Data Submitted (UTC 11): 3/22/2022 4:00:00 AM
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Comments: Southern Environmental Law Center | The Wilderness Society MountainTrue | Defenders of Wildlife | The Sierra Club

March 22, 2022

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Pursuant to 36 C.F.R. [sect] 219.54 (c)(3) Sam Evans of the Southern Environmental Law Center is designated as the lead objector.

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NOTICE OF OBJECTION

Defenders of Wildlife, MountainTrue, Sierra Club, The Wilderness Society and the Southern Environmental Law Center file this objection to the Final Land and Management Plan for the Nantahala and Pisgah National Forests under the process identified in 36 C.F.R. [sect] 219 Subpart B. Notice of availability of the Draft Record of Decision (Draft ROD), Final Environmental Impact Statement (FEIS), and the Final Land Management Plan (Forest Plan or Plan) was published in the Nantahala and Pisgah National Forests newspaper of record, the Asheville Citizen Times, on January 21, 2022; this objection is timely.

ELIGIBILITY TO OBJECT

The objectors have participated in revision of the Land Management Plan for the Nantahala and Pisgah National Forest for nearly a decade. Most of the issues raised herein were raised in Objectors' June 29, 2020, comments on the Draft Environmental Impact Statement (DEIS). See Letter from Sam Evans, SELC, et al. to Hurston Nicholas, Forest Service (June 29, 2020) (DEIS Comments); Letter from Karimah Schoenhut, Sierra Club to Michelle Aldridge, Forest Service (June 29, 2020). All remaining issues relate to information or decisions that were unavailable at the DEIS stage. Objectors document more specific connections to their previous comments throughout.

STATEMENT OF REASONS AND SUGGESTED REMEDIES

I. Introduction and Overview

Please accept the following Objection on behalf of The Wilderness Society, MountainTrue, the Sierra Club, and Defenders of Wildlife (collectively, "Objectors"). Along with their counsel, the Southern Environmental Law Center

(SELC), Objectors have participated in the plan revision process for the Nantahala and Pisgah National Forests (Forests) since the beginning. We have submitted formal or informal comments at every step of the process. Our comments on the Draft Plan and Draft Environmental Impact Statement (DEIS), to which we cite in this Objection, are attached here for reference.

A. The Collaborative Process

After reviewing the Draft Plan in 2020, Objectors were optimistic that the Forest Service would finalize a plan that would enjoy broad support, build social license, and result in better ecological outcomes. Although the range of alternatives in the DEIS made some troubling omissions, it reflected collaborative input. In direct response to stakeholder requests, the alternatives were structured to facilitate continued collaboration rather than to drive groups apart.

We therefore interpreted the Draft Plan as an indication that the Forest Service was genuinely interested in the collaborative solutions offered by the Nantahala Pisgah Forest Partnership ("Partnership"). Indeed, planning staff and agency leaders asked us (along with many others) to participate in and serve as ambassadors for the collaborative process. We took those requests seriously, and we stayed at the table even when it seemed impossible to find consensus. We stayed at the table even while Districts were proposing zero-sum projects that threatened to drive stakeholders apart. We stayed at the table because all of us, across all our diverse perspectives, believed that a more sustainable way forward was possible.

And the Partnership succeeded. Objectors were proud to join a set of collaborative comments on the Draft Plan that included strategies for land allocation, active management, and conflict avoidance, ensuring that as we stretch to meet some needs, we don't undermine others. Our recommendations asked the Forests to define a footprint for rotational harvest that would not force zero-sum choices between harvest and old growth, areas with confirmed rare and exemplary habitats, and currently undeveloped areas with high ecological integrity. At the same time, we supported targeted management in many of those same areas, including commercial harvest, when needed to improve stand-level conditions. We supported "stretch goals" subject to adaptive management triggers to allow growth without degrading resources the Forests are obligated to protect.

To be clear, these were not Objectors' preferred solutions. Had we commented alone, we would have asked for much more rigor in the Plan. Instead, these were new, integrated solutions that none of the stakeholders would have proposed individually. The collaborative recommendations were designed to harness project-level flexibility to ensure cumulative progress toward ecological, social, and economic sustainability.

B. The Plan

The collaborative recommendations showed the Forest Service a glide path to success. As a result, we were dismayed to see the final revised Plan. The Plan expands rotational harvest into over 100,000 acres of known old growth, state-recognized Natural Heritage Natural Areas (NHNAs), and largely undeveloped, inaccessible Wilderness Inventory Areas (WIAs). Under the Partnership's alternative, most of those acres would have been distributed between the old growth network, Backcountry, Special Interest Areas (SIAs), and Ecological Interest Areas (EIAs).

The differences between allocations in the Plan and in the Partnership's Draft Plan Recommendations are perhaps best epitomized by the EIA. The EIA was a major innovation, first proposed in the collaborative process by representatives from North Carolina's Wildlife Resources Commission (WRC) and SELC. Within the EIA, all management tools, including commercial timber harvest and associated road access, are allowed as needed to improve stand- level ecological trajectory consistent with ecological reference conditions. The EIA was intended to support compromise, particularly in WIAs. As the Partnership explained:

As in 2017, the biggest "allocations" question in terms of acreage is how to deal with the portions of Wilderness Inventory Areas (WIAs) that are not legally protected and are not otherwise addressed in our old growth and NHNA recommendations. WIAs are generally unroaded areas with no public motorized access. Familiar examples include areas like Daniel Ridge/Farlow Gap and Chunky Gal Mountain. These areas currently provide backcountry settings and have relatively high ecological integrity. On the other hand, they could be developed with road systems for scheduled timber harvest, and portions of some of them (e.g., Tellico Bald, Pigeon River Gorge) have been degraded by prior land uses and could benefit from active ecological restoration. These areas could theoretically be allocated to a wide variety of MAs, from Matrix to Recommended Wilderness.

NPFP Draft Plan Comments at 26.

Of the roughly 100,000 acres of WIAs falling into this category, the Partnership recommended approximately 70,000 of them for the EIA. In contrast, the Plan assigns only 20,000 acres total to the EIA, drawn mostly from Partnership-recommended Backcountry areas. The Plan's EIA is distributed mainly in small parcels where no harvest is expected.0F Meanwhile, the Plan assigns virtually all of the disputed WIAs to the Matrix and Interface MAs, where rotational harvest is planned.

All told, 610,434 acres (58.5% of the forest) are in Management Areas ("MAs") that are considered suitable for timber production. The timber production footprint has expanded in this Plan by 100,000 acres from the old plan. Half of those new acres are currently inaccessible, meaning that they lack the road infrastructure needed to support rotational harvest, creating a need for greater roadbuilding. To meet the Plan's ambitious objectives in this planning cycle alone, the Forests would have to expand the road system by at least 16%, as explained below.

To be clear, Objectors have not resisted the concept of rotational harvest on a footprint that avoids the highest priority conservation areas. Nor have we objected to the amount of active management proposed by the Forests. We strongly doubt that such levels are needed in the long term, but with clear guidance to ensure that the timber program is restoring ecological reference conditions and protecting rare and exemplary natural communities and other sensitive resources, we could have supported the numbers for timber management that appear in the Plan. Yet the Plan fails to include any of the needed safeguards.

