, or development of new residential areas or infrastructure resulting in an expansion of the WUI, that would likewise receive more intense treatment.

Concerns and Recommendations Applicable to the Watershed and Aquatic Flexible Toolbox

1. CONCERN: There is an understanding that aquatic ecosystems are integrally linked to upland forest conditions and that restoration treatments in the uplands will improve both aquatic and watershed health; however, there is concern that restoration specifically focused on aquatic systems may take a back seat to work done in the uplands. The SHG

understand the pressing need to restore forest ecosystems that are outside the natural range of variability and pose significant risks to communities and resource values. However, restoration of degraded aquatic systems is an equally high priority to 4FRI stakeholders. Over the course of RC DEIS preparation, the Arizona Game and Fish Department, Forest Service, Trout Unlimited, and US Fish and Wildlife Service have worked collaboratively to identify and prioritize aquatic habitat restoration needs within the Rim Country footprint. These recommendations reflect known site-specific conditions as well as long term restoration goals identified in Arizona Game and Fish Department watershed management plans applicable to the planning area. An example plan for the Verde River Watershed can be found at http://arcgis.azgfdportal.com/verdewatershed.

RECOMMENDATION: The SHG recommends that this list of prioritized restoration projects (Appendix II) be included in the FEIS.

2. CONCERN: The RC EIS and ROD should provide site-specific coverage for priority projects. The SHG understands that environmental review is an expensive, time-consuming process and that Forest Service capacity for NEPA is increasingly constrained. Efforts like the Rim Country EIS should preclude or minimize the need for additional NEPA before initiating a project.

   RECOMMENDATION: The SHG recommends that the FEIS provide site-specific coverage for priority restoration projects listed in Appendix II. The Rim Country final decision should be sufficiently clear so as to prevent the need for, and confusion about, additional NEPA on these projects. Additionally, we consider it important that the Forest Service maintain flexibility to conduct additional restoration work in any other aquatic system within the Rim Country footprint that is not listed in Appendix II, which may be needed after the ROD is signed (e.g., following damage to aquatic systems from post-wildfire floods).

3. CONCERN: As a CFLRP project, stakeholder engagement is required throughout the planning and implementation of projects associated with the RC DEIS.

   RECOMMENDATION: The SHG recommends establishing a formal coordination process between the Forest Service and stakeholders that occurs when planning watershed/aquatic restoration projects. Early engagement with stakeholders will facilitate accomplishment of priority projects, help leverage additional funds, and facilitate sharing of resources and site-specific information.

KEY ISSUE 2: DEGREE OF OPENNESS PRE- AND POST-TREATMENT

The degree of forest stand openness following mechanical thinning is a significant concern among stakeholders, which is exacerbated by the ill-defined “interspace” concept used in the RC DEIS.

Concerns and Recommendations

1. CONCERN: "Interspace" is a spatial concept that does not directly translate into quantitative metrics of forest structure readily understood by stakeholders and the public. This creates considerable uncertainty about conditions following mechanical thinning, which may or may not comport with stakeholder expectations. For example, on field trips to the Chimney Springs Task Order (1st EIS, Coconino NF), stakeholders saw considerably different openness on areas thinned to the same level of interspace. We also saw areas thinned to different levels of interspace that were visually indistinguishable. To address this uncertainty, stakeholders have previously requested that pre- and post-treatment conditions (and the treatments themselves) be described in terms of "canopy cover and openness," removing "groups," "interspaces" and other confusing or redundant terms. Until these canopy cover/openness data are in hand, the SHG cannot comment on treatment designs that are potentially controversial, but we want to register our concern with these.

   RECOMMENDATION: The Forest Service has verbally agreed to develop canopy cover/openness metrics for inclusion in the FEIS, as part of the ongoing collaborative efforts with the stakeholder DEIS Work Group. This work is recommended to incorporate learning from implementation on the 1st EIS area as well as available literature on the natural range of variability for canopy cover, openness, aggregation, and other relevant metrics (literature bibliography attached as Appendix III). If interspace is used in implementation, the FEIS should provide a clearly understood and repeatable method for estimating interspace as well as a crosswalk with canopy cover/openness and other relevant stand descriptors (e.g., basal area, trees per acre).

2. CONCERN: RC DEIS prescriptions include "regeneration openings," which the SHG considers scientifically unjustified and a potential impediment to meeting restoration objectives. The SHG asserts that regeneration openings are inconsistent with current science for frequent-fire forests as well as fundamental principles of forest restoration—which emphasize the role of natural processes rather than sustained yield from a regulated forest. There is also concern that on some sites, too-intense mechanical thinning will facilitate excess regeneration and undesirable proliferation of ladder fuels.

   RECOMMENDATION: The SHG recommends that the Forest Service remove regeneration openings from treatment designs in the RC DEIS.

3. CONCERN: There is uncertainty about the "Open Reference Condition" modifier included in the Mechanical Treatments Flexible Toolbox. In meetings with the DEIS WG, the Forest Service has explained the process for using this modifier, which we understand applies solely to mollic-intergrade soils where savannah treatments are not proposed. However, the RC DEIS presents minimal information on this treatment, consisting of a brief footnote in the Mechanical Treatments Flexible Toolbox (RC DEIS Appendix D) and definition in the Glossary (RC DEIS Appendix F). We are also concerned that the proposed approach appears subjective and open to various interpretations by implementers. For example, how would

suspected mollic-intergrade soils be identified on areas where not previously mapped? Would field personnel be required to conduct standardized soil assessments (e.g., dig soil pits)? This modifier is further complicated by issues of scale, as it can be applied to "portions of a stand."

RECOMMENDATION: The SHG recommends that the Forest Service provide a clear rationale for this modifier, including supporting science. The FEIS and Implementation Plan should also specify the process for identifying unmapped units of mollic-intergrade soils and the minimum size unit to which the modifier can apply.

4. CONCERN: There is uncertainty about the extent and location of WUI treatments and how they influence net openness across the landscape post-treatment. The SHG worked with the Forest Service to develop a WUI definition for use in Rim Country. We understand that these areas will receive the most intense mechanical thinning treatment. In discussions with the Planning Team, the DEIS WG requested a summary of WUI treatment acreages by cover type and maps showing the spatial location of these treatments, also by cover type. Some, but not all of this information is currently included in the online visualization tool.

   RECOMMENDATION: The SHG recommends that the online tool and FEIS present complete information on the extent and location of WUI treatments and how they influence post-treatment conditions.

KEY ISSUE 3: OLD GROWTH PROTECTION AND LARGE TREE RETENTION

Since the inception of 4FRI, stakeholders have consistently asserted that cutting old growth is contrary to fundamental principles of forest restoration and unacceptable. Protecting existing old-growth and retaining large trees that represent the next cohort of old growth are central to the social license developed for landscape-scale restoration that includes mechanical thinning. The Collaborative Forest Landscape Restoration Program (CFLRP), which funded work done under the 1st EIS, and for which a renewal proposal has been submitted (to include implementation on Rim Country), is likewise very clear about the need to conserve old/mature forest structure. During preparation of the 1st EIS, 4FRI stakeholders invested enormous effort developing a consensus "Old Growth Protection and Large Tree Retention Strategy" (OGPLTRS, see Project Record), which the Forest Service then translated into "Old Tree" and "Large Tree" Implementation Plans included in the FEIS. Our expectation has been that the substance and intent of this foundational stakeholder work will be brought forward into the RC DEIS.

Concerns and Recommendations

1. CONCERN: At a minimum, the Rim Country EIS should incorporate old tree protections included in the 1st EIS. The SHG notes that Age Class 3 trees (per Thompson 1940) have been included in the Old Tree Implementation Plan (OTIP, RC DEIS Appendix D) per our previous request. However, those age classes are missing from the accompanying illustration (Figure 94).

RECOMMENDATION: The SHG recommends that the figure be updated to match the text.

2. CONCERN: There is uncertainty in some of the language regarding old tree protection. The OTIP (RC DEIS Appendix D, p. 617) indicates that "*Removal 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*." The latter portion of this statement could be interpreted as "habitat degradation" caused by old trees.

   RECOMMENDATION: The SHG does not believe this is the Forest Service's intent and recommends that the statement be clarified and include examples of habitat degradation situations requiring old tree removal.

3. CONCERN: The RC DEIS contains at least one statement inconsistent with the stakeholder old tree–large tree document and LTIPs included in the 1st EIS and RC DEIS. The "Modeling Assumptions" section of the Draft Silviculture Report (no pagination), states:

   > *"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 will follow the Old Tree Implementation Plan (OTIP) and* ***trees larger than 18" that do not meet the OTIP criteria may be cut during implementation****."* [emphasis added].

   RECOMMENDATION: This statement should be revised to be consistent with OGPLTRS/OTIP/LTIP and specify how ponderosa pine and other conifer species will be treated.

4. CONCERN: The old tree age criterion included in the 1st 4FRI EIS has not been incorporated in the RC DEIS. Section D (p. 617) of the RC DEIS defines old tree age as: "*Established prior to 1870, predating Euro-American settlement*."

   RECOMMENDATION: The SHG recommends that the Forest Service replace this statement with this language from the 1st EIS: "*Approximately 150 years and older*."

5. CONCERN: The RC DEIS contains unnecessary language concerning application of the OTIP to subsequent NEPA decisions.

   From the OTIP (RC DEIS Appendix D, p. 617):

   > "*This 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*."

This statement is beyond the scope of the RC DEIS EIS and inconsistent with NEPA guidance provided by the Forest Service (personal communication to DEIS WG from Katherine Sanchez-Meador).

RECOMMENDATION: Given the sensitivities surrounding harvest of old growth, the SHG recommends that this statement be removed.

6. CONCERN: The RC DEIS should expressly prohibit harvest of old and large young ponderosa pine trees to "mitigate" dwarf mistletoe infection. This issue was brought to the forefront by a recent timber sale in the 4FRI CFLRP footprint (Little Creek TS, Apache-Sitgreaves NF), where extensive harvest of old and large ponderosa pine trees occurred, ostensibly to address forest health issues from dwarf mistletoe infection. As communicated in the April 27, 2017 letter to Forest Supervisor Best (see Project Record), the SHG considers such practices inconsistent with the best available science, 4FRI stakeholder expectations, and the social license that has taken more than a decade to develop. We note and appreciate that the RC DEIS Implementation Plan (Section D, p. 617) states that "*old trees would not be cut for forest health reasons.*"

   RECOMMENDATION: The SHG recommends that this language be carried forward into the FEIS.

KEY ISSUE 4: MANAGEMENT OF PONDEROSA PINE DWARF MISTLETOE

Over the past two years, the 4FRI Planning Team and SHG have had ongoing conversations about management of dwarf mistletoe, particularly in ponderosa pine, which the Forest Service has articulated as representing a significant threat to forest health on the RC DEIS footprint. The 4FRI Planning Team had originally proposed extremely aggressive "mitigation" treatments, including even-aged management, on a large portion of the RC DEIS planning area having estimated high levels of dwarf mistletoe. Following several meetings and field trips, the SHG submitted a letter to the Forest Service (dated April 4, 2017), which stated that the Forest Service had not presented a compelling case that dwarf mistletoe infections in ponderosa pine on the planning area were significantly outside the natural range of variability and presented a meaningful obstacle to restoration. We asserted that restoration treatments followed by prescribed fire at regular intervals should be sufficient to meet objectives. The mistletoe management approach in the RC DEIS has been refined somewhat; however, it remains a core element of the Mechanical Treatment Flexible Toolbox. The SHG feels that this emphasis is misplaced and inappropriate for a project ostensibly focused on ecological restoration rather than sustained-yield timber production. We also note that the RC DEIS does not clearly distinguish between dwarf mistletoe infections and associated treatments in ponderosa pine and mistletoes that occur in other conifer tree species.

Concerns and Recommendations

1. CONCERN: Dwarf mistletoe is a high-level decision variable in the Mechanical Treatments Flexible Toolbox. This creates a perception that managing this endemic, natural disturbance agent is a restoration priority—an approach that is at odds with the best available science and stakeholder perspectives. Consistent application of this element of the Flexible Toolbox is unlikely, given the apparent subjectivity of rating stand-level mistletoe infection. For example, during collaborative field trips held by the SHG and Forest Service, it was evident that perceptions of what constitutes a "severe" infection vary considerably across Forests/Districts.

   RECOMMENDATION: The SHG recommends that the Forest Service remove dwarf mistletoe as a decision variable in the Mechanical Treatments Flexible Toolbox.

2. CONCERN: The RC DEIS should incorporate the best available science applicable to management of ponderosa pine dwarf mistletoe. The RC DEIS cites some, but not all of the current science relevant to this issue.

   RECOMMENDATION: A list of pertinent references is provided in Appendix III. The SHG recommends that this information be incorporated into the FEIS, with a clear explanation of the scientific basis for the proposed treatment approach.

3. CONCERN: The initially proposed 55–70% Interspace dwarf mistletoe treatments are not supported by the best available science and contrary to SHG perspectives. Following a request from the SHG, the 4FRI Executive Board agreed to remove these treatments from the RC DEIS (letter to SHG dated September 12, 2019, see Project Record).

   RECOMMENDATION: The SHG appreciates this modification and recommends it be carried forward into the FEIS and ROD.

4. CONCERN: The DEIS does not differentiate between ponderosa pine dwarf mistletoe and other mistletoes. In discussions with the 4FRI Planning Team, the SHG has emphasized that ponderosa pine dwarf mistletoe is but one member of that group of parasitic plants present on the RC DEIS planning area, each of which can have differing effects on host trees and cannot be treated alike from a management perspective.

   RECOMMENDATION: The SHG recommends that the Forest Service clarify differences between the ecology and management of mistletoes in the FEIS.

5. CONCERN: The Mechanical Treatment Flexible Toolbox includes mechanical treatment of ponderosa pine stands with "severe" dwarf mistletoe infection. This approach is not supported by the best available science and contrary to stakeholder expectations. The SHG has previously recommended that such stands be deferred from mechanical treatment or

designated as “burn only.” In discussions with the 4FRI Planning Team, the Forest Service has indicated that both options are covered under the RC DEIS, though not explicitly stated.

RECOMMENDATION: The SHG recommends that the FEIS/Implementation Plan clearly identify deferral or burn only as preferred options for ponderosa pine stands with “severe” levels of dwarf mistletoe.

KEY ISSUE 5: DESCRIPTION OF PRE-TREATMENT CONDITIONS

In comparison to the 1st EIS area, which was predominately ponderosa pine, the Rim Country planning area has a number of other forest cover types targeted for treatment, including mixed-conifer/frequent fire, mixed-conifer with aspen, and ponderosa pine-evergreen oak. The SHG understands the complexity this adds to the RC DEIS and has recommended that the document more fully address diversity of the planning area.

Concerns and Recommendations

1. CONCERN: The RC DEIS should be more specific with respect to existing conditions and treatment allocation for target cover types present on the planning area. Stakeholders have emphasized this need in previous discussions with the 4FRI Planning Team, requesting a tabular summary and spatial representation of treatment allocation across cover types. Some of the spatial information is now available in an online visualization tool, which we appreciate.

   RECOMMENDATION: The SHG recommends that the online tool be completed and a tabular summary made available to stakeholders and then included in the FEIS.

2. CONCERN: The RC DEIS should include spatial representation of WUIs in the planning area, overlaid by cover type and proposed treatments. The SHG had previously requested that this information be added to the online visualization tool. We appreciate the Forest Service’s attention to this request, but note that only some of this information is currently presented.

   RECOMMENDATION: The SHG recommends that the complete information be made available online, with a tabular summary made available to stakeholders and then included in the FEIS.

3. CONCERN: Protection of stands with a preponderance of large, young trees (SPLYT). Conservation of these stands is a high priority to stakeholders and a critical component of collaborative agreement. At the outset of the RC 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 RC DEIS (Section D, p. 638). 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: The SHG recommends 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.

KEY ISSUE 6: COLLABORATIVE ROLE IN IMPLEMENTATION

As a CFLRP project, the Forest Service is mandated to facilitate stakeholder engagement in all phases of 4FRI, from planning through implementation. However, since completion of the 1st 4FRI EIS, stakeholders have had limited engagement in implementation of restoration projects. The SHG has a formal Multi-Party Monitoring Board (MPMB); however, that group is largely focused on long-term data collection to assess ecosystem responses to restoration treatments (effects monitoring). In discussions with the 4FRI Planning Team, we have acknowledged mutual interest in formal collaboration during implementation, in order to facilitate shared learning about treatment outcomes, assist the Forest Service with outreach to field personnel, and inform adaptive management.