Perhaps most disappointing, the Plan abandons any pretense that it will restore ecological integrity consistent with the ecological reference conditions developed by its own professionals. The most promising feature of the Draft Plan was its "ecozone desired conditions"[mdash]i.e., the ecological reference conditions for each major community type, which describe the natural range of variation for disturbance processes, structure (including young forest patch size and proportions), and species composition. In Objectors' comments on the Draft Plan, our primary complaint was that the objectives to create young forest in large patches, irrespective of ecozone, would not actually move the forest toward these ecozone desired conditions.

We expected that the Forests would make an effort to adjust their objectives to better meet the desired conditions. The Partnership pitched in with a list of consensus "priority treatments"[mdash]common departed conditions on the landscape where timber harvest, including even-aged harvest in many cases, is most likely to restore ecozone desired conditions[mdash]and asked that the Forests to ensure that half of its harvest activities were priority treatments.

Rather than adjusting the objectives to meet desired conditions, the Forests responded by deleting the desired conditions. The Final Plan disclaims any requirement or intent to restore these reference conditions. Its silvicultural objectives would instead attempt to create high levels of young forest through even-aged harvest, irrespective of ecozone, even while its own models show that it must entirely liquidate the late-age seral class to sustain those levels.

The Plan's deletion of any requirement to restore ecological reference conditions also undermined the premise of its "coarse filter" approach to diversity requirements. The Plan creates habitat for species associated with large-patch young forest and fire-adapted communities, but it neglects to even consider the needs of small-gap associates, assuming contrary to its own scientists' input that their needs will be met by rotational timber harvest. And it refuses to take rotational harvest off the menu for state NHNAs[mdash]areas with confirmed biodiversity and high density of rare species. The analysis simply treats all acres within an age class as fungible; acres with rare species or existing old growth can be harvested because other acres elsewhere are going to get older eventually. This is not a rational way to maintain the viability of dispersal-limited species. And, lacking a reliable coarse filter, the Forests have failed to adopt adequate fine-filter protections to fill the gaps.

There is no plausible argument that this Plan is sustainable in the long term consistent with the 2012 Planning Rule's requirements to maintain or restore ecological integrity; resilience and biodiversity; and to contribute to economic sustainability. If the Forests intend to distribute timber harvest throughout the suitable base, then they will need to increase the extent of the already-unsustainable road system dramatically and will be unable to avoid logging old growth and NHNAs. If they intend to limit harvest to accessible lands or low-conflict stands, then they will not be able to meet their acreage and volume targets over multiple planning cycles. Neither the Plan nor its analysis discloses that it is a promise waiting to be broken.

Furthermore, despite the exigency of the climate and biodiversity crises, the Plan utterly fails to consider that the Forests' actions here[mdash]in some of the most productive and carbon-rich forests in the National Forest System[mdash]could possibly contribute to a whole-of-government obligation to achieve net-zero carbon emissions. The Plan projects that nearly all its harvest will occur in productive, mesic forests where it is not only ecologically uncharacteristic, but also certain to reduce the forests' carbon storage potential, as compared to restoring characteristic structure and function at the ecozone scale. Although the Forests project that they will remove more volume from the Nantahala and Pisgah than was removed at the peak of unsustainable 1980s-era logging, they claim that their impact is just a drop in the global bucket.

Finally, the Plan's protections for water and soils also come up short. The Plan lacks any scientific basis to conclude that soils will not be impaired, and it backslides from the current plan by allowing ground-based logging on steep slopes, despite the extraordinary harm shown by its own monitoring of sites where this practice has violated the current plan's more protective standard. It assumes zero risk to waters (literally zero) from timber harvest and associated roads and skid trails. And it allows the continued accumulation of road prisms from incompletely decommissioned temporary roads.

The Plan is, in a word, a disappointment.

At this stage of the process, we never imagined there would be so much left to do. It takes a lot of mistakes to get something so wrong. The lengthy Objection below is a function of the Plan's failure to take its legal obligations seriously, along with its lack of credible analysis.

It is difficult for us to criticize so unequivocally the work of people we care about and who we know care about these forests too. So much of the foundational work in this planning process could have advanced the science and practice of conservation planning in the Appalachians, if only it had been used to set a coherent restoration strategy. While we do not doubt the sincerity of the staff who worked on the Plan, we cannot support the final product. The Plan cannot be approved consistent with law, and it is therefore our responsibility to object.

C. Remedies

Fortunately, for those of us who still hope to see an implementable forest plan and improving ecological conditions on the Nantahala and Pisgah, the Plan is not yet final. We take the Forest Service at its word when it says that the objection process is an extension of the collaborative process. We note, however, that the Forests

have not been participants in the collaborative process so far, only observers. Where the collaborative process has produced solutions, the Forests have refused to acknowledge that there are even problems. Where stakeholders have worked to reconcile their needs, the Forests have not brought their own needs to the table.

Collaboration will not get us out of this mess unless the Forest Service is ready to join us. There are constructive solutions on the table, and we can still move forward together. We again affirm and endorse the Partnership's agreements, which are the backbone of the remedies we propose below. These are not the only possible solutions, but they have been vetted through a rigorous years-long process, and we are confident that they maximize the collective good. If the Forest Service has its own proposals to better resolve the tensions addressed by collaborative agreements, we are ready to hear them.

It is in the spirit of constructive dialogue that we propose the following solutions. We are asking the agency to make choices[mdash]to resolve tensions primarily between its logging program and the environmental values often harmed by logging. Those values are not abstract ideas; they are facts on the ground. They will not go away merely because the agency chooses to ignore them. Thus, if the Forest Service leaves the Plan without sideboards around those environmental values, then project-level conflict and inefficient analyses will be the sideboards.

Cross-Cutting Remedies

While many individual remedies are discussed in the following pages, three repeat often enough that they deserve a brief discussion at the outset.

Allocations

First, the Forests must adopt a land allocation strategy that will help it meet its obligations for an integrated, fiscally responsible plan that will sustainably provide for the full suite of restoration needs. Under the current allocation, the Forests have focused singularly on the creation of young forest by hook or by crook. The Partnership endorsed levels of timber harvest that would certainly kickstart the restoration of young forest, including by use of rotational timber harvest. But that strategy will not result in more efficient project delivery unless it avoids creating zero-sum choices between protecting rare ecological values and even-aged harvest. We already know where those zero-sum conflicts are. The Plan need only reflect that information.

If the Forests want to do the right things in the right places, the Partnership's allocations are the answer. Rotational harvest is not always the right thing, but it is broadly supported on the Partnership's suitable base. Compositional restoration is often the right thing, and it is especially appropriate in areas with generally high ecological integrity but some restoration need. Such areas should be mapped to the EIA, again consistent with the Partnership's recommendations.

The mapping provided by the Partnership reflects hard-earned, place-based compromise. Many acres that Objectors originally put forward as Backcountry or Recommended Wilderness were ultimately recommended as Matrix, Interface, or EIA. Likewise, many acres that other groups originally put forward as Matrix were ultimately recommended as EIA or Backcountry.

The value of the information in these maps is extraordinary. They represent the distillation of social sustainability in a set of GIS layers. The Forests should not so blithely dismiss them.

More efficient and responsible land allocations could also help to address legal deficiencies in the Plan and FEIS. Those deficiencies and their relationship to land allocations are discussed throughout this Objection.

Triggers

The issue of "triggers" has been frustrating for Partnership members and, we imagine, for the planning team as well. Because of the closed-door policy between the draft and final stage of planning, the Forests appear to misunderstand both the need for and the shape of this solution.

Objectors have asked the Forest Service to adopt specific "triggers" corresponding to tensions between some Tier 2 objectives and other resource protection obligations. The issue is very simple: Tier 2 is beyond the Forests' current capability. FEIS App. A at 176-77. If the Forests don't have the capacity to increase timber harvest levels without also keeping up with non-native invasive treatments and watershed improvements they say are needed to offset adverse impacts, then they don't have the capacity to increase timber harvest levels. If the Forests don't have the funding to expand the road network without also reducing the maintenance backlog on the current, inadequately maintained road system, then they don't have funding to expand the road network.

The Forests clearly have not grasped the concept. In the press, the lead planner explained:

Think about it. If road maintenance money arrived tomorrow, but we hadn't yet completed all of our plan activities for non-native invasives, we're not going to pause on our road maintenance until we get our non-native invasive work done. If we have the opportunity to do more, we're going to do those things, whether that's more fish passages or sustainable trails or whatever the case may be.1F

This response misses the point entirely. Road maintenance needs are not exacerbated by treating non-native invasive species, improving fish passage, or building sustainable trails. But some Plan objectives are in direct tension with other resource protection obligations. With ambitious goals for timber harvest that the Forests know are beyond their current capability, there is a high potential for goal interference between active management and other active needs for mitigation, including treatment of non-native invasive species, maintenance of roads to protect water quality, and watershed improvements. Triggers are an adaptive management strategy to show that the Forests are capable of mitigating harm before moving to "stretch goals."

In the Response to Comments, the Forests attempt to explain further:

All resource areas analyzed the effects of both tiers of objectives in Chapter 3 of the EIS, so the impact of moving to a Tier 2 objective on individual and integrated resources has been analyzed.

FEIS App. A at 177.

We agree that the Forest Service has analyzed the effects of both Tier 1 and Tier 2 objectives, albeit with many shortcomings as described in this Objection. For example, the Forest Service has attempted an analysis of the effects of Tier 2 objectives on young forest habitat creation. However, the Forest Service has not analyzed the effects of meeting Tier 2 objectives without meeting the corresponding objectives mitigating harm to resources directly impacted by timber harvest.

The FEIS makes the argument for us: "With the increased potential for more invasive species under Tier 2 vegetation management objectives, the Tier 2 objectives for invasive species treatments should be implemented in order to reduce the potential impacts of new invasive species infestations." FEIS at 3-448. The effects analysis assumes that Tier 2 levels of NNIS treatment will actually occur. Id. at 449. The same holds true for road maintenance decommissioning, which the FEIS assumes will occur and will offset the impacts of the road system and new construction. e.g., id. at 3-495, 3-497. Similarly, the FEIS assumes no long-term impact from temporary roads because temporary roads would be decommissioned to prevent any such impact. Id. at 3-73.

There is no analysis of the effects of Tier 2 levels of timber harvest without Tier 2 levels of NNIS treatment. There is no analysis of road construction effects without offsetting levels of road decommissioning. Yet the Forests have

stated clearly that if they have the funding for any Tier 2 objective, they can implement it without worrying about whether other needs are met:

Moving from Tier 1 to Tier 2 objectives for an individual resource is dependent on the additional capacity and resources that are contributing to the achievement of the objective. The final plan clarifies that any individual objective may proceed to Tier 2 when additional capacity and resources are available for that action.

FEIS App. A at 177.

This is inconsistent with the FEIS's assumptions. It is unlawful to leave essential mitigation needs behind but assume, for the sake of analysis, that they will be completed. If the Forests are as confident that they will mitigate the impacts of their actions as the FEIS suggests, then there is no harm in making that commitment in the Plan.

The Forests make one further excuse for omitting triggers:

The plan's monitoring program and adaptive management framework will evaluate whether plan direction and management are effective in maintaining or achieving progress toward the desired conditions and objectives for the plan area.

The Forests misunderstand adaptive management. An agency may always implement a decision, monitor its effects, and then change the decision as needed. That is not adaptive management as the agency has defined it. Adaptive management, as defined by Forest Service policy, "must clearly identify the adjustment(s) that may be made" as a result of monitoring. 36 C.F.R. [sect] 220.5. The EIS "must also describe the monitoring that would take place to inform the responsible official during implementation whether the action is having its intended effect." Id.

Here, the Forests have identified an "adjustment" that may be made during implementation[mdash]moving to Tier 2. But the adjustment must remain within "the bounds of [the effects] anticipated in the original decision." FSH 1909.15, Ch. 14.1. The Forests have not identified a monitoring strategy that would inform the responsible official that making the adjustment would remain within the bounds of the effects analyzed in the FEIS. There is only one way to do that: adopt monitoring thresholds (triggers) demonstrating that NNIS treatments, road maintenance and decommissioning, and similar necessary mitigations are in fact keeping pace with the timber harvest program.

By putting tiered objectives in the plan, the Forests are intentionally aiming beyond their fiscal capabilities. There must be some boundary between the tiers. Otherwise, the Forests don't have tiered objectives; they have unlawful, fiscally unconstrained objectives.

Priority treatments

Closely related to these "triggers" is the Partnership's pacing mechanism for priority treatments to accomplish ecological restoration. As the Partnership wrote in 2020, "[t]he Plan [hellip] needs a mechanism to harness project-level flexibility to achieve long-term goals." Requiring that half of timber harvests be in priority treatments, the Partnership believed, "would give the Forest Service a basis to conclude that the Plan will actually maintain and restore ecological integrity" over time, without limiting flexibility in any particular project.

Current projects show how prescient that recommendation was. As discussed further herein, 60% of the harvest in the Forests' current projects are located in the cove ecozone. As the Partnership wrote charitably, "project-level incentives tilt toward activities that are less likely to achieve our full range of restoration goals but are more commercially attractive." While harvest in coves can "help to pay for other needed work elsewhere," "too much young forest in cove ecozones" could cumulatively "impede our progress toward ecozone desired conditions."

Restoration inherently requires some attention to the proportions of different types of actions, because local decisions have to contribute to landscape-scale outcomes. Pacing is the solution to ensure that "flexible" project development doesn't result in doing the same easy, cookie-cutter things over and over again, moving away from NRV.

Additional Remedies

Without excluding other legal obligations that may be discussed herein, the Forests must:

* Supplement their analysis to compare alternatives' likelihood of conflict versus implementability;
* Supplement their analysis to comply with NFMA's requirement to avoid boom-bust cycles of harvest;
* Supplement their analysis to consider the cumulative carbon storage implications of planning, including a comparative analysis of a strategy (not yet considered) to restore key ecosystem characteristics consistent with ecozone reference conditions;
* Review existing projects for consistency with the new Plan and modify them to exclude inconsistent activities;
* Reconsider Plan-level allocations prejudiced by project-level decisions in a supplemental analysis and abandon project-level actions that were prejudicial;
* Update modeling and analysis based thereon to account for the host of errors described herein;
* Include known old growth forest in the designated patch network as recommended by the Partnership;
* Bring forward old growth patches designated under the current plan into the designated network;
* Adopt the cap and trade mechanism for adjustments to the old growth network;
* Adopt a standard prohibiting roads in the old growth network and in SIAs unless physically impossible to avoid;
* Protect NHNAs not allocated to SIA with components requiring they be managed for the reasons they were delineated;
* Add old growth (as distinct from old forest), the Rich Subtype of Rich Cove Forest, the Rich Subtype of Northern Hardwoods Forest, and the Basic Subtype of Montane Oak Hickory Forest to the list of rare habitats;
* Provide coarse filter protection for core salamander habitat and analyze accordingly;