Concerns and Recommendations

1. CONCERN: There is uncertainty about the degree to which treatment outcomes will comport with CFLRP requirements and stakeholder expectations. As articulated in these comments, the SHG is concerned with various aspects of implementation on Rim Country—e.g., retention of old and large trees, management of dwarf mistletoe in ponderosa pine, conservation of SPLYT stands, and application of the Flexible Toolboxes. Our expectation is that these actions will reflect stakeholder expectations and occur in a manner that is predictable, reliable, and repeatable. The SHG feels this need is best addressed by more effective coordination among Forest Service staff on the Planning Team and at Forest/District level, and by creating a formal mechanism for collaborative engagement during implementation.

   RECOMMENDATION: The SHG recommends that the Forest Service work with stakeholders to develop an appropriate framework for this. A recent, informative example is attached in Appendix V (Spruce Beetle Epidemic-Aspen Decline EIS, Grand Mesa, Uncompahgre, and Gunnison National Forest).

2. CONCERN: The framework for stakeholder engagement should to be memorialized in a manner that is binding and ensures follow-through. The DEIS WG and 4FRI Planning Team have discussed and concur on this need.

RECOMMENDATION: The Forest Service agreed to research this question and provide appropriate guidance, that the SHG recommends be carried forward with appropriate placement in the FEIS.

3. CONCERN: Collaborative implementation should be bolstered by mechanisms outside the RC DEIS. It was suggested that the 4FRI Memorandum of Understanding could be revised to meet this need.

   RECOMMENDATION: The SHG concurs and commits to working with the Forest Service and other partners on a potential revision of the MOU.

KEY ISSUE 7: ADAPTIVE MANAGEMENT AND MONITORING

Science-driven monitoring and adaptive management are key requirements under CFLRP and a high priority for 4FRI stakeholders. The SHG has been actively engaged in this process since initiation of the 1st EIS, under auspices of the Multi-Party Monitoring Board (MPMB). The MPMB has worked closely with the 4FRI Monitoring Coordinator to develop a new plan for the RC DEIS planning area and looks forward to continued collaboration refining the questions and approach for Rim Country. We have identified nine key concerns that should be addressed and then included in the FEIS.

Concerns and Recommendations

1. CONCERN: The Rim Country Monitoring Plan (RC DEIS Appendix E) should be updated to reflect work completed since the 1st EIS and improvements in monitoring design.

   RECOMMENDATION: The SHG recommends the following modifications:

   - Monitoring questions, indicators, triggers, and thresholds should be completed and/or updated as needed—a process that can be informed by the living monitoring document maintained by the MPMB.
   - Vague wording in this section (e.g., the term “appropriate”) should be clarified with necessary context, sideboards, and direction.
   - The Monitoring Plan should incorporate information from 4FRI monitoring reports including, but not limited to Hjerpe and Mottek-Lucas (2018) as well as relevant information from the RC DEIS Specialist Report (“Socioeconomic Environmental Consequences”).
   - Monitoring efforts in treated areas (e.g., groundwater assessment (p. 792) should include control and pre-treatment data collection in a BACI (Before-After-Control-Impact) design to support the strongest inference.
   - The Monitoring Plan will need to be updated to reflect openness metrics (and associated assessments on the 1st EIS area) being developed in collaboration with the SHG.

- Indicators (e.g., spatial metrics, forest structure, and wildlife variables) should be measured at the same scale whenever possible.

2. CONCERN: The relationship between Monitoring Plans in the 1st EIS and Rim Country needs to be clarified. The FEIS should clearly state that the Rim Country Monitoring Plan does not apply to the 1st EIS area, but rather complements it. It is also important to indicate that some indicators overlap both EIS areas, but others are unique to Rim Country.

   RECOMMENDATION: The SHG recommends that the text in RC DEIS Appendix E (p. 663) be modified accordingly.

3. CONCERN: Forest cover types, tree species, and structural components currently listed in the RC DEIS Monitoring Plan are specific to the 1st 4FRI EIS.

   RECOMMENDATION: The SHG recommends that this section be updated to reflect the Rim Country planning area. This should include additional descriptions and justification in RC DEIS Appendix E (p. 674–675) for mixed-conifer and other forest types, and adjustment of indicators, thresholds, and triggers for mixed-conifer (including monitoring of species proportions, diameter distributions, and spatial distribution of trees).

4. CONCERN: The relationship between implementation, implementation monitoring, and treatment effectiveness needs is not clearly articulated in the RC DEIS Monitoring Plan. These components need to be effectively integrated in the Monitoring Plan.

   RECOMMENDATION: The SHG recommends that RC DEIS Appendix E be expanded to articulate implementation tracking requirements, and indicate how this information will be linked to effectiveness monitoring when developing adaptive management recommendations. This could be presented in a table of similar theme as Table 130, that lists specific tracking metrics for effectiveness monitoring across Districts/Forests, which could then be reviewed with monitoring results to produce adaptive recommendations.

5. CONCERN: The RC DEIS Monitoring Plan should leverage the best available technology and tools. There have been a number of significant advancements since completion of the 1st 4FRI EIS.

   RECOMMENDATION: The SHG recommends that the Monitoring Plan be updated to include the following:

   - Fire Hazard Index (FHI), a new modeling approach used in the RC DEIS analysis of fire effects, but only loosely referenced in the Monitoring Plan.

- Various technologies and products that could be used to monitor tree age structure, spatial aggregation, canopy openness, patch size, patch configuration, patch density, and patch evenness, as well as the frequency and scale (e.g., UAV based imagery on a project basis).
- Quantification of snags using LiDAR data.

6. CONCERN: Scale of the RC DEIS monitoring plans does not match the analysis area.

   RECOMMENDATION: The SHG recommends that the scale of the Biophysical and Social and Economic plans be revised as needed throughout the FEIS. This includes inclusion of language in RC DEIS Appendix E indicating that fire analyses are performed at the HUC 6 level.

7. CONCERN: References in the RC DEIS Monitoring Plan should reflect the best available current science.

   RECOMMENDATION: The SHG recommends that references in RC DEIS Appendix E be updated. Examples include, but are not limited to:

   - Forest thinning and groundwater recharge (O'Donnell 2018, Moreno et al. 2016)
   - Canopy openness, soil moisture, and snowpack accumulation (Broxton et al. 2019)
   - Scale and grain considerations (Wasserman et al. 2019).
   - Climate science (Seager and Vecch 2010, Barnes and Polvani 2013, Lu et al. 2018, Singh et al. 2018, Espinoza et al. 2018, the 2018 National Climate Assessment)
   - Human dimensions and economics (Egan and Nielsen 2014, Brown 2015, Esch and Vosick 2016)

8. CONCERN: Additional detail is needed on the adaptive management process.

   RECOMMENDATION: The SHG recommends that the Monitoring Plan (RC DEIS Appendix E) more clearly articulate specific steps in the monitoring and adaptive management process (as illustrated in Figure 100) and indicate that decisions will be made in collaboration with the SHG and MPMB.

9. CONCERN: The RC DEIS should more explicitly acknowledge the role of the MPMB.

   RECOMMENDATION: The SHG recommends that the FEIS emphasize the collaborative approach to monitoring and adaptive management and add language (e.g., in RC DEIS Appendix E, p. 662) indicating that the 4FRI MPMB is well established and will play a significant role going forward.

KEY ISSUE 8: PREVIOUS ISSUES RESOLVED IN THE PUBLISHED DEIS

1. CONCERN: drift from the intent of CFLRP. Stakeholders were concerned that the drafty-draft RC DEIS did not include key CFLRP language articulating a focus on thinning small diameter trees and protecting large/old-growth trees. The DEIS WG provided recommended language to the 4FRI Planning Team, which was approved by the Executive Board and added to the RC DEIS.

   RECOMMENDATION: the SHG appreciates that modification and recommends it be carried forward into the FEIS and ROD.

2. CONCERN: terms and definitions needing clarification or correction. The SHG previously requested that the term "overmature" be removed or placed in appropriate context. While overmature remains in the document, it is with respect to the age classification tables based on cited literature. The definition of overmature used is based also on the cited literature.

   RECOMMENDATION: the SHG appreciates changes made in the DEIS and request they be carried forward into the FEIS and ROD.

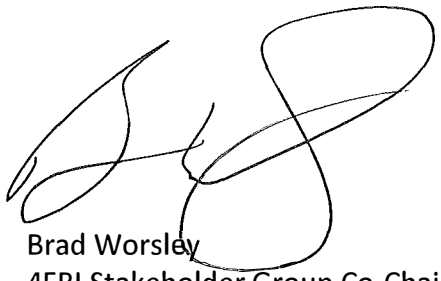
3. CONCERN: removal of 55-70% interspace treatments used for the management of mistletoe. The SHG asked for removal of 55-70% interspace treatments, listed in an early version of the DEIS, to manage mistletoe. This was a departure from the 1st EIS, and does not meet the intent or goals of the CFLRP. On reception of the SHG official request (see Project Record), the Executive Board removed all treatments above 55% interspace outside of WUI.

   RECOMMENDATION: the SHG appreciates this change made in the DEIS and recommends it be carried forward into the FEIS and ROD.

Thank you for the opportunity to comment. The 4FRI Stakeholder group appreciates the effort it took to develop the Rim Country DEIS; we greatly appreciate the collaborative effort in the last year. We look forward to continuing to work with our USFS partners to complete the Final EIS incorporating recommendations and finalized Stakeholder documents. For any clarification, please contact the 4FRI current co-chairs.

Sincerely,

Greg Smith
4FRI Stakeholder Group Co-chair



Brad Worsley
4FRI Stakeholder Group Co-Chair

APPENDIX B

4FRI STAKEHOLDER OLD GROWTH PROTECTION AND LARGE TREE RETENTION STRATEGY

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September 13, 2011

Old Growth Protection & Large Tree Retention Strategy

Contents

I. Old Growth Protection & Large Tree Retention Strategy (OGP&LTRS) Overview

The goals of the Four Forests Restoration Initiative (4FRI) are to restore healthy, diverse stands, supporting abundant populations of native plants and animals; to protect communities in forested landscapes from destructive wildland fire; and to support sustainable forest industries that strengthen local economies while conserving natural resources and aesthetic values. In short, we seek to re-establish largely self-regulating forested landscapes including their associated fire regimes through a process of ecological restoration that benefits communities, economies, ecosystems and biodiversity.

Ecological restoration will require thinning post-settlement ponderosa pine trees[1] in unnaturally dense stands. While there is broad agreement for reducing small diameter tree densities, where and how this should be done has often been the subject of social and scientific debate. The purpose of this document is to affirm recommendations of the 4FRI Stakeholder Group relating to the retention of large post-settlement and old growth trees—recommendations that are critical to moving beyond those debates—and to provide specific, science-based recommendations for incorporation into 4FRI restoration plans and projects.

Retention of Old Growth and Large Post-settlement Trees

"The Path Forward"—a foundational document of the 4FRI—calls for blanket old growth protection, regardless of tree size. It states that, "No old-growth trees (pre-dating Euro-American settlement) shall be cut." The document also includes broad recommendations for retaining large post-settlement trees with some carefully specified exceptions.

In southwestern ponderosa pine forests, old-growth trees are important to ecosystem structure and function. They increase genetic diversity on the landscape; old trees have greater genetic diversity than even-aged groups of young trees (Kolanoski 2002) and, thus, may have a better chance of adapting to changing climatic and environmental conditions, an ability they can pass on to their progeny. In addition, when not surrounded by large amounts of fuel, the thick bark of old-growth trees makes them largely resistant to low-intensity surface fire (Agee 1998). Old-growth trees also increase forest structural diversity, which, in turn, provides more wildlife habitat. For example, large trees provide additional structure for bats, which roost under slabs of bark; nest trees for northern goshawks and Mexican spotted owls; continuous canopy for tassel-eared squirrels; and foraging habitat for bark-gleaning birds (Bull and Hohmann 1994, Humes et al. 1999, Dodd et al. 2003). In addition, old trees often become long-lasting snags when they die, which benefits many species of cavity-nesting birds and mammals (Chambers and Mast

[1] Large and old growth tree recommendations offered in this document refer specifically to ponderosa pine trees.

2005). Old, large trees also serve as long-term carbon stores (Harmon et al. 1990) and preserve a record of the past that can inform future research about insect outbreak, fire history, and climate change (Fulé et al. 1997, Soulé and Knapp 2006). Finally, old-growth trees enhance the aesthetics of forests (Brown and Daniel 1984) and, thus, increase public support for restoration projects. Old-growth trees are present on the landscape at similar or lower densities compared to presettlement times (Mast et al. 1999, Moore et al. 2004), depending on how many trees have been removed postsettlement by forest management practices (e.g., clearcut, thinning, seed tree, etc.). The three main threats to old-growth trees are high-severity wildfire, competition from mid- or under-story trees, and drought and subsequent bark beetle attacks (Kolb et al. 2007). Restoration treatments (thinning and prescribed burning) around old-growth trees can cause some mortality. However, this threat can be reduced through careful management (Hood 2010). In addition, restoration treatment should result in a reduced threat of wildfire, a release from competition, and increased tree growth (Fajardo et al. 2007, Fulé et al. 2007).

The Path Forward also calls for retaining large post-settlement trees (defined by the socio-political process as those greater than 16 inches diameter-at-breast height [dbh]) throughout the 4FRI landscape, except: (1) as necessary to meet community protection and public safety goals within the Community Protection Management Areas identified in the Analysis of Small Diameter Wood Supply in Northern Arizona and where stakeholder agreement identifies priority areas within approved CWPPs; and (2) when best available science and stakeholder agreement (as defined in the 4FRI Charter) identify sites where ecological restoration and biodiversity objectives cannot otherwise be met – specifically wet meadows, seeps, springs, riparian areas, encroached grasslands, aspen groves or oak stands, within-stand openings, and heavily stocked stands with high basal area generated by a preponderance of large, young trees.

We recognize that there are multiple causes of ecological degradation that may not be affected by mechanical thinning and different types of burning. The exceptions articulated in the following section are intended to be part of a more comprehensive and concurrent approach to treating causes (rather than just symptoms) of ecological decline. To that end, we are asking the Forests to work collaboratively on a comprehensive restoration assessment that identifies possible management actions to stem/reverse ecological decline. We believe this restoration assessment should focus on a wider range of forest resources than just timber and fire; such as hydrology, range, recreation, and wildlife. We ask the four National Forests to initiate this assessment with the 4FRI Stakeholders, upon release of the Draft EIS for the first project area.

The intention of the exception process is to increase landscape heterogeneity and conserve biodiversity. Thus we do not support implementing any exceptions where removing the trees would conflict with existing recovery/conservation plan objectives for managing sensitive, threatened or endangered species or their habitat. 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.

II. OGP&LTRS Rationale: The Historical Debate Regarding Diameter Caps in the Southwest and the 4FRI's Large Tree Retention Policy

Introduction

Diameter caps for tree cutting have been used in forest management efforts across the West. They have been and continue to be the subject of much debate. In this section of the Large Tree Retention Strategy document, two different perspectives on diameter caps are presented. Recognizing that the 4FRI Large Tree Retention and Old Growth Protection Strategy is not meant to serve as a strict diameter cap, these perspectives are offered here to illuminate elements of the historical debate that have led to the 4FRI's formulation of the existing Large Tree Retention and Old Growth Protection Strategy.

Arguments in Favor of Diameter Caps

There is a generally recognized need to retain larger trees and protect old growth in southwestern ponderosa pine forest restoration. Some proponents of large tree retention have suggested that a 16" diameter cap is both ecologically and socio-politically warranted given the scarcity of mature and old growth forest cover in the region; the need to quickly re-establish lost mature and old forest structure; the necessity of retaining trees larger than 16" dbh to recruit new trees into regionally-underrepresented VSS 5, 6 and "old growth" structural stages; and the regional rarity of trees larger than 16" (approximately 96% of ponderosa pine trees in northern Arizona and New Mexico are smaller than 16-inch dbh).

Such proponents have proposed diameter caps as a means to (1) prevent large-tree logging for production-oriented, uneven-aged silvicultural goals, (2) discourage large-tree logging to pay for small-tree thinning or other activities, (3) favor small-diameter-specific industries over large-tree-dependent ones, (4) avoid population-level effects to imperiled species and wildlife that are associated with larger live and dead trees and denser canopy, (5) mitigate unforeseen large tree mortality during and following restoration treatments, (6) mitigate unknown rates of future large tree mortality resulting from re-establishing natural fire regimes and future climates, (7) mitigate under-estimates of historical tree densities owing to evidence undercounting and loss to fire, logging and decay, (8) accommodate differing reference scales, choices of reference attributes, restoration objectives and desired degrees of precision or rates of change, (9) mitigate uncertainty about future national forest policy, timber and wildlife habitat management, and (10) facilitate a restoration approach that reduces immediate crown fire threat while incrementally moving the forest toward its natural range of variability through a combination of thinning and natural fire.

Diameter limits and exception-thresholds for tree cutting are a common strategy for achieving ecological objectives in western forest landscapes. In their recommendations to Congress and the President, the Eastside Forests Scientific Society Panel proposed a 20" diameter limit for trees younger than 150 years old to protect late-successional and old-growth dry forests of eastern Oregon and Washington. They cited the ecological importance and scarcity of large and old trees and the need to retain them to replenish regionally-depleted supplies of large and old trees, snags, logs and associated wildlife

habitat. Those recommendations formed the basis for interim management direction amending nine national forest plans and establishing a 21" diameter limit in dry forests which in turn carried forward into an exception-threshold of 21" diameter in legislation proposed to restore dry forests of eastern Oregon. The Sierra Nevada Framework set forth a 20" diameter limit for tree cutting to conserve late-seral forests across national forest land in the Sierra Nevada. Larger diameter limit and exception-thresholds in these examples reflect more productive forests and larger mean diameters than in southwestern forests. Diameter limits in Region 3 forest plans restrict large tree cutting in habitat for Mexican spotted owl and northern goshawk for their viability and in "old growth"; diameter-based "vegetative structural stages" guide management of those species' habitats.

Arguments Against Diameter Caps

Arbitrary diameter thresholds (or "caps") may assure that trees of a certain size are retained, but they do not guarantee that short- or long-term ecological restoration goals will be achieved. In fact, diameter caps can actually prevent attainment of ecological restoration objectives because they can have unintended consequences such as interfering with the restoration of herbaceous openings and, where unnaturally dense stands of larger, post-settlement trees predominate, caps can limit fuel reduction and, therefore, undermine the agency's ability to re-establish surface fire (Abella et al. 2006, Sanchez-Meador 2009). A diameter threshold also creates a "one-size-fits-all" guideline which can lead to treatments that are inconsistent with site-based conditions.

In general caps are arbitrarily chosen to achieve socio-political objectives that do not necessarily support comprehensive ecological restoration. Contemporary diameter caps, even as an informal agreement, have become the condition that allows fuel reduction and restoration to move forward without lengthy delays due to appeals and litigation. Examples of their arbitrary application include:

- In order to test restoration treatments in the Grand Canyon, a 5-inch cap was required by environmental advocates (Fulé 2006).
- For restoration to proceed in the White Mountains, a 16-inch cap was required (Abrams and Burns 2007).
- A 12-inch cap was employed to define forest biomass appropriate for generating renewable energy (Arizona Corporation Commission, 2006).
- On the Coconino National Forest, a 16-inch cap was imposed to allow restoration projects proposed by the Grand Canyon Forest Partnership to proceed (Friederici 2003).

Further evidence that caps undermine ecological restoration goals is reflected in a recent decision on the Marshall Fuel Reduction and Forest Restoration Project (USFS 2010). The Forest Service rejected an alternative that proposed a 16-inch diameter cap because, "A 16-inch cap would prevent the restoration of natural openings and more natural spatial distribution of clumps of trees important for wildlife habitat and forest health." When administrative and legal challenges to forest thinning and restoration projects prevail it is

generally because of issues related to agency compliance with law and policy (Brown 2009)—not because there is a scientific basis for a diameter threshold.

Finally, a static diameter cap fails to account for the fact that trees grow, that restoration will occur over decades while those trees are growing, and that over time, retention of excess trees may undermine efforts to restore ecosystem resilience in the face of drier conditions associated with climate change (Glicksman 2009, Westerling et al. 2006).

Conclusions

Recognizing a need to move beyond the historical debate and move forward with landscape-scale restoration that is ecologically, socially, and economically viable, the 4FRI Collaborative has agreed that the 4FRI effort should implement large tree retention and old growth protection strategies that are not based on strict diameter limits, but are based upon a 16" diameter threshold that limits the cutting of trees larger than 16" to circumstances and criteria set forth in pre-defined exception categories that follow. In addition, 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.

It is our hope and expectation that this approach will balance the approaches and opinions expressed above, and will serve as a policy mechanism for supporting comprehensive ecosystem restoration while addressing stakeholders' needs for protecting old growth and large ponderosa pine trees.

III. Exception Process for Large Post-Settlement Tree Retention

The following section outlines a problem statement, specific identifying circumstances, ecological objectives and selection criteria for instances in which large post-settlement trees may be cut to meet restoration objectives. At specific locations, large trees may need to be removed, felled, or girdled for purposes of ecological restoration and biodiversity conservation. The purpose of this section is to provide sufficient specificity to translate those exception categories—where stakeholder agreement exists to do so—into management actions and tree-marking guidelines. For eight of the nine exception categories programmatic recommendations describe the circumstances and criteria in which large post-settlement trees may need to be removed. For the "Heavily Stocked Stands with High Basal Area Generated by a Preponderance of Large Young Trees" (or "Large Young Tree") exception category, getting to a higher level of social and scientific agreement entails more complexity and challenges, so we propose the initiation of additional collaborative discussion and planning that we hope will bolster restoration efforts by increasing confidence and knowledge-sharing, maximizing agreement and minimizing disagreement.

IV. Exceptions

Seeps & Springs

Suggested Tree Marking Exception Code: "S"

Identifiable Circumstance

Seeps are locations where surface-emergent groundwater causes ephemeral or perennial moist soil or bedrock, where standing or running water is infrequent or absent and that exhibit vegetation and other biological diversity adapted to mesic soils.

Springs are small areas where surface-emergent groundwater causes ephemeral or perennial standing or running water, wet or moist soils and that exhibit vegetation and other biological diversity adapted to mesic soils or aquatic environments (Feth and Hem 1963).

Problem Statement

Seeps exhibit unique, often isolated biophysical conditions that can sustain unique, mesic-adapted biological diversity and can facilitate endemism and speciation. In the absence of frequent fires and in the presence of livestock grazing, large post-settlement trees may have established and grown in such proximity to seeps to compromise available soil moisture or light upon that afford those unique biophysical conditions.

Springs exhibit unique, often isolated biophysical conditions that can sustain unique, mesic-adapted or aquatic biological diversity and can facilitate endemism and speciation. Springs also provide water and other habitat to terrestrial wildlife. In the absence of frequent fires and in the presence of livestock grazing, large post-settlement trees may have established and grown in such proximity to springs to compromise available soil moisture (Simonin et al. 2007) or light upon that afford those unique biophysical conditions.

Removal of these trees may constitute a relatively small part of an overall seep and spring restoration effort when compared to addressing root causes of overall degradation. Thinning alone without addressing other sources of degradation is unlikely to restore seeps and springs (Thompson et al. 2002).

Ecological Objectives

(1) Conserve and restore the biophysical conditions in seeps and springs upon which terrestrial, mesic-adapted and aquatic native biological diversity depend.

Criteria

Large (>16”dbh) post-settlement ponderosa pine trees may be removed to conserve the unique biophysical attributes of seeps & springs according to these criteria:

(1) Where large trees’ roots are encroaching on mesic soils associated with a seep or spring, or such trees’ drip lines are overlapping or nearly overlapping a seep or spring such that its shading compromises the integrity of a spring’s unique biophysical attributes, and;

(2) Where removing the trees does not conflict with existing recovery/conservation plan objectives for managing sensitive, threatened or endangered species or their habitat.

Note:
Where there is evidence of pre-settlement trees having grown in similar root and crown proximity to said seep or spring in the past, leave an equivalent number of large replacement trees.

Riparian

Suggested Tree Marking Exception Code: "R"

Identifiable Circumstance

Riparian areas occur along ephemeral or perennial streams or are located down-gradient of seeps or springs. These areas exhibit riparian vegetation, mesic soils, and/or aquatic environments.

Problem statement

Riparian areas exhibit unique biophysical conditions that can sustain unique, mesic-adapted or aquatic biological diversity. Riparian areas and the streams, springs and seeps connected to them often harbor imperiled species and can be sources of endemism. Riparian areas also provide water and other habitat to terrestrial wildlife. In the absence of frequent fires and in the presence of livestock grazing, water development projects and other factors, large post-settlement trees may have established and grown within riparian areas such that they compromise available soil moisture or light that support those unique biophysical conditions. However, it is likely to be a very rare circumstance that trees of any size will need to be removed from forested riparian zones.

Cutting of any trees within riparian areas should minimize impacts by following Best Management Practices (BMPs).

Whenever possible, large trees identified for cutting should be left onsite as snags or downed logs.

Removal of these trees may constitute a relatively small part of an overall riparian area restoration effort when compared to addressing fundamental causes of overall degradation. Thinning alone without addressing other sources of degradation is unlikely to restore riparian areas.

Ecological Objectives

Conserve and restore the biophysical conditions in riparian habitat upon which terrestrial and aquatic native biological diversity depend.

Criteria

Large (>16"dbh) post-settlement ponderosa pine trees may be removed to conserve the unique biophysical attributes of riparian areas according to these criteria:

(1) Where large trees are growing (rooted) within a riparian area and compromising available soil moisture or light that support that area's unique biophysical conditions, and

(2) Where removing the trees does not conflict with existing recovery/conservation plan objectives for managing sensitive, threatened or endangered species or their habitat.

Notes:
Where there is evidence of pre-settlement trees having grown in similar root and crown proximity to said riparian in the past, leave an equivalent number of large replacement trees.

There may be additional areas and/or circumstances identified for riparian restoration through a site specific agreement-based, collaborative process as described in the 4FRI Charter.

Wet Meadows

Suggested Tree Marking Exception Code: "WM"

Identifiable Circumstance

High-elevation streamside or spring-fed meadows occur in numerous locations throughout the Southwest. However, less than 1% of the landscape in the region is characterized as wetland (Dahl 1990), and wet meadows are just one of several wetland types that occur. Patton and Judd (1970) reported that approximately 17,700 ha of wet meadows occur on national forests in Arizona and New Mexico.

These areas may be referred to as riparian meadows, montane (or high-elevation) riparian meadows, sedge meadows, or simply as wet meadows. Wet meadows are usually located in valleys or swales, but may occasionally be found in isolated depressions, such as along the fringes of ponds and lakes with no outlets. Where wet meadows have not been excessively altered, sedges (*Carex* spp.), rushes (*Juncus* spp.), and spikerush (*Eleocharis* spp.) are common species (Patton and Judd 1970, Hendrickson and Minckley 1984, Muldavin et al. 2000). Willow (Salix) and alder (Alnus) species often occur in or adjacent to these meadows (Long 2000, 2002, Maschinski 2001, Medina and Steed 2002). High-elevation wet meadows frequently occur along a gradient that includes aquatic vegetation at the lower end and mesic meadows, dry meadows, and ponderosa pine or mixed conifer forest at the upper end. These vegetation gradients are closely associated with differences in flooding, depth to water table, and soil characteristics (Judd 1972, Castelli et al. 2000, Dwire et al. 2006). While relatively rare, wet meadows are believed to be of disproportionate value because of their use by wildlife and the range of other ecosystem services they provide. Wet meadows perform many of the same ecosystem functions associated with other wetland types, such as water quality improvement, reduction of flood peaks, and carbon sequestration.

Problem statement

Wet meadows are one of the most heavily altered ecosystems. They have been used extensively for grazing livestock, have become the site of many small dams and stock tanks, have had roads built through them, and have experienced other types of hydrologic alterations, most notably the lowering of their water tables due to stream downcutting, surface water diversions, or groundwater withdrawal (Neary and Medina 1996, Gage and Cooper 2008). In the presence of livestock grazing and hydrologic changes, large post-settlement trees may have established and grown within wet meadows such that they compromise available soil moisture or light creating unique biophysical conditions.

Removal of these trees may constitute a relatively small part of an overall wet meadow restoration effort when compared to addressing root causes of overall degradation. Thinning alone without addressing other sources of degradation is unlikely to restore wet meadows.

Ecological Objectives

Conserve and restore the biophysical conditions of wet meadows upon which terrestrial native biological diversity depend.

Criteria

Large (>16”dbh) post-settlement ponderosa pine trees may be removed to conserve the unique biophysical attributes of wet meadows according to these criteria:

(1) Where large trees are growing (rooted) in a wet meadow, and

(2) Where removing the trees does not conflict with existing recovery/conservation plan objectives for managing sensitive, threatened or endangered species or their habitat.

Note:
Where there is evidence of pre-settlement trees having grown in similar root and crown proximity to said wet meadows in the past, leave an equivalent number of large replacement trees.

Encroached Grasslands

Suggested Tree Marking Exception Code: "EG"

Identifiable Circumstance

Encroached grasslands are herbaceous ecosystems that have infrequent-to-no evidence of pine trees growing prior to settlement. The two prevalent grassland categories in the 4FRI landscape are montane (includes subalpine) grasslands and Colorado Plateau (a subset of Great Basin) grasslands, with montane grasslands being most common (Finch 2004). A key indicator of grasslands is the presence of mollisol soils, which are typically deeper with higher rates of accumulation and decomposition of soil organic matter relative to soils in the surrounding landscape. Grasslands in this region evolved during the Miocene and Pliocene periods, and the dark, rich soils observed in grasslands today have taken more than 3 million years to produce. In addition to their association with mollic soils, grasslands in this region are maintained by a combination of climate, fire, wind desiccation, and to a lesser extent by animal herbivory (Finch 2004).

Typical montane grasslands in this region are characterized by Arizona fescue (Festuca arizonica) meadows on elevated plains of basaltic and sandstone residual soils. Montane grasslands are the most naturally fragmented grasslands in the region, ranging from thousands of acres in size (e.g., in the White Mountains, Baker 1983) down to only a few acres. They generally occur in small (<100 ac.) to medium-sized (100 to 1000 ac.) patches. Historic maintenance of the herbaceous condition in these grasslands is subject to some debate though appears to be primarily driven by periodic fire. The cool-season growth of Arizona fescue also plays a large role in maintenance of parks and openings by directly competing with ponderosa pine seedlings.

Identification of grasslands in this region should use a combination of the Terrestrial Ecosystem Survey, Southwest Regional GAP Analysis, Brown and Lowe Vegetation Classification (Brown and Lowe 1982; TNC GIS Layer 2006) among other existing vegetation and soils data.

This exception category will require an iterative process of collaborative mapping, field verification, and refinement. There are some debate and questions about where and how much the grassland-forest mosaic shifts over time and space. There are also debate and 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.

Problem statement

Prior to European settlement, pine trees rarely established in grasslands because they were either outcompeted by production of cool-season grasses or killed by frequent fire (Finch 2004). In the late 1800s, unsustainable livestock grazing practices significantly reduced herbaceous cover, releasing competition pressure on pine seedlings. Coupled with the onset of fire suppression in the early 1900s, pine trees rapidly encroached and recruited into native grasslands (e.g., Allen 1984, Moore and Huffman 2004, Coop and Givnish 2007).Pine encroachment into grasslands has contributed to a significant loss of biodiversity (Stacey 1995) and wildlife habitat particularly for grassland-dependent species such as pronghorn. Plant diversity is particularly important in grassland ecosystems: grassland plots with greater specie diversity have been found to be more resistant to drought and to recover more quickly than less diverse plots (Tilman and Downing 1994); this resilience will become even more important in a warming climate. Pine tree removal, restoration of fire, and complementary reductions in livestock grazing pressure are all necessary to restore structure and function of native grasslands.

Ecological Objectives

(1) Enhance, maintain, and restore naturally functioning grasslands.

(2) Ensure native grassland composition, increase native species diversity, improve resilience to drought.

(3) Restore natural fire regime.

Criteria

Large (>16" dbh) post-settlement ponderosa pine trees may be cut and/or removed to restore the unique biophysical attributes of grasslands according to these criteria:

(1) Where existing grasslands are being encroached, and large trees are interfering with overall restoration objectives, and

(2) Where removing the trees does not conflict with existing recovery/conservation plan objectives for managing sensitive, threatened or endangered species or their habitat.