* Reinstate draft component PAD-S-03 to commit the Forests to maintaining characteristics required by listed/SCC species;
* Amend TIM-S-14 to limit gap size to 10 acres in hardwood-dominated forests within .5 miles of known populations of Indiana bats, Virginia big-eared bats, and Northern long- eared bats;
* Include additional fine-filter components for the protection of Carolina northern flying squirrel, bats, cerulean warbler, rusty patch bumble bee, noonday globe, and sediment- sensitive aquatic species;
* Adopt standards, as described herein, for streamside management zones and ephemeral
* Require skyline logging by default on slopes over 40% unless another method is shown to be equally protective;
* Replace or justify the 15% threshold for ground disturbance;
* Require pre-harvest assessment of potential for base cation depletion in vulnerable areas;
* Clarify screening criteria for landslide and soil risk in a post-Plan process;
* Develop a guidance document post-Plan to identify relevant species and their passage needs for stream crossings;
* Adopt standards or guidelines better defining temporary roads and requiring complete decommissioning by reference Plan desired conditions;
* Supplement its analysis with further public comment on a monitoring plan that complies with the Planning Rule; and
* Reconsider allocations with supplemental analysis for Wilderness Inventory Areas as discussed herein.

The Forest Service Has Failed to Provide an Apples-to-Apples Comparison of Its Alternatives.

The FEIS comparison of alternatives is fundamentally misleading because it does not compare apples to apples. Alternative A, the current plan, sets a target of 3,300 acres per year of regeneration harvest young forest creation[mdash]a figure that is higher than comparable objectives in action alternatives. See Amendment 5 ROD at 7. Yet the FEIS assumes that Alternative A would result in only 650 acres per year[mdash]less than 20% of that total. In contrast, the FEIS assumes that Alternative E (like the other action alternatives) would reach 100% of their objectives, for timber harvest, fire, and the works.

The high discount rate on Alternative A is straightforward to understand: it represents the Forests' historical performance under the old plan. FEIS at 2-16 (assumptions based on "actual accomplishments"). Nowhere does the FEIS explain, however, why this same discount rate is not applied to the action alternatives. Why is Alternative E expected to achieve 100% of its objectives when Alternative A could manage only 20%?

As Objectors explained throughout comments on the draft, conflict has been the biggest drag on the old plan, and conflict has been driven by repeated proposals for rotational harvest in areas with locally rare or unique values or other sensitive contexts. These conflicts are predictable based on management area allocations. As we suggested, the greater the percentage of high conservation priority areas in timber production MAs, the higher the risk of conflict.2F

The Forests did not respond to Objectors' comments in any ascertainable way. Yet the fact remains that the action alternatives would be likely to cause different levels of conflict. With the least acreage in high-conflict areas, Alternative C would come closest to fully achieving its goals. (An even stronger case could be made for the Partnership's alternative.) Alternative E, with over 100,000 acres of high-conflict areas in suitable MAs, would likely fare no better than the old plan. As the Forests know, Tier 2 levels of management are impossible without partner contributions, but partners are not likely to invest in a high-conflict plan.

If the Forests have a different theory about why the old plan has been unsuccessful and why Alternative E can transcend that same fate, they have not deigned to explain it. The FEIS therefore violates NEPA's most basic requirement[mdash]the very "heart" of the analytical process. 40

C.F.R. [sect] 1502.14. NEPA requires an apples-to-apples comparison. Id. (explaining that an EIS must present alternatives in comparative form, "sharply defining the issues and providing a clear basis for choice among options by the decisionmaker and the public"). The Forests have failed to articulate a clear basis for comparing and choosing between the alternatives.

Although found nowhere in the FEIS or Response to Comments, the lead planner has explained in the press the agency's thinking about why projects implemented under the Plan can avoid conflict: "We're not harvesting timber at random. We're thoughtfully restoring ecosystems."3F Of course, this glib answer cannot fulfill the agency's obligation under NEPA. In fact, it makes the NEPA failure even more profound. Has the Forest Service not been thoughtfully restoring ecosystems under the old plan? The argument appears to be that projects will do rotational harvest better than they used to, without acknowledging that rotational harvest itself is the problem. See FEIS at 3-532 - 3-534. Despite the FEIS assumptions about silvicultural advances, moreover, the Plan itself does not require a single change, and it allows the resumption of clearcutting that was essentially phased out under the old plan. And the biggest change in the rotational timber harvest program, of course, is the new Plan's dramatically expanded footprint.

Furthermore, it is unclear what the Forest Service means to communicate by this statement. It cannot mean that the Forests intend to "thoughtfully" determine whether there is a stand-level need before assigning a treatment prescription. Even though treating stand-level needs can produce both compositional and structural benefits, Plan at 223 (explaining that restoring species composition would "result in a mix of forest habitats of various ages, sizes, and configurations), the Forests clearly explain that they will not limit themselves to treating stand-level needs. Draft ROD at 56 (stating that such a strategy would be "fiscally infeasible" at the "large scale"

desired).

Nor can it mean that the Forests intend to "thoughtfully" restore the ecozone-scale reference conditions[mdash]the characteristic patch sizes and distributions for the major forest community types. As noted above, the Forests deleted the desired condition that would have pointed them in this direction, and instead they note that they will "locally deviate" from ecozone-scale reference conditions, and that projects will instead "be designed to restore the landscape structure [hellip] at the forestwide scale"[mdash]i.e., balancing age classes irrespective of community type. Draft ROD at 66-67.

Throughout the Plan and FEIS, the Forests have told us that they intend to minimize the amount of thoughtfulness required for project development. Virtually all regeneration harvest will happen on "suitable" lands as part of a rotational timber harvest program. TIM-DC-06. The Forests have entirely conflated timber production and ecological restoration. As they explain, their "regularly scheduled timber harvest program" is "not for the primary purpose of producing timber but rather to meet restoration and habitat objectives for young forest." FEIS App. A at 76. Thus, the Forests' restoration, wildlife, and timber production goals are all wrapped up neatly in the rotational timber harvest program. It does not matter which of the three purposes is considered "primary," because the result is the same: local needs and values are subordinated to landscape-level goals for young forest and timber volume.

This type of harvest will cause conflict and undue harm because approximately one fifth of the suitable base is comprised of known old growth forest, NHNAs, and unroaded areas.

Without any commitment to limit the purposes for timber harvest, it is simply not credible to conclude that conflict over these values will magically be avoided in the absence of Plan direction to avoid it.

Furthermore, by failing to acknowledge in the FEIS that rotational harvest may be incompatible with other rare and unique values, the Forests show that they simply do not understand the problem. If they cannot explain in the FEIS that they understand rotational harvest in the wrong places is a problem, then it is difficult to believe that they understand the problem well enough to avoid it at the project level. This is especially true at this moment in time, as we reflect on a parade of projects that have targeted these values for rotational harvest precisely because the old plan did not forbid it. The Forests have not earned the trust they are asking for, and trust demands accountability.

In sum, the new Plan will cause as much or more conflict as the old plan, and the Forests have given no reason to justify an assumption that it will not. The FEIS simply makes no effort to explain why the poor performance of the old plan will be avoided in the future. The comparison of alternatives is therefore invalid. The Forests must supplement their analysis, evaluate the likelihood of fully implementing each alternative (including the Partnership's), and make a reasoned decision about which alternative will most fully meet the needs identified during the planning process.