There may be additional areas and/or circumstances identified for grassland restoration through a site specific agreement-based, collaborative process as described in the 4FRI Charter.

Aspen Forest & Woodland

Suggested Tree Marking Exception Code: "AF"

Identifiable Circumstance

Quaking aspen (*Populus tremuloides*) occurs in small patches throughout the 4FRI area. Bartos (2001) refers to three broad categories of aspen: (1) stable and regenerating (stable), (2) converting to conifers (seral), and (3) decadent and deteriorating. Almost all of the aspen within ponderosa pine of the 4FRI area occurs as seral aspen, and regenerates after disturbance. Favorable soil and moisture conditions maintain stable aspen over time.

Problem Statement

Aspen occurs within ponderosa pine forests, and is ecologically important due to the high concentration of biodiversity that depends on aspen for habitat (Tew 1970, DeByle 1985, Finch and Reynolds 1987, Griffis-Kyle and Beier 2003). In addition, stable aspen stands serve as an indicator of ecological integrity (Di Orio and others 2005). However, aspen is currently declining at an alarming rate (Fairweather and others 2008).

The loss of fire as a natural disturbance regime in southwestern ponderosa pine forests since European settlement has caused much of the aspen-dominated lands to succeed to conifers (Bartos 2001). Other factors contributing to gradual aspen decline over the past 140 years include reduced regeneration from browsing by livestock and introduced and native wild ungulates in the absence of natural predators like wolves (Pearson 1914, Larson 1959, Martin 1965, Jones 1975, Shepperd and Fairweather 1994, Martin 2007). More recently, aerial and ground surveys indicate more rapid decline of aspen, with 90% mortality occurring in low elevation aspen sites and over 60% mortality observed in mid-elevations. Major factors thought to be causing this rapid decline of aspen include frost events, severe drought, and a host of insects and pathogens (Fairweather and others 2008) that have served as the "final straws" for already compromised stands.

Removal of encroaching pine trees constitutes part of an overall aspen restoration effort. Thinning alone without addressing other sources of degradation, such as excessive herbivory is unlikely to successfully restore aspen forests.

Some stakeholders expressed that considerable uncertainty exists around fire regimes for aspen in ponderosa pine, and that research questions remain unanswered around the prevalence of mixed-severity fire and its ecological role as a driving force for aspen stands at the top of its elevational range, and on steep slopes within this vegetation type.

Ecological Objectives

(1) Conserve and restore aspen forests and woodlands within 4FRI area by restoring appropriate fire regimes and decreasing competition from ponderosa pine.

(2) Protect regeneration, saplings, and juvenile trees from browsing.

Criteria

Large (>16”dbh) post-settlement trees may be cut in conifer-encroached seral aspen stands according to the following criteria:

(1) Where current post-settlement ponderosa pine tree numbers are above and beyond residual targets (identified using pre-settlement conifer tree evidences), and

(2) Where fire cannot be used safely and effectively to regenerate or maintain aspen, or

(3) Where site visitation and/or data collection and analysis indicates the need for encroachment mitigation, and

(4) Where removing large trees does not conflict with existing recovery/conservation plan objectives for managing sensitive, threatened or endangered species or their habitat

Note:
There may be additional areas and/or circumstances identified for aspen restoration through a site specific agreement-based, collaborative process as described in the 4FRI Charter.

Ponderosa Pine/Gambel Oak Forest (Pine-Oak)

Suggested Tree Marking Code: "P-O"

Identifiable Circumstance

A number of habitat types exist in the southwestern United States that could be described as pine-oak. Ponderosa pine forests are interspersed with Gambel oak trees in locations throughout the 4FRI area in a habitat association referred to as PIPO/QUGA (USFS 1997, USDI FWS 1995). Specifically, any stand within the Pinus ponderosa series where ≥10% of stand basal area consists of Gambel oak (*Quercus gambelii*) ≥13 cm (5 in) diameter at root collar (drc) is considered to be pine-oak within the 4FRI area (USDI FWS 1995). In southwestern ponderosa pine forests, Gambel oak has several growth forms distinguished by stem sizes and the density and spacing of stems within clumps. These include shrubby thickets of small stems, clumps of intermediate-sized stems, and large, mature trees that are influenced by age, disturbance history, and site conditions (Brown 1958, Kruse 1992, Rosenstock 1998, Abella and Springer 2008, Abella 2008a). Different growth forms provide important habitat for a large number of varying wildlife species (Neff and others 1979, Kruse 1992).

Gambel oak provides high quality wildlife habitat in its various growth forms, and is a desirable component of ponderosa pine forests (Neff and others 1979, Kruse 1992, Bernardos et al. 2004). Gambel oak enhances soils (Klemmedson 1987), wildlife habitat (Kruse 1992, Rosenstock 1998, USDI FWS1995, Bernardos et al. 2004), and understory community composition (Abella and Springer 2008). Large oak trees are particularly valuable since they typically provide more natural cavities and pockets of decay that allow excavation and use by cavity nesters than conifers. In addition to its important ecological role, Gambel oak has high value to humans as it is a popular fuelwood that possesses superior heat-producing qualities compared to other tree species (Wagstaff 1984).

Problem Statement

Although management on public lands with regard to oak has changed to better protect the species, illegal fuelwood cutting of Gambel oak and elk and livestock grazing negatively impact oak growth and regeneration (Harper et al. 1985, Clary and Tiedemann 1992, Rick Miller, 1993, unpublished report) and continues to result in the removal of rare, large diameter oak trees (Bernardos et al. 2004).

A literature review by Abella and Fule (2008) found that Gambel oak densities appear to have increased in many areas with fire exclusion, especially in the small and medium-diameter stems (<8" dbh). Chambers (2002) found that Gambel oak on the Kaibab and Coconino National Forests was distributed in an uneven-aged distribution, dominated by smaller size classes (<5 cm dbh) and few large diameter oak trees. Because of Gambel

oak's slow growth rate, there may be little opportunity for these small Gambel oak trees to attain large diameters (>85 cm) (Chambers 2002).

Pine competition with oak has been identified as an issue in slowing oak growth, particularly for older oaks (Onkonburi 1999). Onkonburi (1999) also found that for northern Arizona forests, pine thinning increased oak incremental growth more than oak thinning and prescribed fire. Fule (2005) found that oak diameter growth tended to be greater in areas where pine was thinned relative to burn only treatments and controls. Thinning of competing pine trees may promote large oaks with vigorous crowns and enhanced acorn production (Abella 2008b), and may increase oak seedling establishment (Ffolliott and Gottfried 1991).

Ecological Objectives:

(1) Maintain and restore all growth forms of Gambel oak, focusing on enhancing and maintaining larger, older oak trees.

(2) Restore frequent, low intensity surface fire to ponderosa pine-Gambel oak forests.

(3) Restore and maintain brushy thicket, pole and dispersed clump growth forms of Gambel oak by allowing natural self-thinning, thinning dense clumps, and/or burning.

(4) Protect Gambel oak growth forms from fuel wood cutting, damage during restoration treatments including thinning and post thinning slash burning.

Criteria

In pine-oak, which occurs when ≥10% of the stand basal area consists of Gambel oak >13 cm (5 in) diameter at root collar, large (>16 dbh) post-settlement ponderosa pine trees may be removed to conserve oaks according to these criteria:

In MSO restricted habitat:

(1) Within MSO habitat and designated critical habitat, the Recovery Plan for the Mexican spotted owl should be followed to improve key habitat components and primary biological factors, which includes Gambel oak, or

Outside MSO restricted habitat: where large post-settlement trees' drip lines or roots overlap with those of Gambel oak trees exhibiting drc of >12"; and

(2) Where removing the trees does not conflict with existing recovery/conservation plan objectives for managing sensitive, threatened or endangered species or their habitat.

Within Stand Openings

Suggested Tree Marking Exception Code: "WSO"

Identifiable Circumstance

Within Stand Openings are small openings (generally 0.05 to 1.0 acres) that were occupied by grasses and wildflowers before settlement (Pearson 1942, White 1985, Covington and Sackett 1992, Sanchez-Meador et al. 2009). Pre-settlement openings can be identified by the lack of stumps, stump holes, and other evidence of pre-settlement tree occupancy (Covington et al. 1997). These openings are most pronounced on sites with heavy textured (e.g., silt-clay loam) soils (Covington and Moore 1994). Current openings include fine scaled canopy gaps. It is not necessary that desired within stand openings and groups be located in the same location that they were in before settlement (the site fidelity assumption). Trees might be retained in areas that were openings before settlement, and openings might be established in areas which had previously supported pre-settlement trees. The within stand opening criteria described here are distinct from and should not be considered as guidance relating to regeneration openings. The stakeholder group does not support the cutting of large trees to create regeneration openings.

Problem Statement

Within stand openings appear to have been self-perpetuating before overgrazing and fire exclusion (Pearson 1942, Sanchez-Meador et al. 2009). Fully occupied by the roots of grasses and wildflowers as well as those of neighboring groups of trees, these openings had low water and nutrient availability because of intense root competition (Kaye et al. 1999). Heavy surface fuel loads insured that tree seedlings were killed by frequent surface fires, reinforcing the competitive exclusion of tree seedlings (Fulé et al. 1997). These natural openings appear to have been very important for some species of butterflies, birds, and mammals (Waltz and Covington 2004). Often the largest post-settlement trees, typically a single tree, became established in these natural within a stand opening as soon as herbaceous vegetation was removed by overgrazing (Sanchez-Meador et al. 2009). Contemporary within stand openings or areas dominated by smaller post-settlement trees should be the starting point for restoring more natural within stand heterogeneity.

Ecological Objectives

(1) Conserve and restore openings within stands to provide natural spatial heterogeneity for biological diversity.

(2) Break up fuel continuity to reduce the probability of torching and crowning.

(3) Restore natural heterogeneity within stands.

(4) Promote snow-pack accumulation and retention to benefit groundwater recharge and watershed processes at small scale.

Criteria

Large (>16" dbh) post-settlement ponderosa pine trees may be removed to restore the unique biophysical attributes of within stand openings according to these criteria:

(1) When the presence of such trees would prevent the re-establishment of sufficient within stand openings to emulate natural vegetation patterns based on current stand conditions, pre-settlement evidences, desired future conditions, or other restoration objectives, and

(2) Where desired openings are tentatively identified as ≥0.05 acre (these openings should be established wherever possible by enlarging current within stand openings or where small diameter trees are predominant), and

(3) Where removing the trees does not conflict with existing recovery/conservation plan objectives for managing sensitive, threatened or endangered species or their habitat.

NOTE: It is not necessary that within stand openings and groups be located in the same location that they were in before settlement. That is, trees might be retained in areas that were openings before settlement, and openings might be established in areas that had previously supported pre-settlement trees.

[2]Heavily Stocked Stands with High Basal Area Generated By a Preponderance of Large Young Trees

Suggested Tree Marking Exception Code: "LYT"

Identifiable Circumstance
In some areas irruption of post-settlement has been so robust that current stand structure is characterized by high density and basal area of large, young ponderosa pine trees. These stands or groups of stands exhibit continuous canopy promoting unnaturally severe fire effects under severe fire weather conditions. At the small scales, this circumstance applies on a case-by-case basis where the cutting of large trees is necessary to meet site-specific ecological objectives such as reducing potential for crown fire spread into communities or important habitats such as for Mexican spotted owls and/or goshawk nest stands. This circumstance applies where other exception categories, when implemented, would not alleviate the afore-mentioned severe fire effects.

Problem Statement
In stands where pre-settlement evidences, restoration objectives, community protection, or other social or ecological restoration objectives indicate much lower tree density and BA would be desirable, large post-settlement pines may need to be removed to achieve post-treatment conditions consistent with a desired restoration trajectory. In stands where evidences indicate that higher tree density and BA would have occurred pre-settlement, only a few large pines may need to be removed. Many of these areas would support crown fire, and thus require structural modification to reduce crown fire potential and restore understory vegetation that supports surface fire.

Ecological Objectives

Natural heterogeneity of forest, savannah and grasslands occurs at the landscape scale.

Natural heterogeneity exists within stands.

Canopy fuel discontinuity reduces the probability of torching and crowning and restores herbaceous fuel continuity to carry surface fire.

Natural fire (rather than silviculture) is the principle regulator of forest structure over time.

Restore groups by retaining the largest trees on the landscape to most quickly re-establish old growth structure, where appropriate to site conditions, restoration and species conservation objectives.

[2] The "Large Young Tree" exception was drafted, vetted with the Stakeholder Group, finalized and submitted to the USFS on July 15, 2011.

Criteria

Large (>16" dbh) post-settlement ponderosa pine trees may be removed to meet restoration objectives according to these criteria:

(1) When the presence of such trees contributes to continuous canopy promoting unnaturally severe mid- or larger-scale (100+ acre) fire effects under severe fire weather conditions;

(2) When the cutting of such trees is necessary to meet site-specific social or ecological objectives such as reducing potential for crown fire spread into communities or important habitats such as for Mexican spotted owls and/or goshawk nest stands;

(3) When other exception categories, if implemented, would not alleviate the afore-mentioned severe fire effects;

(4) When removing the trees does not conflict with existing recovery / conservation plan objectives for managing sensitive, threatened or endangered species or their habitat.

Note: It is not necessary that trees or groups be located in the same location that they were in before settlement. That is, trees might be retained in areas that were openings before settlement, and openings might be established in areas that had previously supported pre-settlement trees.

V. Description of Desired Next Steps and Ongoing Collaborative Clarification of OGP&LTRS

All of the exception categories listed in this document have been clarified such that they can be operationalized "programmatically", that is, the process of mapping and selecting areas for exceptions is ready to be tested with real data in specific areas. This means that the stakeholder group considers the guidance offered for these exception categories sufficient to operationalize large tree retention/removal per these criteria across the 4FRI area. This process will require the participation of stakeholders and USFS team members to ensure that the suggested process in this document achieves the stated restoration objectives, and is not burdensome in its approach and mechanics.

[3]The "Large Young Tree" exception category listed in this document will require additional collaborative analysis and clarification. Thus far, the group has discussed an opportunity and a need to carry these discussions forward with a combination of additional site visits to representative areas, analysis of USFS stand data, and further exploration of ForestERA remote sensing data that could inform our collective sense of the distribution and extent of areas exhibiting circumstances necessitating large tree removal, and an efficient means of analyzing data and selecting areas for treatment.

Recognizing the importance of finding additional clarity and agreement for these exception categories, the group intends to pursue additional field and data-centered explorations of these exception categories in 2011, working closely with the Forest Service to ensure that additional analysis occurs in a coordinated fashion, and that additional recommendations can be operationalized in a straightforward fashion. Analysis and visitation schedules are intended to be developed by March, 2011, and completed by May 6, 2011.

[3] The "Large Young Tree" exception was drafted, vetted with the Stakeholder Group, finalized and submitted to the USFS on July 15, 2011.

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Appendix 1 – Reservations

From Scott Harger, Coconino NRCD

From: Scott Harger [mailto:cannonbone@msn.com] Sent: Friday, March 04, 2011 6:57 PM To: Windy Greer Subject: Re: Old Growth Protection and Large Tree Retention Strategy Document for Stakeholders' review

Dear Windy, and LTRS Sub-Group of the LSWG:

I appreciate the accelerated effort to push this document for timely delivery to the USFS.

I like the descriptions captured here for the large tree strategy overview and rationale for the document and the 8-of-9 exception categories whose language appear to be resolved. Except for some very turgid prose in section V that can be edited, I can support this draft as a partial or preliminary version, subject to review of the 9th exception. Otherwise, I can support approval of this final draft without conditions. I would also support it if "Problem Description" were changed to "Management Issue" or "Concerns driving the Exception" or something that doesn't suggest that habitats are problems.

Scott Harger
Range Conservationist
Coconino NRCD
Flagstaff, AZ
928.527.9050

From Scott Hunt, Arizona State Forester

From: Scott Hunt [mailto:ScottHunt@azsf.gov] Sent: Friday, March 11, 2011 12:00 PM To: Windy Greer; 'Ethan Aumack'; Ed Smith Cc: Kevin Boness Subject: RE: Old Growth Protection and Large Tree Retention Strategy Document for Stakeholders' review

Thank you Ed and Ethan for the dedicated work on this strategy. The State Forestry Division agrees with reservations on this large tree retention policy. The arguments against diameter caps that you provided in the policy capture most of our reservations. We have two additional items we wish to offer for consideration:

-In the category “Seeps and Springs” under criteria: there should be an allowance for removal of large trees a considerable distance from the seep or spring to help invigorate infiltration and flow. Distance will need to be determined by the effective area that benefits the seep or spring.