The Agency's Definition and Implementation of "Sustained Yield Limit" is Inconsistent with NFMA and Facilitates Unsustainable Timber Harvesting in this Plan.

One of the National Forest Management Act's bedrock objectives is to secure long-term sustainability of national forest resources. This includes preventing a repeat of the boom-bust timber cycles that are responsible for much of the forest's currently uncharacteristically uniform age distribution. See FEIS at 3-117. Such boom-bust cycles tend not only to damage ecological integrity, but also undermine the stability of local economies. In this Plan, regeneration harvest will be targeted at the "low hanging fruit," but the Forests have refused to consider the effects, in future planning cycles, when the remaining fruit is out of reach.

At the DEIS stage, we cautioned the agency that its draft proposed "to log too much of the economically valuable

cove forests to subsidize non-viable harvests in unsuitable ecozones" which would violate various NFMA provisions. See DEIS Comments at 86-89.4F Unfortunately, the FEIS and Final Plan fail to correct these problems and set the forests on a trajectory to overharvest in certain ecozones[mdash]particularly cove forests[mdash]and in areas of the forest that have current road access and are economically viable, leaving non-viable work to the future. As explained elsewhere, this is inconsistent with ecological integrity. It also poses the separate problems of leaving less viable work available for future planning cycles and a strong likelihood of a declining flow of timber volume. As discussed below, the root of this problem can be traced to an unreasonable definition of sustained yield limit (SYL) in the Forest Service Handbook, but it also violates the Planning Rule's requirements for economic and social sustainability.

To remedy this error, the agency should[mdash]at bare minimum[mdash]adopt the MA allocations and the pacing mechanism recommended by the Pisgah-Nantahala Forest Partnership, which would require the Forest to ensure that at least half of its regeneration harvests at Tier 2 harvest levels are improving the site-level trajectories of stands in need of compositional restoration, on a footprint that does not assume future development of areas that cannot feasibly be accessed.

The agency could also develop a more realistic sustained yield limitation by basing its analysis on acres identified as suitable for timber production using the methodology in the DEIS, which was economically realistic about the viability of dry forests. The agency may be able to justify departures from a non-declining even flow (NDEF) if needed to address restoration needs that would diminish over time and establish a trajectory consistent with NRV. The agency's analysis, however, simply neglects to properly consider sustainability of the timber program over multiple planning cycles.

Under NFMA, national forest's must "determine forest management systems, harvesting levels, and procedures in the light of . . . the availability of lands and their suitability for resource management." 16 U.S.C. [sect] 1604(e)(2) (emphasis added). In doing so, the agency must "limit the sale of timber . . . to a quantity equal to or less than a quantity which can be removed from such forest annually in perpetuity on a sustained-yield basis" consistent with multiple uses. Id. [sect] 1611(a). NFMA requires explicit disclosure to justify any future decline in the volume that can be removed sustainably[mdash]a publicly vetted "planned departure" that must be consistent with other plan objectives.

Under the 1982 forest planning rule, the agency complied with these requirements by identifying the "[t]he highest uniform wood yield from lands being managed for timber production that may be sustained under a specified management intensity consistent with multiple-use objectives." 36 C.F.R. [sect] 219.3 (1982). The 2012 Planning Rule continues to require the agency to identify the "quantity of timber that may be sold from the national forest . . . in perpetuity on a sustained yield basis" but omits instruction about how to quantify that limit. 36C.F.R. [sect] 219.11(d)(6) (2012). Notably, during revision of the forest planning rule, commenters protested that the 2012 "rule was unclear on direction for limiting the quantity of timber removed annually in perpetuity on a sustained-yield basis."5F In response, the agency explained that it would subsequently "set forth procedures . . . to further explain the methods for determining the limit of the quantity of timber removed annually in perpetuity on a sustained-yield basis." Id.

Those procedures were ultimately provided in a 2015 revision to the agency's Forest Service Handbook. In a significant departure from past practice, there the agency defined "sustained yield limit" as "the amount of timber that could be produced on all lands that may be suitable for timber production, assuming all of these lands were managed to produce timber without considering other multiple uses or fiscal or organizational capability." FSH 1909.12, Ch. 64.31 (emphasis added); see FEIS at 3-535.

As explained in the FEIS, "[k]ey differences between the [1982 rule approach] and [2012 rule approach] center on lands included in the [sustained yield] calculation." FEIS at 3-535. "The 1982 [rule limit] is calculated from those lands only suited to timber production. The 2012 [rule limit] is calculated off the lands that 'may be suited

for timber production,' including lands that are ultimately found to not be suitable for timber production." Id. "[T]he 2012 [limit] is not constrained by fiscal, organization capacity, or multiple use objectives"[mdash]differences which "result in a much greater number of acres being included in the [2012 rule limit] calculation . . . which results in a higher annual sustained yield." Id.

This change[mdash]from the volume of timber that "can be removed" with a non-declining even flow, 16 U.S.C. [sect] 1611(a), to the volume that "could be produced" regardless of whether it would ever be removed, FSH 1909.12, Ch. 64.31[mdash]is inconsistent with NFMA. As noted above, NFMA requires the agency to determine "harvesting levels . . . in the light of . . . the availability of lands and their suitability for resource management." 16 U.S.C. [sect] 1604(e)(2). The Forest Service Handbook throws out this limitation by developing a sustained yield limit "assuming" lands that are identified as unsuitable for timber production and lands that cannot economically be harvested are "managed to produce timber without considering other multiple uses or fiscal or organizational capability." FSH 1909.12, Ch. 64.31; see FEIS at 3-535.

This is exactly what happened on the Nantahala-Pisgah National Forest. The "sustained yield limit was calculated from approximately 700,000 acres"[mdash]i.e., the sustained yield limit analysis assumes 700,000 acres are managed to produce timber. FEIS at 3-535. But under Alternative E, 238,416 of these same acres were removed from the suitable base because "timber production is not compatible with the desired conditions and objectives established by the plan." Id. at 3-541. Of the acres that remain in the suitable base, the agency concedes that harvesting in some areas is not economically viable and that "age and condition of the forest, landscape topography, and other constraints" otherwise limit timber production. Id. at 3-541 - 3-542.

Indeed, in the DEIS significant portions of the forest (dry ecozones) were excluded from the suitable base for this very reason. See FEIS App. A at 72.

Ultimately, even without removing the dry forests that may never be economically suitable for timber production, the FEIS discloses that under Alternative E only: (1) 107,751 acres are likely to be commercially viable over the life of the plan and accessible given the current transportation system, with (2) an additional 136,770 of commercially viable acres made available based on potential future road building. FEIS at 3-542. In this planning cycle alone, the Forest Service would harvest 94,000 of those acres, id. at xiv, nearly all of them in the moist and moderate moisture classes where harvesting is economically feasible. See Section II.B.3, infra.

In this planning cycle, therefore, the Forests would harvest 40% of the total accessible and inaccessible viable acres. That is theoretically possible, if we set aside access concerns (which are discussed elsewhere in this Objection).

Over multiple planning cycles, however, this rate of harvest is simply impossible. Even if every acre of potential harvest is made accessible with road infrastructure, and if every acre is in fact harvested there is a maximum of 505,618 acres to work with. FEIS at 3-542. The problem should be immediately and painfully obvious. Even if every acre were economically viable, the Forest Service would be harvesting them all on roughly a 100-year rotation in order to maintain Tier 2 levels of harvest over time. Of course, many of these acres will never be viable, as noted above. And these acres include known reservoirs of biological diversity, like state NHNAs and existing old growth. The Plan is making timber yield promises that the Forests simply cannot keep[mdash]at least not sustainably.

This has real consequences because it leads the agency to assume it can sustainably harvest timber "in perpetuity" at levels that are disconnected from reality. 16 U.S.C. [sect] 1611(a). This is harmful ecologically and to local timber interests who will be unable to rely on sustainable harvesting based on this improbable limit.

As we noted at the DEIS stage, this is particularly problematic in cove forests. Current projects are focusing approximately 60% of regeneration harvest in cove ecozones. If carried forward at 2,800 acres of regeneration

per year, this would equate to 33,600 acres over the life of the Plan. See section II.B.3, infra. This scale of harvest will take cove ecosystems well outside the natural range of variation with respect to the frequency, distribution, and proportions of large young forest patches and, as noted above, will be focused in economically viable areas with existing or potential future transportation access. See generally Section II.B.2, infra.

Relatedly, the agency anticipates levels of timber volume in this planning cycle that exceed any level ever achieved in the past. Compare FEIS at 3-544, tbl.211 (176,114 ccf annually at Tier 2) with id. at 3-526, Fig. 120 (showing a maximum of less than 120,000 ccf in the early 1980s). These projections depend on a volume-per-acre coefficient that requires harvesting almost exclusively in mesic forests. See FEIS at 3-542, tbl.211. This level of harvest will not be possible in future planning cycles because the accessible, economically viable timber will be gone, leaving other stands with less value and greater access costs. It will also be impossible because the forests will have tremendous deficits of mid- and late-aged forests that will need to be restored passively. See Section II.B.2 infra.

History bears out this concern. The Forest Service admits that a timber sale program is not implementable in these forests unless regeneration harvest in mesic systems is a large component of that program. See Draft ROD at 56 (explaining that "structural restoration," including harvest at patch sizes inconsistent with ecozone-scale NRV, is necessary to provide "timber harvest receipts" and "package successful timber sales"). As the Forests must surely know, the difficulty of putting together commercially viable timber sales over the past two decades was caused by the unsustainable rate of timber production from cove forests in past decades. The accessible, high-volume forests were historically targeted for production, which can be seen in the age-class distribution of cove forests in the "accessible" lands. As a result, the potential stumpage across the forest has been low, creating challenges for packaging sales. It has taken time for the coves to recover enough to be commercially viable again; the glut of cove forests harvested in the 1980s will not become viable until 2040 or later. During this planning cycle the Forest Service is rushing in to make the same mistake.

The unlawfully developed sustained yield limit[mdash]the mechanism that should have been designed to ensure harvest levels maintain a sustainable, non-declining flow of timber over time[mdash]enables this outcome to repeat by assuming harvest can viably occur in areas where elsewhere the agency concedes it cannot. The measure itself is therefore arbitrary and incapable of demonstrating compliance with NFMA.

In summary, the Plan's timber program depends on timber production at unsustainable levels. By inflating SYL to allow harvest in areas where it is prohibited and/or completely unrealistic, the Forest Service's definition and use of the SYL concept is unlawful, and it is effectively useless in the planning process. To show compliance with NFMA, the Forests must assess, using some measure other than SYL, whether this Plan is setting future plans up for failure.

The failure to consider sustainability over multiple planning cycles also violates other provisions of the 2012 Planning Rule, namely the requirements to "ensure that the planning process, plan components, and other plan content are within . . . the inherent capability of the plan area, and the fiscal capability of the unit," 36 C.F.R. [sect] 219.1(g), and various requirements related to sustainability including economic and social sustainability, id. [sect][sect] 219.1, 219.8, 219.19. It is not sustainable to overharvest accessible areas and productive ecozones in one planning cycle and then leave less viable work to future planning cycles. It is ecologically unsustainable because it will result in "pulses" of young forest followed by longer periods of middle-aged forests that are neither able to support timber harvest or to produce characteristic gaps through natural mortality. It is economically unsustainable because it will encourage timber industry investments and then fail to support them. And it is socially unsustainable because it will lead to conflict as the agency finds that it must harvest productive forests in NHNAs and old growth in order to keep the pace.

Proper determination of a sustained yield limitation, along with a departure analysis if appropriate, should foreclose that outcome. Unfortunately, calculating sustained yield in accordance with the Forest Service

Handbook allows it. Regardless, the Handbook's faulty definition does not allow the agency to escape its sustainability obligations under NFMA and its 2012 Planning Rule.

Finally, focusing harvests in the most productive, easily accessible areas now[mdash]under the faulty assumption enabled by the SYL that this harvest level is sustainable long term[mdash]has consequences that the agency must disclose under NEPA and NFMA. For example, in the future the agency will have to choose between reducing harvest levels in cove ecosystems or additional road construction to access currently inaccessible cove forests. And by calculating the sustained yield limit assuming timber production will occur in areas where it "is not compatible with the desired conditions and objectives established by the plan," the agency will be forced to choose between sustaining harvest levels and potentially impairing other multiples uses. FEIS at 3-541. These are meaningful tradeoffs causally linked to decisions in the forest plan which requires consideration of their effects and public disclosure. They are impacts of the agency's creation, and the Plan makes them inevitable.

The Forests must make serious adjustments to the Plan to prevent this outcome. As we have argued throughout the process, the levels of timber harvest anticipated by the Plan are neither needed for purely structural reasons nor possible on a long-term basis. However, as we have also repeatedly noted, there are good arguments for higher levels of timber harvest in this planning cycle[mdash]namely, to restore species composition, improve stand-level trajectories in degraded forests, and restore levels of young forest that are lacking due to historical logging levels and missing disturbance processes. Such a strategy, on a footprint that excludes the highest-value conservation areas, would protect biodiversity while we work to restore the forests' function[mdash]the disturbance processes that will create characteristic structure and composition in the future with less need for manipulation.

NFMA provides the framework for making such a decision, giving planners the tools to weigh long-term sustainability against short-term needs in a departure analysis. No such analysis was attempted here; the problem was simply ignored in reliance on a standard that doesn't answer a question the statute says is controlling. The Forests must therefore supplement their analysis to calculate a sustained yield limit based on suitable acres and known limitations on the economic viability of dry forests, and they must disclose the serious future impacts to ecological, economic, and social sustainability discussed above. They must also, at a minimum, (a) adopt the Partnership's management area allocations, which would help to mitigate the Forests' failure to internalize access costs when considering long-term sustainability, and (b) ensure that at least half of acres harvested are in priority treatment areas, which would help to prevent unsustainable proportions of harvest in mesic forests during this planning cycle.

The Forest Service Must Review Previously Approved Project for Consistency with the Revised Plan and Those Projects Cannot Prejudice Plan Alternatives.

Under NFMA, projects must be "consistent with the land management plans." 16 U.S.C.[sect] 1604(i); 36 C.F.R. [sect] 219.15. The Draft ROD explains that "[p]reviously approved and ongoing projects and activities are not required to meet the direction of the [revised] Plan and will remain consistent with the direction in the 1994 Forest Plan." Draft ROD at 82. This does not comply with NFMA.

When amending its forest planning rule in 2012, the agency explained how to determine whether previously approved projects were consistent with a revised plan. There are two methods:

1) the plan decision document must expressly allow such projects to go forward or continue, and thus deem them consistent, or 2) in the absence of such express provision, the . . . project, or activity must be adjusted as soon as practicable to be consistent with the plan, plan amendment, or plan revision, subject to valid existing rights.