-We believe a consideration needs to given for stands that may have a healthy understory of regenerated ponderosa pine with an overstory of trees that are heavily infected with dwarf mistletoe. Objectives for this type of stand may encourage and favor the vigorous, healthy understory. Removal of the larger trees that are infected would be required to meet the stand objectives.

We will look forward the opportunity to comment on the Larger Young Tree removal category when it is developed. Thanks again for all your time and effort.

Scott Hunt

APPENDIX C

CENTER FOR BIOLOGICAL DIVERSITY POST-LOGGING RAPID SURVEY LITTLE CREEK TIMBER SALE, APACHE-SITGREAVES NATIONAL FOREST

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Center for Biological Diversity Post-Logging Rapid Survey

Unit 10, Little Timber Sale, Apache-Sitgreaves National Forests

Prepared by Joe Trudeau for 4FRI-SHG Little Timber Sale tour, 9/25/2018. Revised 10/15/2018.
Direct comments or questions to: jtrudeau@biologicaldiversity.org

Introduction

Between June 30 and July 2, 2018, a Facebook user posted a series of images of large diameter stumps, decks of large and old logs, and other photos and comments that called into question thinning activities underway at the Little Timber Sale on the Apache-Sitgreaves National Forest near Luna Lake, Arizona. In these posts, the author suggested that the public had been 'duped' by the Forest Service's claims that thinning under the Four Forest Restoration Initiative (4FRI) would be focused on small diameter trees. The revelation of these disturbing images of felled old growth and large diameter trees led to a series of visits to the site by a number of 4FRI stakeholders. This includes Center for Biological Diversity staff participating in a field trip to the timber sale with the Forest Service on August 28, 2018. Between August 27 and 31, 2018, Center for Biological Diversity conducted a rapid quantitative survey of a randomly selected unit where thinning had been completed (Unit 10). The purpose was to conclude if old growth was removed, and if so to estimate the amount cut. The methods and results of that survey are presented on the next two pages of this report, and discussed below.

Discussion

An additional field trip to the Little Timber Sale was requested by 4FRI Stakeholders and occurred on September 26, 2018. Approximately 45 Stakeholders and Forest Service employees attended. By request, the fifth stop of the itinerary was at Unit 10, where Center for Biological Diversity presented the results of this survey as well as an interpretation on how these observations fit into a broader - and concerning - narrative within 4FRI; that there appears to be a discernable shift away from core forest restoration principles and methodologies in southwestern ponderosa pine forest restoration, including pushing the boundaries of what has come to be known as the "social consensus" around cutting of large and old trees. The following results of our survey support this concern:

•The stand was thinned below the low end of the desired range. The desired basal are for this unit was 40-60 ft^2/acre, but our results found the units thinned to approximately 36 ft^2/acre. This supports our observation that the Forest Service tends to thin to the low end or below desired density ranges.

• Stump tallies and ring counts showed that more old growth trees (>150 years old) were cut than were retained. Removal of groups of old trees accounted for most of the reduction in this age class, with two 1-acre plots each having twenty probable old growth stumps. Despite Forest Service claims that these were predominantly large young trees, we found concrete evidence that trees well above 200 years old were cut, and that old trees may often be < 18" DBH (see photos on next page). Our sampling indicates that more than 1,300 old growth trees were cut in just this 200-acre unit. Even if our tree aging was 50% wrong, there would still be a very alarming result.

•Large trees were disproportionately targeted for removal, with nearly half of basal area reduction made in trees larger than 18" DBH, and the overall mean diameter of ponderosa pine at the stand level dropped by 2.3". Proportion of small to large trees, as measured by sampling frequency, was maintained pre- to post-logging. These results confirm that thinning was not focused on removal of small diameter trees.

•Stand exam data that we obtained showed that less than 6% of sampled ponderosa pine trees had mistletoe infections that would warrant removal under the stand thinning prescription. That prescription also stated plainly that "the stands have a low infection of dwarf mistletoe in the ponderosa pine." While is it difficult to determine the level of mistletoe infection of removed trees, our observations suggested that old tree removal was more focused on basal area reduction than severe disease infection. Based on our field survey results, target basal area of 40-60 ft^2/acre could have been met even without cutting any old trees at all.

Conclusion

Though the West Escudilla project was authorized under a separate NEPA analysis, it is part of 4FRI, being counted toward restoration targets within the 4FRI umbrella. The Center considers the observations reported here to be a troubling departure from Stakeholder-developed guidance for protection of large and old trees.

Center for Biological Diversity Post-Logging Rapid Survey (page 2)

Unit 10, Little Timber Sale, Apache-Sitgreaves National Forests

Prepared by Joe Trudeau for 4FRI-SHG Little Timber Sale tour, 9/25/2018. Revised 10/15/2018.

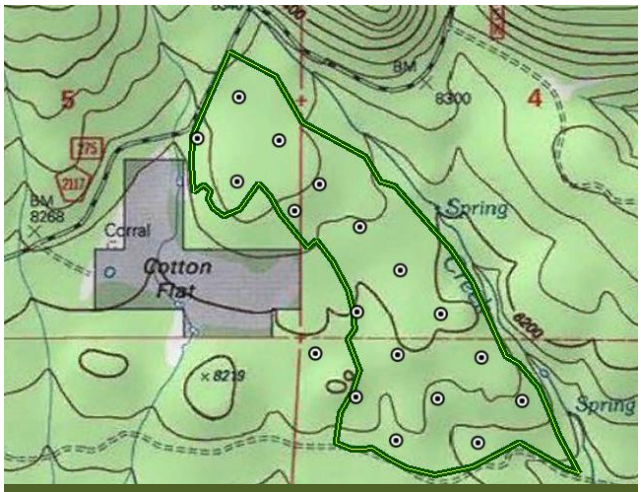
Inventory Specifications

18 plot centers located on August 27 and 31, 2018.
At each point, data from 3 plots were recorded:

Plot a) 10-factor prism
- in/out tally to determine basal area

Plot b) 1/10th acre fixed radius (37.2' radius)
- tree status (live, snag, stump), species, and DBH
- random sample first tree from North: determine age and record diameter at stump height

Plot c) 1 acre fixed radius (117.8' radius)
- tallied live trees of all species over 4.5' tall
- tallied live old growth (>150 years) and recent cut old growth stumps



Plots located on 10-chain grid (660'). One plot was moved due to fenceline and edge of unit.

Live Tree Results

Plot a) 10-factor prism (generous with "in" trees, no limiting distances checked)
- basal area: **37.8 ft²/acre** (includes all species, any tree over 4.5' tall)

Plot b) 1/10th acre fixed radius (37.2' radius)
- 139 sample trees measured: PIPO (n=71), QUGA (n=67); JUDE (n=1)
- PIPO basal area: **30.5 ft²/acre**
- All species basal area: **33.7 ft²/acre** (~10% of BA in QUGA)

mean BA=35.75 ft²/acre

- 16 of 18 plots had live PIPO trees (~10% in "regen openings")
- PIPO basal area excluding 2 plots with no live trees (exclude "regen openings"): **34.3 ft²/acre**
- Trees/acre: **39.4 TPA** (PIPO), 77 TPA (all species >4.5' tall)
- Average diameter of live trees (all species): 7.1"
- Average diameter of live trees (PIPO only): 10.3"
- Average age of sample tree: 117 years
- Tree taper ratio: 0.8227 (DBH/DSH on first sample tree)

Plot c) 1 acre fixed radius (117.8' radius)
- Average TPA Tally: 50.4 trees per acre (includes all species, any tree over 4.5' tall)
- 103 likely live old growth trees tallied (3 top plots account for over 50% of total)
- 118 likely old growth stumps tallied (3 top plots account for nearly 50% of total)

Cut Tree Results (recent stumps on 1/10 acre plot, DBH estimated by applying site-specific taper ratio)

- 72 sample stumps measured (does not include stumps predating the Little sale)
- Average diameter at stump height (DSH) of recent cut trees 14.6"
- Estimated average DBH of recent cut trees 12.2"
- Estimated 37 ft²/acre removed by recent thinning
- 18% of total trees and 45% of basal area removed was in VSS5 and VSS6 trees
- 1 snag recorded across all 18 plots (Forest Plan DC's aims for 2 snags/acre)

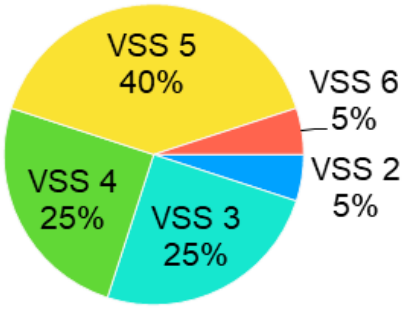
Center for Biological Diversity Post-Logging Rapid Survey (page 3)

Unit 10, Little Timber Sale, Apache-Sitgreaves National Forests

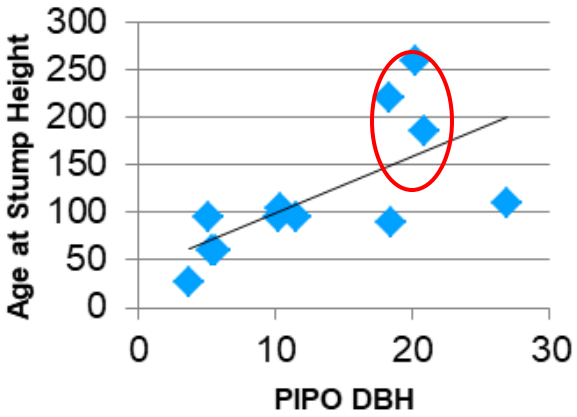
Prepared by Joe Trudeau for 4FRI-SHG Little Timber Sale tour, 9/25/2018. Revised 10/15/2018.

Supplemental Information

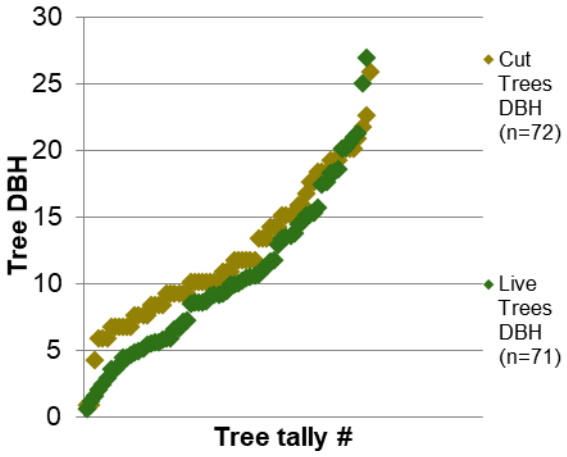
Percent of basal area removed by VSS class



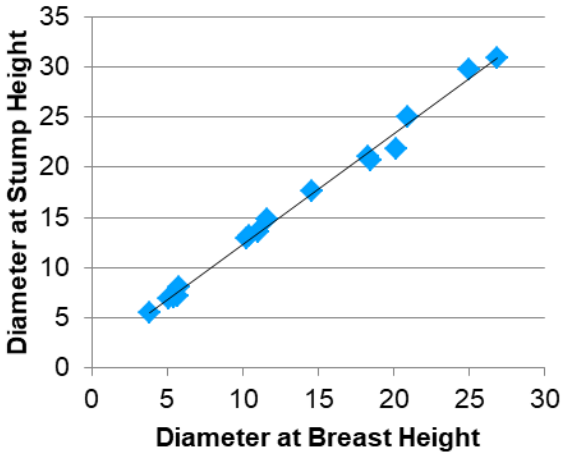
Sampled Tree Ages



DBH of PIPO Cut vs. PIPO left



Taper Ratio: DBH/DSH



16" DSH (13.2" DBH)
230 years old at stump via ring count

22" DSH (18" DBH)
170 years old at stump via increment borer

26" DSH (21.3" DBH)
6" DBH leave tree has DMR score of 5

Supplemental Photos

Four 170-year old stumps (one not visible) surround a suppressed 6" DBH tree that is more than 60 years old. It is extremely unlikely that the old growth trees were severely infected with mistletoe while the small tree was uninfected.

Supplemental Photos

A 36"diameter ponderosa pine stump, approximately 160 years old. At the cusp of being a large young tree, this tree was presumably removed because of heart rot, likely visible in a broken top. Such trees are valued wildlife habitat.

Supplemental Photos

A tree that, based on bark character, was undeniably an old growth tree. As open as this area is, it's hard to reconcile that the tree had to be removed to meet restoration objectives. Nearby old trees showed no signs of mistletoe infection.

Supplemental Photos

A 32" diameter stump, aged at >160 years old, in the most aggressively thinned portion of Unit 10. The West Escudilla EA defined old trees as those >150 years, and claimed that removal would be rare except in cases of severe mistletoe. Inspection of slash piles failed to reveal troves of mistletoe infected branches.

APPENDIX D

4FRI STAKEHOLDER POSITION STATEMENT: PLANNING FOR STANDS WITH A PREPONDERANCE OF LARGE YOUNG TREES (SPLYT)

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Four Forest Restoration Initiative (4FRI) Stakeholder Group

UPDATE to August 2017 Stakeholder Position Statement: Planning for Stands with a Preponderance of Large Young Trees (SPLYT)

At the September 2017 4FRI Stakeholder Group meeting, stakeholders re-visited the need for utilizing Site Class filters to determine SPLYT stand management. Full consensus was reached to remove all Site Class filters for such analyses. Please consider the following statement the final position of the 4FRI Stakeholder Group:

The iterative spatial analysis and field validation effort undertaken by the 4FRI Team and stakeholders yielded an initial filter for SPLYT stands located outside of Mexican Spotted Owl (MSO) Protected Activity Centers, MSO Recovery Habitat, and wildland urban interfaces (WUI). SPLYT criteria are: a) Quadratic Mean Diameter (QMD) of the largest 20 trees is >15" and b) there is >50 square feet/acre of basal area (BA) in trees >16" diameter at breast height (DBH). All stands will be field-verified prior to mechanical thinning. Stands (or portions thereof) meeting SPLYT criteria, including those not captured by the data filter, will be treated at the lowest range of intensity. For example, a stand identified with the flexible toolbox to receive a Uneven-aged treatment with 10 to 25% interspace (UEA 10-25) treatment would be treated to 10% interspace and to the upper end of Natural Range of Variability (NRV) for trees per acre (TPA) and BA in order to maintain large tree dominance and conditions favorable to canopy-dependent species. Stands (or portions thereof) that are captured by the SPLYT criteria data filter but upon field verification are determined not to meet the SPLYT criteria will be treated within the range of intensities applied to other non-SPLYT stands.

Statement approved by unanimous 4FRI Stakeholder Group consensus on September 27, 2017 and provided to U.S.D.A. Forest Service 4FRI Board and Planning Team on October 13, 2017.

Sue Sitko

Sue Sitko
Co-Chair, 4FRI Stakeholder Group

Diane J. Vosick

Diane Vosick
Co-Chair, 4FRI Stakeholder Group

APPENDIX E

AGFD REPORT:
REFERENCE CONDITIONS, DESIRED CONDITIONS AND RESTORATION TREATMENTS FOR 4FRI RIM COUNTRY: THE SCOPE OF INFERENCE FROM CURRENT SCIENCE

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Reference Conditions, NRV, Desired Conditions, and Restoration Treatments for 4FRI Rim Country: The Scope of Inference from Current Science

Steve Rosenstock and Haley Nelson, Arizona Game and Fish Department, Phoenix

July 19, 2018

(this document is an updated, narrative summary of a May 18, 2018 Powerpoint Presentation to the 4FRI Stakeholder Planning Work Group)

Background. Desired Conditions (DC) for restoration and management of Southwestern coniferous forests have been an ongoing point of discussion and controversy. These DCs (as articulated in Reynolds et al. 2013, RMRS GTR-310) rely heavily on studies that reconstructed "reference condition" forest structure and its "natural range of variability" (NRV) prior to ecosystem disruptions (fire suppression, livestock grazing, etc.) that followed European settlement. Reference condition NRV's are seen as equilibrium states that can optimize ecosystem function/services, be sustained over time under expected disturbance regimes and a changing climate, and thus represent appropriate targets for management.

Discussions about DCs entered the 4FRI arena in response to proposals for expanded higher-intensity mechanical thinning in the Rim Country EIS. Per USFS staff, these treatments (variously referred to as "Functional Restoration," "Extended Duration Restoration," "Protection of Values at Risk," etc.) are intended to put stands on a more rapid trajectory toward DCs and maintain those states for a longer period of time.

DCs for Southwestern ponderosa pine specify very open conditions, e.g., at mid-scale (10-1,000 ac), 52-90% of the area is in openings, unless trees are strongly aggregated (70-90% in openings). Some 4FRI stakeholders have questioned the degree to which current science supports extrapolation of these open conditions across the Rim Country landscape. This concern is exacerbated by silvicultural prescriptions that include thinning an additional 10-15% of the stand to create "regeneration" openings. Consequently, a stand assigned to have 40-55% interspace could actually have 50-70% total interspace post-treatment.

Objectives. The basic analysis addressed a relatively simple question – *What is the reliable scope of inference from existing data on reference condition NRV (that underpin DCs) to the larger Rim Country landscape*?

Approach. The initial challenge was how to reduce this large, highly complex landscape into a workable framework for analysis. Bell et al. (2009) and Rodman et al. (2017) found strong relationships between USFS Terrestrial Ecosystem Survey Units (TESUs), and variables

describing reference conditions. TESUs are spatially discrete units with distinct combinations of soils, topography, climatic regime, and potential vegetation that have been mapped across the four forests. The aforementioned studies found that forest structural characteristics, specifically tree density (which is central to current debates over NRV and thinning intensity), differed among, but were consistent within TEUs.

TESUs have also been used to plan treatments on both 4FRI EIS areas. For that purpose, USFS soil scientists combined multiple TESUs into strata that had common soil characteristics, climate, and treatment potential. These strata were described in the following documents: "*Combining Terrestrial Ecosystem Survey Units, Understory Diversity Trends, and Plant Associations to assist in Analysis of Existing Conditions for Forest Restoration at the Landscape Scale*" (Version #5, November 2010) and "*Watershed Interpretations for Stratums within Rim Country 4 Forest Restoration Initiative – Coconino/A-S National Forests"* (December 2015).

For our analysis, we assumed that individual TESUs represent landscape units that would have supported similar reference conditions prior to European settlement and constituted the "population of interest." We used USFS TESU data to develop a GIS coverage of ponderosa pine and mixed-conifer forest within the Rim Country planning area that could potentially receive mechanical treatment. We excluded non-forest types (e.g., grassland, wetland), pinyon-juniper and other woodlands, and coniferous forest on slopes >40%. We then identified TESUs of reference condition studies used by Rodman et al. (2017, Appendix A) and tabulated/mapped their extent within the Rim Country footprint. Those TESUs were considered to be within the scope of NRV inference from existing data.

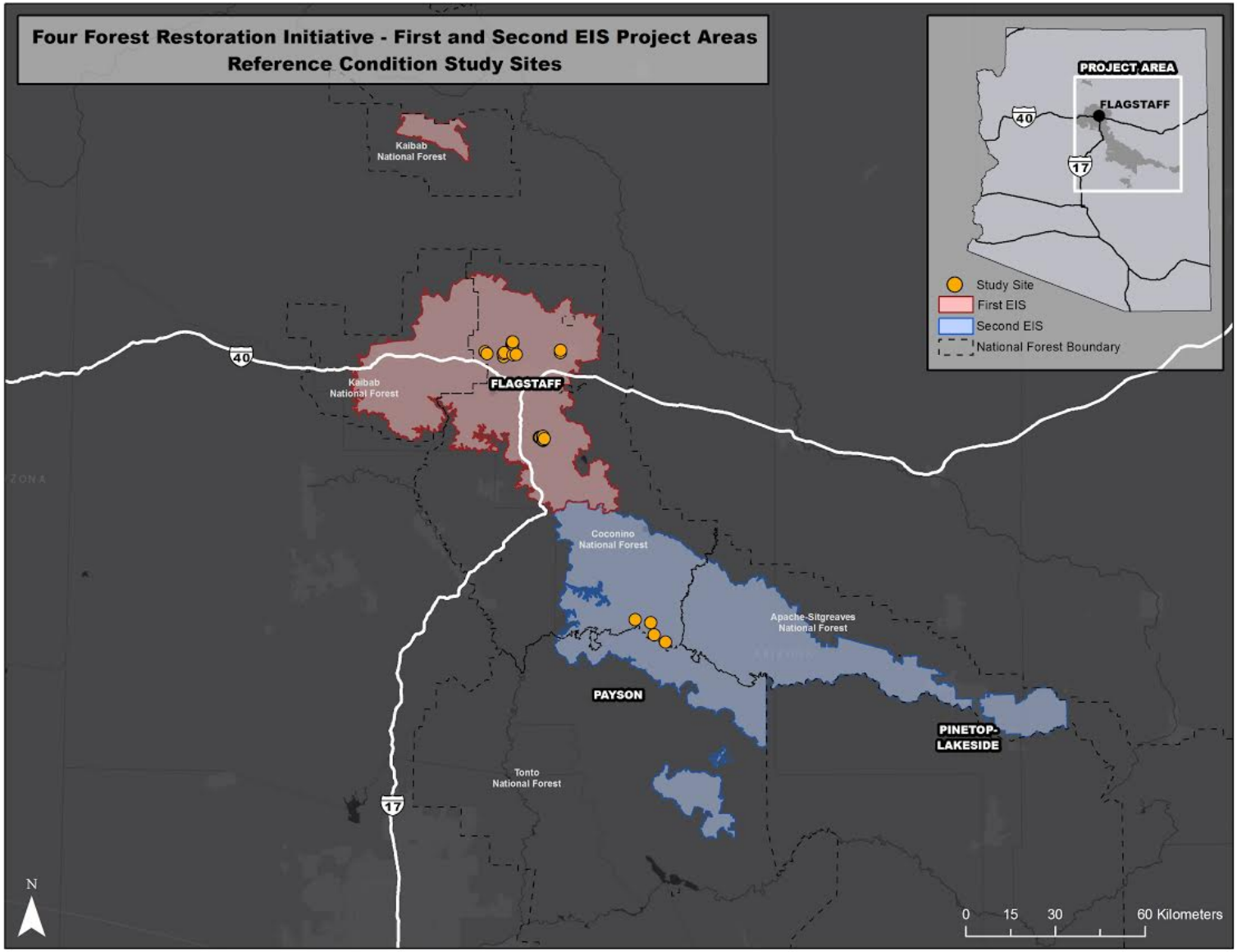
At the May 18, 2018 presentation to the 4FRI Planning Work Group, there were several constructive suggestions to expand the initial analysis. The first was to merge TESUs that cross forest boundaries and are essentially the same, but were mapped separately (and assigned different identifiers) during surveys on the respective forests. Unfortunately, we were unable to locate a crosswalk for these cross-forest TESUs and could not perform that analysis.

It was also suggested that the aforementioned TESU stratifications for Rim Country might identify a broader, potentially viable scope of inference from existing reference condition/NRV information. For this analysis, we applied the same screening criteria for mechanical treatment, and assumed that any stratum having one or more TESUs included in Rodman et al. (2017) was within the scope of inference.

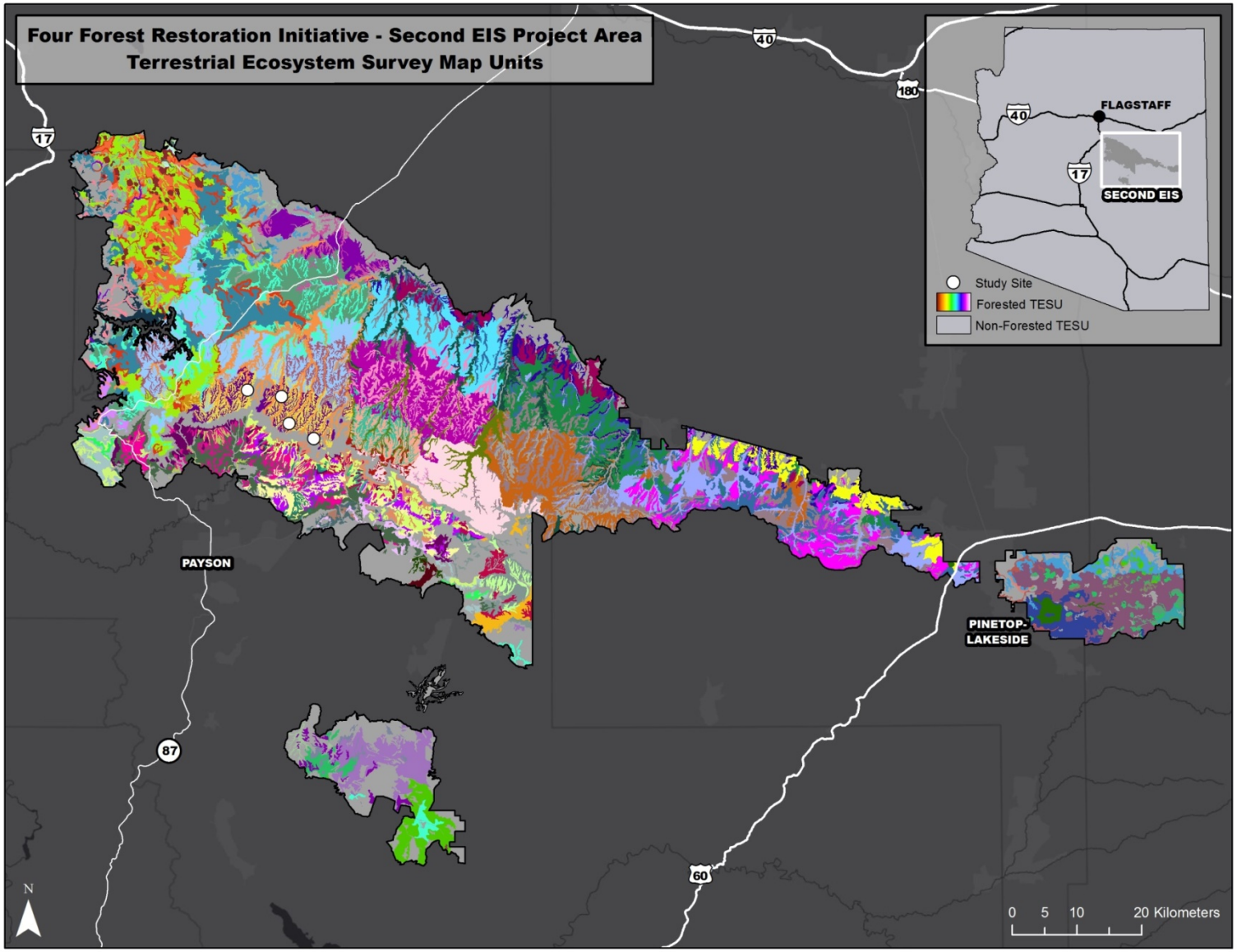
Finally, it was noted that the Long Valley Experimental Forest (LVEF), a research site on the Coconino NF, has soil conditions and forest structure that are not well represented in previous studies of reference conditions/NRV. We performed a similar GIS analysis for this area, to identify areas across the Rim Country footprint that could be represented by reference condition data obtained from LVEF.

Results

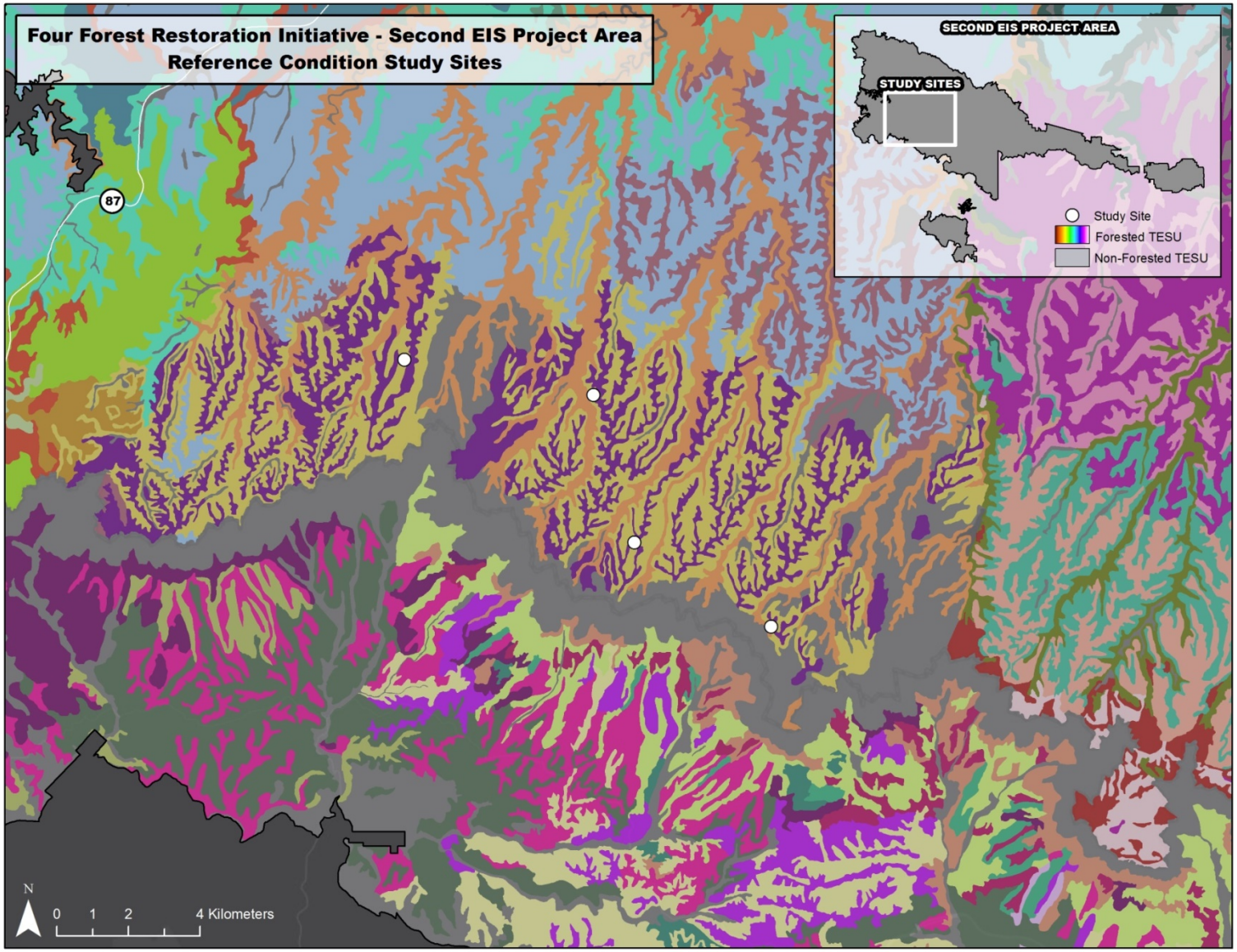
A total of 26 study sites (yellow circles) used by Rodman et al. (2017) are located in the 4FRI footprint, 22 in the first EIS area, four in Rim Country.