68 Fed. Reg. 21,162, 21,240-41 (Apr. 9, 2012).

The agency has not complied with the first provision because its finding in the ROD turns on consistency "with the direction in the 1994 Forest Plan"[mdash]not the revised plan. Draft ROD at 82. A project cannot be "deemed consistent" with the new plan based on an explicit finding that it is consistent with the old plan. Accordingly, the agency must review previously approved projects to determine if they are consistent with the revised plan.

This is not a hollow exercise. For example, the Final Environmental Assessment for the Southside Project prescribes two-aged regeneration harvest for stand 41-53. The justification for this treatment is "vegetation habitat improvement, and for forest regeneration, sustainability, and provision of early successional habitat." Southside EA at 10. Alternative E allocates stand 41-53 to the Special Interest Management Area which only allows timber management to "[i]mprove threatened, endangered, or SCC habitat, "[r]estore, enhance, or maintain rare plant communities," "[r]estore, enhance, or mimic historic fire regimes," "[r]educe insect and disease hazards," or "[p]rovide for public safety." SIA-S-02, Plan at 226. The agency must explain how two-aged regeneration harvest in this stand is consistent with the revised plan or omit this treatment from the Southside Project.

The agency also explains that it need not assess consistency of previously approved projects because "pre-existing actions were considered part of the baseline in developing the revised plan and its effects"[mdash]the implication being that including projects in the baseline effectively built in a consistency finding. Draft ROD at 82. However, a project cannot be deemed consistent with a new plan if it is in fact inconsistent. See Cherokee Forest Voices v. U.S. Forest Serv., 182 F. App'x 488, 495 (6th Cir. 2006). The FEIS does not show why, as a "baseline" matter or in any other way, that the Southside project is in fact consistent with the new plan.

Indeed, the incompatibility of the Southside Project's prescription for stand 41-53 with the revised plan torpedoes this assertion.

In addition, incorporating projects into the "baseline" by requiring that the final plan alternative avoid changes to those projects violates NEPA. During plan revision, the agency was prohibited from taking action that would "[l]imit the choice of reasonable alternatives." 40 C.F.R. [sect] 1506.1(a)(2) (1978 and 2020). The agency has plainly violated this requirement if it required that the Plan leave intact projects approved during plan revision. Stated differently, NEPA prohibits the agency from effectively making plan-level decisions through project-level analyses during forest plan revision. Instead, the agency is required to make these decisions independently and evaluate previously approved projects for consistency with the new plan after revision is complete.

The agency appears to admit that it committed this error[mdash]limiting plan level alternatives through project-level decisions[mdash]regarding the Buck Project in Clay County, NC. The Buck Project was very controversial, in part for proposing road building and timber harvest in the Chunky Gal Wilderness Inventory Area. There were many logging units approved by the Buck Project that could have been impossible under the management area allocations under Alternative C. The project authorized logging in stands 102-3, 102-5, 108-20, 108-23, 114-17 that would have been inconsistent with those stands' allocation to the Backcountry Management Area under Alternative C. Similarly, the project authorized logging in stands 104-13, 104-18, 104-19, 109-7, 110-7, and 110-22 that would have been inconsistent with those stands' allocation to the Ecological Interest Management Area under Alternative C.

The revised plan allocates all these stands to Matrix[mdash]allowing the Buck prescriptions to move forward[mdash]with surgical precision. The Forest Service has gerrymandered the Plan to protect incumbent projects without first listening to the public's input in the planning process under NEPA. The map below shows timber harvest units in the Buck Project in relation to management areas in Alternative E.

MAP

Compartment 108 was considered for the Backcountry or Special Interest Management Area in Alternative C. As

shown on the map, a portion of Compartment 108 was allocated to Special Interest Area in Alternative E, but all portions proposed for timber harvest were carefully and precisely drawn into Matrix. This is no mistake. The Buck Project's prescription for stand 108-20 obviously influenced management area boundaries in the revised plan. Similarly, stands in Compartment 104 were considered for the Ecological Interest Management Area in Alternative C but were ultimately allocated to Matrix in Alternative E. By using the Buck Project decision to dictate management area allocation in the revised plan, the agency violated NEPA's prohibition on taking action that prejudices the choice before it. See 40 C.F.R. [sect] 1506.1(a)(2) (1978 and 2020). To remedy this error, the agency should disclose the role the Buck Project played in designing plan alternatives and abandon stand-level prescriptions inconsistent with management area limitations under Alternatives B-E.

II. The Plan Fails to Provide for the Maintenance and Restoration of Ecological Integrity.

NFMA and the Planning Rule Require That Forest Plans Commit to Restoring Ecological Integrity.

The Plan does not meet the requirements of NFMA, 16 U.S.C. [sect] 1600 et seq., or the 2012 Planning Rule, 36 C.F.R. Part 219. The issues discussed here were raised in detail throughout Objector's prior comments.7 Yet the Forests did not address those comments and have, in fact, gone backwards.

Although the Forest Service has done a good job of describing what ecological integrity should look like in the forest communities found on Nantahala-Pisgah, it has not adopted plan components that will maintain ecological integrity where it exists and restore it where it has been degraded. Further, the agency's analysis falls far short of showing that the forests' condition will improve toward NRV in the future. Nor does it analyze the full range of impacts the Plan allows. As a result, the Forests have not complied with NFMA, the planning rule, or NEPA.

The National Forest Management Act requires that units of the National Forest System develop and implement land and resource management plans. 16 U.S.C. [sect] 1604. NFMA requires a single, "integrated" plan, 16 U.S.C. [sect] 1604(f)(1), and the Forest Service's directives make clear that this means that the plan must be internally consistent[mdash]i.e., that some plan components do not preclude the achievement of others. FSH 1909.12, Ch. 22.

The Planning Rule requires that the Forest Service maintain or restore ecological integrity, defined as the condition of being within the natural range of variation (NRV). 36 C.F.R. [sect] 219.8(a)(1). This same requirement serves as the coarse filter for protection of biological diversity. To meet each requirement, plans must "include plan components, including standards or guidelines, to maintain or restore the ecological integrity. Ecological integrity is defined as "the quality or condition of an ecosystem when its dominant ecological characteristics occur within the natural range of variation." Id. [sect] 219.19 (emphasis added). Plans must maintain or restore ecological integrity along four dimensions: "structure, function, composition, and connectivity." Id. [sect][sect] 219.8(a); 219.9(a) (emphasis added).

The kinds of components required to meet these obligations[mdash]standards and guidelines[mdash] are mandatory and enforceable. Id. [sect][sect] 219.7(e); 219.15(d). Thus, the Planning Rule requires that units be accountable for achieving ecological integrity. To sum up, forest plans are legally required to contain binding components that "provide for" conditions on the forest that are within forest ecosystems' NRV with respect to their "structure, function, composition, and connectivity." Id. [sect] 219.8(a)(1).

Ecological integrity also requires plan components to maintain or restore conditions that "can withstand and recover from most perturbations imposed by natural environmental dynamics or human influence"[mdash]i.e., that these conditions be resilient. Id. [sect] 219.19. This, too, is accomplished by reference to NRV. As the directives further explain, NRV is "a guide to understanding how to restore a resilient ecosystem with structural and functional properties that will enable it to persist in the future." FSH 1909.12, Ch. 23.11a. As the agency has explained, the NRV requirement is premised on "the concept that the environmental conditions that sustained

species and other ecosystem components in the past are likely to sustain them (at least over the short term) in the future." Id. at 23.1.