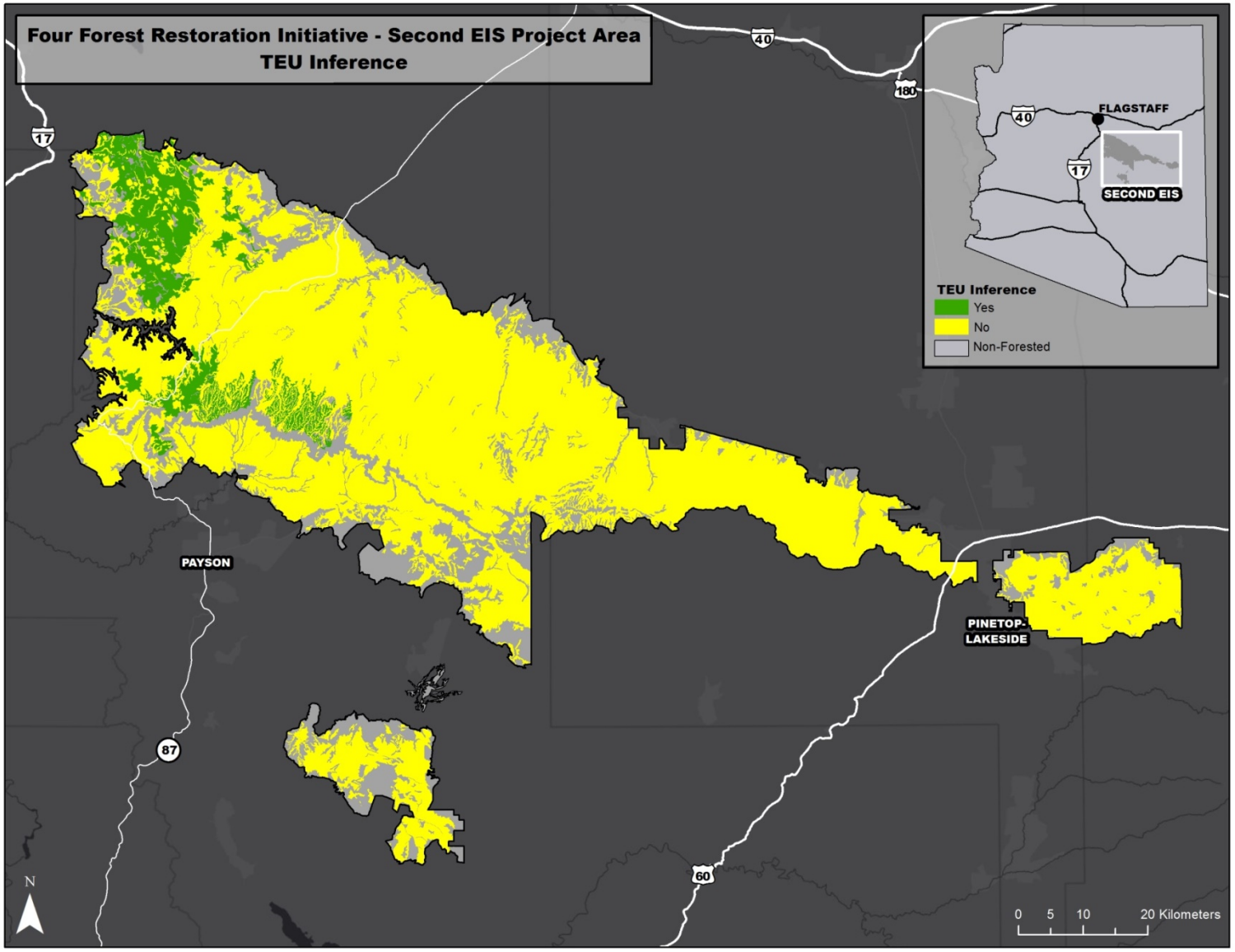
The Rim Country analysis area has 91 forested TESUs. Each color represents a different TESU, non-forest types are shown in gray. The white circles are reference condition study sites included in Rodman et al. (2017).



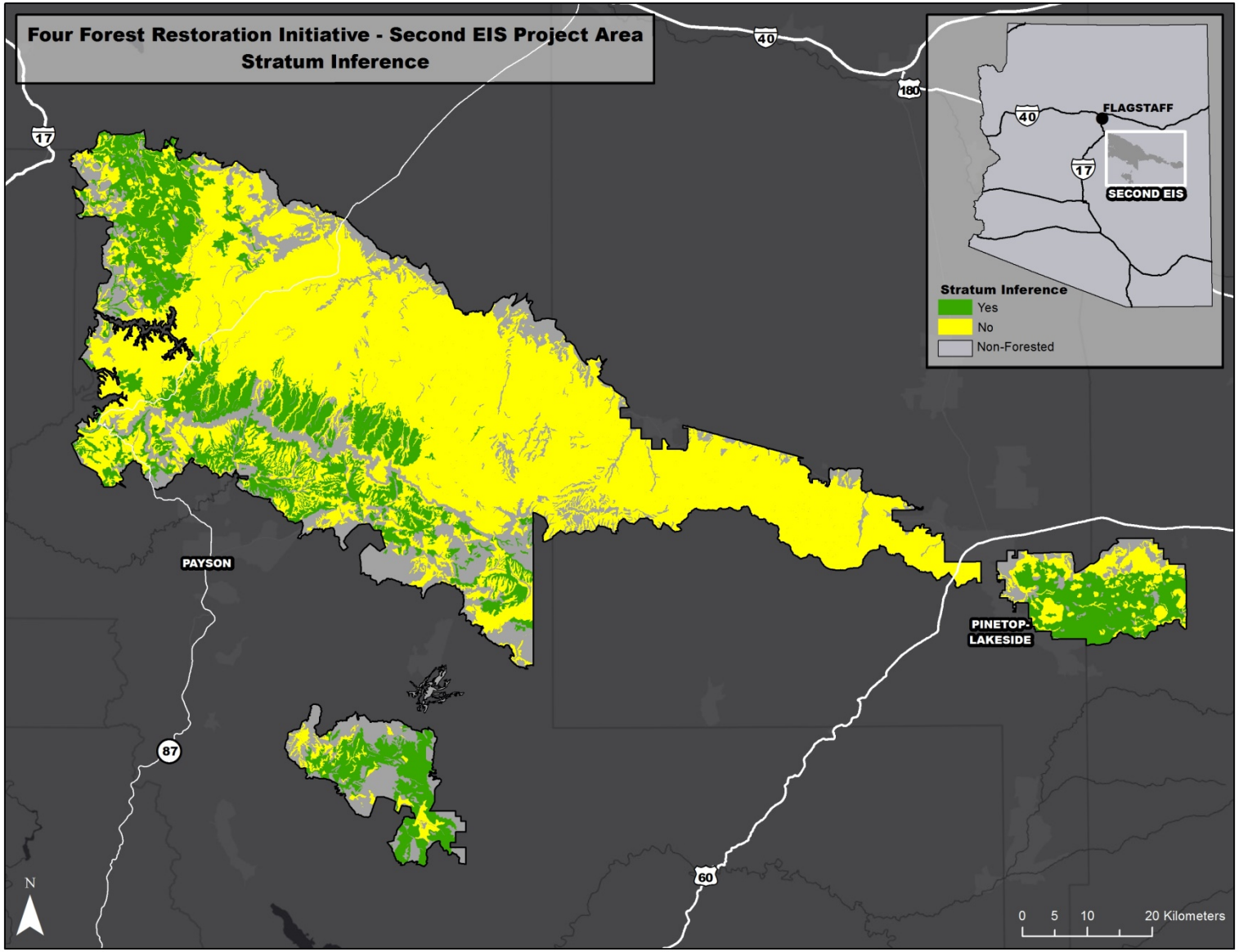
This is a zoomed area around the reference condition study sites (white circles) in Rim Country. Note the high diversity of this landscape, as reflected in the TESUs.



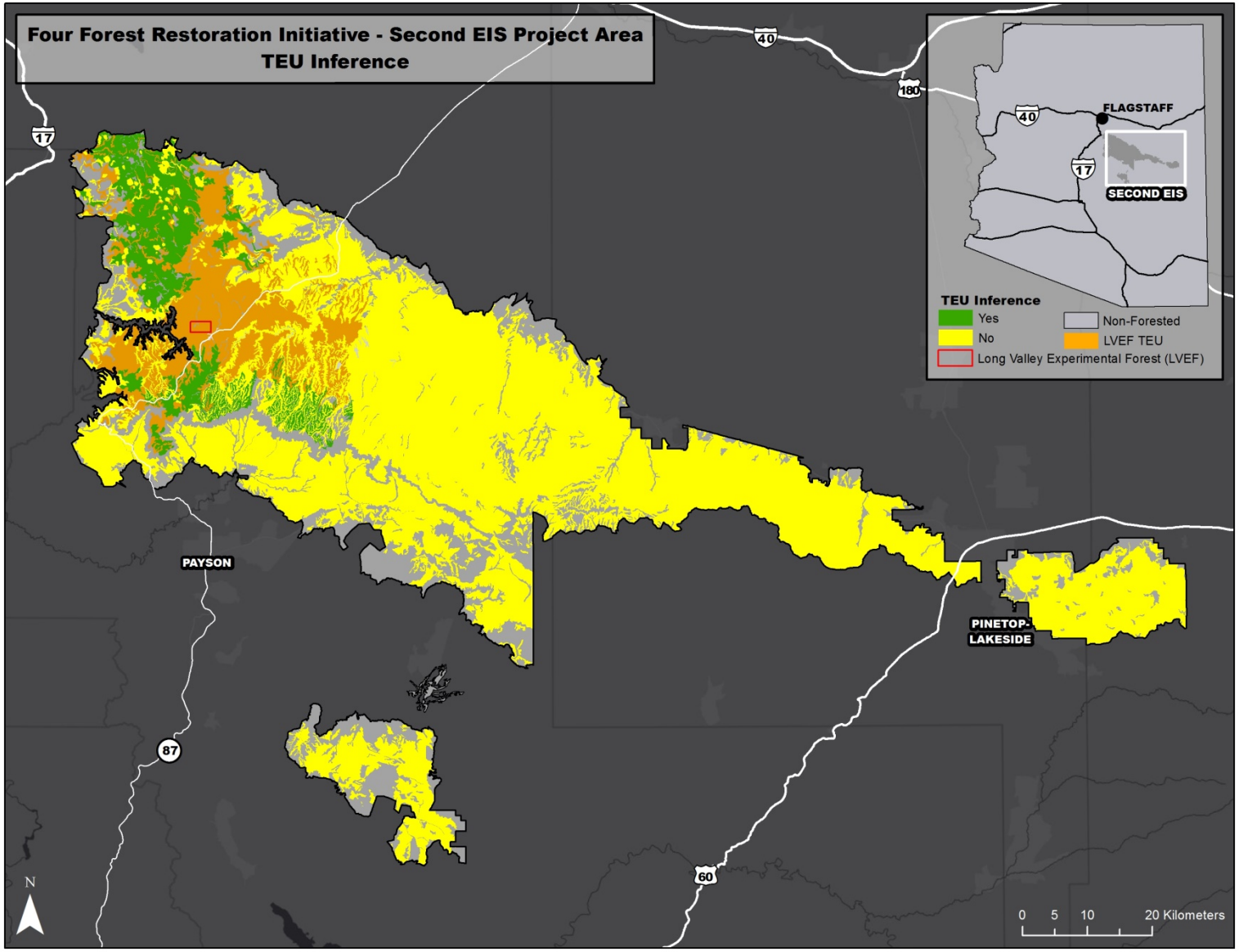
Six of 91 forested TESUs in Rim Country are represented in existing reference condition data, some from studies located outside the analysis area. TESUs within the "scope of inference" are shown in green, areas not represented in yellow, gray areas are non-forested types. Areas within the "scope of inference" are located in the western portion of the analysis area and highly clustered. They total approximately 87,000 acres, about 8% of the area (approximately 1,028,000 acres) that could receive mechanical treatment.



Analysis using USFS stratifications condensed the 91 forested TESUs to 25 strata. Strata within the “scope of inference” are shown in green, areas not represented in yellow, gray areas are non-forested types. Areas within the “scope of inference” total approximately 258,000 acres, about 25% of the area that could receive mechanical treatment.



The Long Valley Experimental forest site (orange rectangle) contains 4 forested TESUs. These represent an additional 133,000 acres in the Rim Country footprint that are not represented in existing reference condition/NRV data for Rim Country.



Conclusions. This simple analysis provides useful context to stakeholder discussions about the scientific basis for intensive thinning treatments -- which to this point have largely transpired in a "data-free" zone. Our results suggest that existing reference condition/NRV data may represent a relatively small portion of the Rim Country analysis area. Inferences from those data are further constrained by limitations of previous studies, including non-random placement of study plots and failure to report measures of variability for key parameters such as tree density, basal area, etc.

There are strong data indicating that contemporary forest stands in the 4FRI footprint have much higher tree densities than existed prior to European settlement, and are unsustainable. However, it is unclear whether or not reference conditions derived from a small number of geographically-clustered study sites can be reliably extrapolated to management targets for the 4FRI Rim Country (and Southwestern) landscapes writ large.

Cited References

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.

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 Forest Service Rocky Mountain Research Station General Technical Report GTR-310.

Rodman, K.C., A.J. Sanchez-Meador, M.M Moore, and 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.

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APPENDIX F

4FRI STAKEHOLDER POSITION ON DWARF MISTLETOE TREATMENTS IN THE RIM COUNTRY EIS

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http://www.4fri.org/

April 27, 2017

USFS 4FRI Chief Executive Scott Russell
sarussell@fs.fed.us

Re: 4FRI Stakeholder Group Position on Dwarf Mistletoe Treatments in the Rim Country EIS.

Dear Scott,

On April 5, 2017, members of the U.S. Forest Service (USFS) 4FRI ID Team gave a presentation to the 4FRI Planning Workgroup (PWG) on dwarf mistletoe concerns in the Rim Country EIS planning area. It included a review of the role of dwarf mistletoe in forest ecosystems, an assessment of historical and current mistletoe infection levels, and a proposal for aggressive, targeted treatments (aka "mitigation") in moderately to severely infected stands (>20% of area infected; up to 265,000 acres of the planning area under current Forest Plan direction). This "mitigation" approach was included in the Proposed Action prepared by the USFS. It was asserted that a failure to implement dwarf mistletoe "mitigation" would be contrary to direction in the Forest Plans.

The PWG evaluated the information presented by USFS and developed this recommendation for consideration by the 4FRI Stakeholder Group (SHG), and with its approval, communication to USFS. The SHG decided unanimously to adopt this recommendation at its April 26, 2017 meeting.

The SHG appreciated the Forest Service's outreach to the PWG and concurs with the stated goal of maintaining mistletoe as a natural component of restored forests. Dwarf mistletoe is a natural disturbance agent and component of coniferous forests within the planning area. The plant provides food and cover for wildlife; large-tree mortality caused by mistletoe is an important factor in recruiting snags that provide habitat for cavity-nesting birds and other species.

The historical and recent data presented by USFS did not make a compelling case that mistletoe infections within the planning area are significantly outside the natural range of variability and

pose a meaningful obstacle to meeting restoration objectives. The SHG welcomes additional data that USFS can bring to bear on this issue and the opportunity to see first-hand examples on the ground. We are also greatly interested in the larger discussion about using restoration treatments to address forest health concerns related to dwarf mistletoe.

The SHG feels that restoration treatments consisting of mechanical or hand thinning, followed by application of prescribed/managed fire at regular intervals, meet the intent of the Forest Plans and are the preferred approach for stands with high levels of mistletoe infection. Where needed, those stands could also be buffered to reduce mistletoe spread. The SHG also supports testing alternative restoration treatments for affected stands, if done at limited scale and in a learning/adaptive management framework.

The SHG also feels that traditional silvicultural approaches to managing dwarf mistletoe (e.g. overstory removal, even-aged management) are inconsistent with an ecological restoration approach and are not supported by the best available science. These may also be at odds with directions in 4FRI stakeholder foundational documents; the Collaborative Forest Landscape Restoration Program; and, the 2012 USFS Planning Rule. The SHG is particularly concerned that alternatives containing such aggressive treatments will be controversial and likely to impede timely completion of the Rim Country EIS and a Record of Decision.

Sincerely,

Jason Whiting, 4FRI co-chair

Jason Whiting
4FRI Stakeholder Group Co-chair

Travis Bruner, 4FRI co-chair

Travis Bruner
4FRI Stakeholder Group Co-chair

CC: Regional Forester Cal Joiner
Apache/Sitgreaves NF Supervisor Steve Best
Tonto NF Supervisor Neil Bosworth
Coconino NF Supervisor Laura Jo West
Kaibab NF Supervisor Heather Provencio

APPENDIX G

PUBLIC ENGAGEMENT IN ADAPTIVE IMPLEMENTATION: A PROCESS FOR ADAPTIVE IMPLEMENTATION OF THE SPRUCE BEETLE EPIDEMIC-ASPEN DECLINE MANAGEMENT RESPONSE EIS GRAND MESA, UNCOMPAGHRE, AND GUNNISON NATIONAL FOREST

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Appendix E:

Public Engagement in Adaptive Implementation

A Process for Adaptive Implementation of the Spruce Beetle Epidemic-Aspen Decline Management Response EIS

Grand Mesa, Uncompahgre, and Gunnison National Forest
USDA Forest Service
In cooperation with:
Rocky Mountain Research Station, USDA Forest Service
Colorado Forest Restoration Institute, Colorado State University

INTRODUCTION AND BACKGROUND

The purpose of this document is to describe activities comprising the adaptive implementation and monitoring framework for the SBEADMR project. The primary goals are to:

- continue the public participation and collaborative learning that occurred during the planning phase, encourage and support the continuation of collaborative workgroup efforts throughout implementation;
- ensure implementation of treatments is responsive to dynamic on-the-ground conditions, new scientific information, and public input;
- demonstrate compliance with management direction specified in the EIS/ROD;
- conduct a transparent adaptive implementation process that keeps the public informed of and involved in treatment unit timing, design, and monitoring;
- ensure integrated engagement of interdisciplinary team members, field personnel, scientists, line officers and the public;
- focus on shared priorities and work to resolve concerns and solve problems related to selection and implementation of SBEADMR treatment units;
- conduct monitoring activities, interpret and share results, adapt implementation practices to improve results and better meet project objectives.

ADAPTIVE IMPLEMENTATION FRAMEWORK

The SBEADMR FEIS/ROD specifies this adaptive implementation framework for defining treatment locations and design, determining monitoring questions, reviewing and evaluating the effects of treatments, and adjusting management towards desired conditions and away from undesirable conditions. These actions will involve public stakeholders, the science team, and forest staff. The public participation and collaboration process that occurred during the planning process was significantly aided by the efforts of a collaborative workgroup of diverse stakeholders. This group has indicated that it would like to continue convening and facilitating collaborative work to assist in applying this adaptive framework. Specific phases and activities are outlined below. The intent is that this adaptive implementation framework will be utilized over a multi-year timeframe (8-12 years).

Stakeholder opportunities to influence SBEADMR implementation are outlined for each step of the process. Opportunities are confined by the sideboards of the selected alternative, as outlined in the Final Environmental Impact Statement (FEIS) and Record of Decision (ROD). Further, the Forest Service retains the authority to make final decisions related to location, extent and types of treatments planned and completed consistent with the FEIS/ ROD. However, if at any-time a stakeholder has a specific question or concern related to any aspect of implementation under SBEADMR, forest staff will respond to stakeholder input to the greatest extent practicable and will provide feedback to stakeholders about how their concerns were addressed. The process outlined here is required by the ROD and stakeholder involvement will be ongoing throughout the life of the project.

Appendix E – Process for Adaptive Implementation of the Spruce Beetle Epidemic –Aspen Decline Management Response EIS

The adaptive implementation steps will cover pre-implementation treatment planning; post-implementation review; annual monitoring, evaluation, and new science integration; and annual management review with forest leadership team.

Commercial and non-commercial treatments that occur under the authority of the FEIS/ ROD will take up several years to pass through all the phases of implementation. Therefore, at any given time there will be several projects occurring that have passed through different steps of implementation and monitoring. The public will be invited to participate as discussed below.

Appendix E – Process for Adaptive Implementation of the Spruce Beetle Epidemic –Aspen Decline Management Response EIS

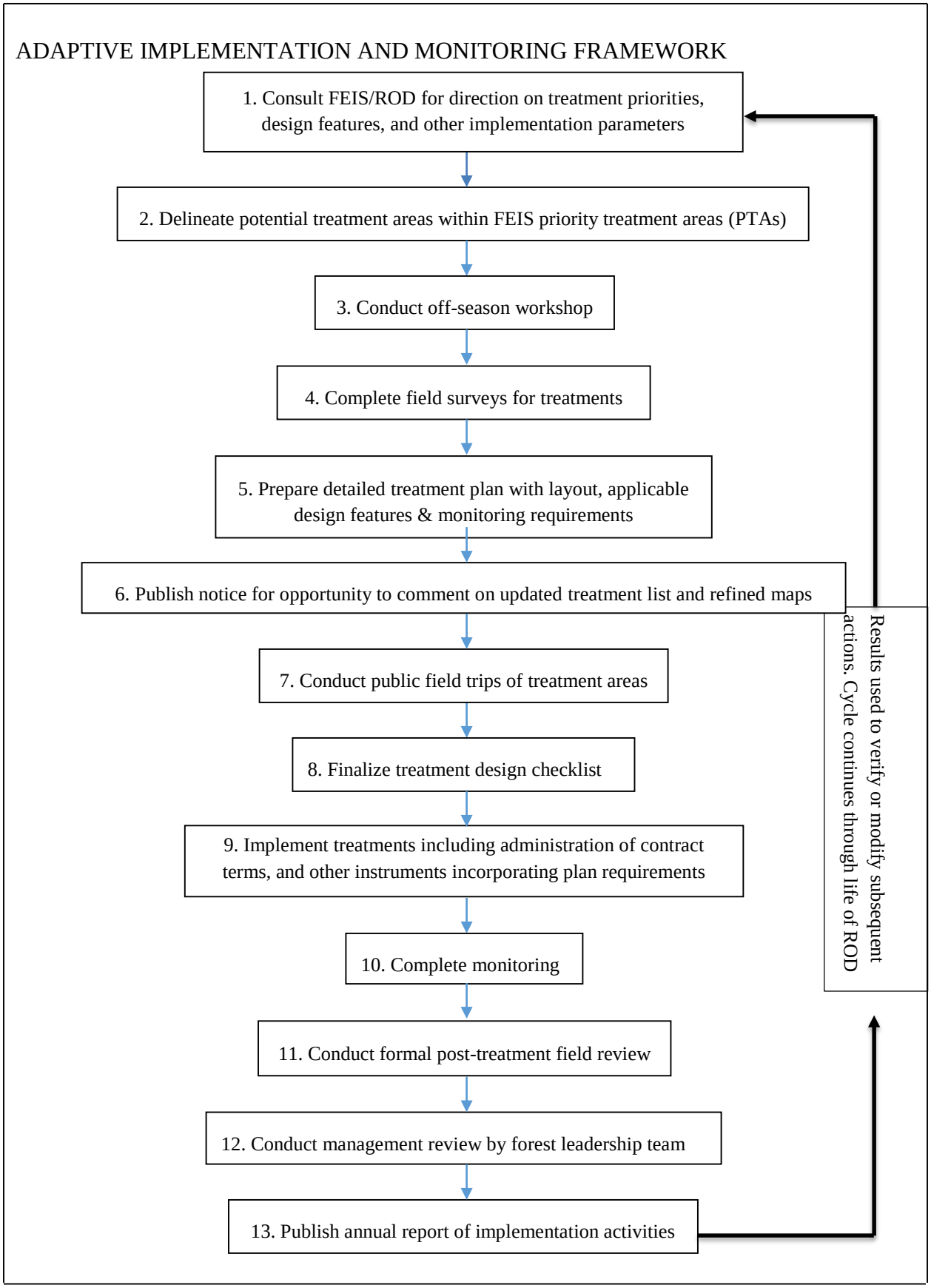

Figure 1. Adaptive implementation and monitoring framework. Details are provided below.

Step 1) Consult the FEIS/ROD for direction on treatment priorities, design features, and other parameters.

The direction in the FEIS/ROD reflects comprehensive public participation and collaborative efforts conducted over a three-year planning period. The public had opportunities to influence all elements of these documents.

Stakeholder Opportunities:

A. Become familiar with the implementation parameters of the FEIS/ROD to develop an understanding of these limits and requirements and enhance ability to more meaningfully participate in implementation and adaptive management;
B. Treatment needs outside of the FEIS/ROD would need to be addressed under separate planning efforts.

Step 2) Delineate treatment units within the FEIS priority treatment areas (PTAs).

The priority treatment areas (PTAs) will form the bounds for out-year SBEADMR treatments that become part of the normal Forest Service program of work, including the 5-year timber sale, fuels management, and wildlife habitat programs. Nearer-term treatment units will be delineated with more detail, while out-year treatments may be shown with broader PTA boundaries.

Stakeholder Opportunities:

The forest will share information on the details of proposed treatment units as they become available, thereby enabling the collaborative workgroup (Adaptive Management Group) and all stakeholders the opportunity to learn about implementation activities prior to the subsequent steps. Updated information will be posted on the forest website.

Step 3) Conduct off-season workshop with stakeholders and science team.

Each year a winter or spring workshop will be held with stakeholders, treatment implementation team, and forest leadership team members to discuss implementation program, including:

- Proposed new out-year treatments;
- Report status of treatments already planned/in process of being implemented;
- Findings from the prior-year management review of treatments and the out-year program of work;
- Monitoring results to date and proposed coming-year and out-year multi-party monitoring;
- Evaluation and feedback on potential need for change in implementation or monitoring practices;
- New science and individual studies within the context of the larger body of scientific literature;

- Updates and future use of GIS prioritization tool.

Stakeholder Opportunities:

A. Review updated maps of proposed treatment units, evaluate, discuss and comment on priority sequencing of treatments, treatment prescriptions, EIS/ROD compliance.
B. Provide feedback to the Forest Service regarding prior-year Management Review;
C. Input on types and location of monitoring. Participants will be invited to participate in monitoring during summer field trips;
D. Identify applicable peer-reviewed science to be considered in annual science summary;
E. Raise questions and make suggestions to be considered for further administrative study and multi-party monitoring.

Step 4) Complete field surveys of treatment units.

Forest Service personnel will conduct initial field surveys of proposed treatment units to confirm that treatments can be designed and implemented in conformance with FEIS/ROD parameters, and how to do so.

Stakeholder Opportunities:

The results from this agency effort will develop refined implementation products that will further inform the public in the following steps.

Step 5) Prepare refined treatment plans and implementation instructions, including applicable design features, unit layout guidance, road work, and monitoring requirements, including selection of applicable design features.

Confirm design features to be applied to the given treatment. These are actions that will be incorporated in a treatment when resource conditions indicate the need to do so. For example, presence of a goshawk nest in a proposed treatment area triggers the use of design features to protect goshawk. Treatments will be adjusted as needed to conform to requirements or treatments will be deferred.

Stakeholder Opportunities:

A. Detailed treatment plans will be posted on the forest website and available for public review as part of Step 6.
B. Forest implementation team will assist the Adaptive Management Group and other stakeholders in interpreting detailed plans.

Step 6) Publish notice of opportunity to comment on updated treatment list, treatment plans, refined maps, and schedule.

Annually, the Forest will publish a single notice in local newspapers requesting comments from the general public on the following year's planned treatments.[1]

Publication of the updated treatment list, status of implementation activities, refined treatment plans and maps will provide a broad audience of public participants an opportunity to stay informed of and comment on treatment implementation priorities, on-the-ground treatment design, and monitoring activities. This will be an additional opportunity benefiting those participants who are not available to participate in field trips and meetings. The review and comment period will run for 30 days. Comments will be considered by the implementation teams and responsible official and used to adjust treatment plans as warranted.

Stakeholder Opportunities:

Provide comments and recommendations to responsible official and district implementation teams concerning:

A. Selection and scheduling of priority treatments;
B. Types and locations of planned treatments;
C. Monitoring topics, questions, and priorities;
D. Application and adequacy of design features;
E. Treatment conformance to scope of FEIS/ROD, disclosure of environmental effects, and adherence to decision parameters.

Step 7) Conduct public field trips of treatment areas.

Every year the public will be invited to interact with the GMUG staff and science team members on SBEADMR implementation field trips. Each of the timber management zones (Gunnison Ranger District, Norwood-Ouray Ranger Districts, and Grand Valley-Paonia Districts) will host trips. There will between 1-3 trips per field season, depending on public interest. Field review will focus on pre-treatment areas; however post-treatment and monitoring activities will likely be viewed on the same trip.

Stakeholder Opportunities:

A. View changing conditions on the ground and discuss adaptive management principles;
B. Collaborative learning about on-the-ground conditions before and after treatment;
C. Discuss treatment rationale (fit to FEIS/ROD parameters) and treatment objectives;

[1] This clarification included in response to the administrative review of the FEIS.

D. For pre-implementation site visits, identify treatment-specific resource concerns. District IDT will seek to resolve resource concerns identified by the public to the greatest extent practicable.
E. For post-treatment site visits, IDT members will provide results from formal finding described in Appendix D--identified surveys, design features, and post-treatment monitoring.
F. Identify recommended treatment-level and project-wide adaptations;
G. View areas where monitoring activities have occurred and discuss findings.
H. View areas or discuss what treated areas will look like 10, 20, or more decades into the future—will desired conditions be met?

Step 8) Finalize treatment design checklist and implementation package (timber sale contract, stewardship contract, burn plan, etc.)

The GMUG implementation team will prepare final treatment pre-treatment checklist (FEIS Appendix C), contracts, agreements, burn plans, or other implementation instruments as reflective of this framework.

Stakeholder Opportunities:

Final documents will reflect public participation in previous steps and will be available for public review.

Step 9) Implement treatments, including administration of contract terms and other instruments incorporating plan requirements.

Administration of activities provides records of treatment compliance or approved modifications with rationale. This information will contribute to Steps 9-13.

Step 10) Complete treatment monitoring as specified in the final treatment design checklist and science team study plans.

Monitoring activities will be specified in pre-treatment checklist (FEIS Appendix C) and the ongoing work of the science team. The final set of monitoring activities will be responsive to the public input received in the previous steps. Monitoring results will be used to inform agency and public dialog and deliberation on adaptive management adjustments to the treatment.

Stakeholder Opportunities:

A. Participate in interpretation and use of monitoring data post-treatment reviews and mid-winter meeting.
B. Discuss potential changes in treatments as indicated by monitoring results.
C. Recommend changes in monitoring activities to better serve collaborative learning and adaptive management.
D. Participate in field monitoring opportunities identified in the science team program of work.

Step 11) Conduct formal post-treatment review.

Each year the forest will conduct one formal post-treatment to provide stakeholders the opportunity to interact directly with Forest Service implementation teams, line officers, and science team members. Stakeholders will be invited to help select the commercial harvest, non-commercial mechanical treatments, or broadcast burning treatment subject to the review. This formal agency review will:

- Demonstrate treatments are implemented in accordance with the EIS/ROD and other requirements or identify corrective actions.

- Ensure Forest accountability to stakeholders and show that treatments are being implemented in accordance with best available scientific evidence through the iterative treatment design and monitoring cycle.
- Ensure Forest accountability to stakeholders that pre-treatment input was considered in treatment location, design, implementation, and follow-up.
- Provide specific feedback to regulatory agencies (e.g. Fish and Wildlife Service, State Historic Preservation Office, and EPA), documenting compliance with law and regulation specific to the SBEADMR ROD.
- Provide summary of findings and any recommended changes (from IDT and/or stakeholders) to treatment design and layout, best management practices (BMPs), design features, or other aspects of a treatment in a report submitted to the forest leadership team. Findings, including recommendations, will be addressed during the management review (Step 12).

Stakeholder Opportunities:

A. Provide evaluation and feedback on whether treatment implementation met expectations and was responsive to overall treatment objectives and FEIS/ROD requirements;
B. Provide evaluation and feedback about how well pre-treatment public input was incorporated into treatment design and implementation;
C. Develop treatment-specific input and recommendations informed by the preponderance of scientific evidence, such as effectiveness of design features to address resource concerns;
D. Foster dialog on implementation or monitoring concerns with IDT and science team, and develop recommendations for improvements.
E. Describe perceptions about whether desired conditions have been or will be met with treatments and follow-up activities.

Step 12) Complete management review by the GMUG forest leadership team.

The goal of this step is to make certain GMUG leadership stays engaged in addressing environmental, social and management issues and takes action for continual improvement and incorporation of new knowledge during SBEADMR implementation. Final decision of

management review will be applied to all future planned treatments under SBEADMR. The review will cover:

- Environmental and management issues resulting from SBEADMR implementation, and actions necessary to address concerns;
- Stakeholder recommendations and corresponding forest responses, provided at multiple stages throughout the year;
- Post-treatment IDT review;
- Information provided from multi-party monitoring efforts;
- New best available science summarized by the science team;
- Changes in agency policy or direction;
- Changed conditions (such as the US Fish and Wildlife Service listing a species as threatened or endangered);
- Conclusions on whether the reviewed information warrants modifications to SBEADMR implementation, and whether such changes are within the scope of the ROD/EIS.

Step 13) Publish annual report of implementation activities, stakeholder participation, and management review findings.

Following completion of the annual management review, the GMUG will publish on the forest website a summary of all the steps in this adaptive implementation and monitoring framework. The goal is to transparently ensure compliance with the FEIS/ROD, applicable laws/regulations, and integration of best available science throughout the life of the ROD; and to demonstrate responsiveness to public participation in this framework.

Stakeholder Opportunities:

A. Review annual report to stay informed of SBEADMR implementation activities;
B. Plan future participation in implementation and monitoring as the GMUG moves forward, repeating the steps of the annual framework.