To restore ecological integrity under the Planning Rule, the Forest Service must first identify the "key ecosystem characteristics" that will serve as the through-line from plan assessment to monitoring. 36 C.F.R. [sect] 219.9(a)(2) (plan "must include plan components to maintain or restore key characteristics associated with terrestrial and aquatic ecosystem types"); FSH 1909.12, Ch. 12.1, 12.13, 23.1, 23.11a, 23.11b, 32.13b.

Key ecozone characteristics are elements of ecosystems that can be affected by management decisions and measured. They were chosen as indicators because they will "respond[] to direct or indirect management or will inform management." Id. at 12.13. During plan revision, forests must identify the "scales at which key ecosystem characteristics are relevant to developing plan components." Id. at 12.12. Key characteristics correspond to the dimensions of ecological integrity: composition, structure, function, and connectivity.

Key ecosystem characteristics for composition include the diversity and proportions of characteristic native species. FSH 1909.12, Ch. 12.13 Ex. 01. Key characteristics for structure include patch size, quantity, and distribution for seral or successional stages. Id. Key characteristics for function include descriptions of ecological processes. Id. And key characteristics for connectivity consider distribution of habitat components and the ability of native species to move throughout the plan area. Id.

For these key ecosystem characteristics, the Forest Service must next define an ecological reference model[mdash]i.e., what ought to be the condition of those key ecosystem characteristics in a restored system? The reference model must match the ecosystem's NRV except in two limited circumstances: unless "information is lacking, or the system is no longer capable of sustaining key ecosystem characteristics identified as common in the past." Id. at Ch. 12.14a. An "alternative" ecological reference model can be developed only if "there is not enough information to understand the natural range of variation . . . or the system is no longer capable" of operating as it did in the past." Id. at Ch. 12.14b.7F

After identifying the ecological reference model, a planning unit must "[c]ompare the existing conditions of each key ecosystem characteristic with the [NRV]." Id. at Ch. 12.14c. For each key characteristic, the planning unit must determine if current conditions are contributing to ecological integrity, and, if not, whether they could contribute to ecological integrity "with changes in management or plan direction," or whether they are "not expected to contribute to ecological integrity" for reasons outside the agency's control. Id.

Although NRV is the default ecological reference model (and was used as the reference model by the Nantahala and Pisgah), by itself it "does not necessarily represent a management target or desired condition." FEIS at 3-102. To be sure, desired conditions and other plan components are developed separately, but they must move key ecosystem characteristics toward the ecological reference model, which here is based on NRV. See 36 C.F.R. [sect] 219.9(a)(2). As the directives acknowledge, plan components must generally be "aimed at maintaining or restoring the natural range of variation of specific key ecosystem characteristics." FSH 1909.12, Ch. 23.11a.

Although the Forests' ecological reference model is based on NRV, the Forest Service has argued that its plan components do not have to restore NRV. See FEIS, App. A at 49-50. The directives do provide that, "[f]or specific areas within an ecosystem, the Responsible Official may determine that it is not appropriate, practical, possible, or desirable to contribute to restoring conditions to the [NRV]." FSH 1909.12, Ch. 23.11a. However, as we explained in prior comments, such deviations must be limited to "specific areas" so that the exception does not overwhelm the rule[mdash]namely, the planning rule's basic requirement to restore NRV. See DEIS Comments at 112-14. Here, the agency has decided it need not even try to restore key ecosystem characteristics to the ecological reference model anywhere on the landscape, and that it can instead pursue a rotational timber program to balance age classes in perpetuity. Moreover, the even deviation for "specific areas" must be

explained in the plan Record of Decision. FSH 1909.12, Ch. 23.11a. Such decisions cannot be deferred from the plan to the project level, as the Forests suggest they may do here. Draft ROD at 66 (stating that it "may be appropriate" to deviate from NRV anywhere the Forests conduct timber harvest in the future).

This is flatly inconsistent with the Planning Rule. Even if restoring NRV is considered impossible or undesirable for specific areas, plan components must nevertheless be "based on a general scientific and ecological understanding of the conditions that would sustain key ecosystem characteristics." FSH 1909.12, Ch. 23.11a. There is simply no loophole to the Planning Rule's requirement to design plan components that will actually address the conditions of the key ecosystem characteristics that it has identified.

The Plan Does Not Sufficiently Commit the Forests to Pursuing Key Characteristics.

The Plan starts strong by affirming the Planning Rule's determination that an ecological system has integrity when its dominant characteristics are within their natural ranges of variation. Plan at 50. The Plan also sets out a desired condition to "restor[e] the key ecosystem characteristics of ecozone composition and structure, function and processes needed to maintain those key characteristics over time." ECO-DC-06. Giving substance to that desired condition, the Plan contains a detailed description of the ecological reference model for each of the forest's ecozones. Plan at 54-64. Finally, the Plan explains that restoration of key ecosystem characteristics according to this reference model is also the "coarse filter" for protecting biological diversity, noting that most wildlife habitats "are supported through restoration of [the key ecosystem characteristics] displayed above." Plan at 64.

But none of that work informs the Plan's objectives, standards, and guidelines. Rather than developing plan components to restore the key ecosystem characteristics according to the ecological reference model, the Plan sets objectives to balance age classes at the landscape level, regardless of their effects at the ecozone scale. The Plan components (and the model used to balance them) are premised on an assumption that is not justified anywhere in the FEIS, and which is flatly inconsistent with the ecological reference model[mdash]namely, that balancing age classes alone will restore NRV and serve as an effective coarse filter. This fundamental error undermines the Plan and violates the law.

The Final Plan Has Retreated from Commitments Made by the Draft Plan.

Troublingly, the Forests appear to have retreated from the Draft Plan's treatment of NRV, which reflected a greater understanding of and willingness to commit to achieving NRV for all required characteristics.

In the Draft Plan, the Forests included useful information that helped the public evaluate whether the Plan and its analysis accounted for ecozone NRV, such as graphs showing changes predicted by the Spectrum model and tables providing the numeric values for NRV by ecozone. DEIS at 161; Draft Plan at 58. This information was helpful at the draft stage because it revealed some of the fundamental flaws with the models and analysis. Unfortunately, similar information was omitted from the FEIS, requiring members of the public to obtain the raw data on which the analysis was based. Further, while we appreciate the Forests' provision of the data soon after the

Plan was published, the process of reviewing and creating graphs from the data to reveal its conclusions and assumptions was tedious and time-consuming[mdash]this information should have been more clearly disclosed to the public. Frustratingly, because interpreting the Spectrum data required independent derivative work, stakeholders reviewing the final plan did not have equal access to the FEIS's analysis. As we cautioned prior to the release of the Plan, and despite our best efforts to share information with other stakeholders, this undermined the trustworthiness of the analysis and resulted in stakeholders having different levels of understanding of what the analysis does and does not (and what it can and cannot) tell us about the effects of the Plan.

Even more troubling were the changes made to the Plan itself related to NRV. The first desired condition in the draft plan, ECO-DC-01, was a desired condition that "[t]he landscape sustains an evolving network of structural classes (from young to old) within the natural range of variation for each ecozone." Draft Plan at 45 (emphasis added). In the Final Plan's version of ECO-DC-01, this commitment to NRV is omitted. Similarly, the ecological reference model for ecozones was provided as "ecozone desired conditions" in the Draft Plan, but it is described merely as "key ecosystem characteristics" in the Final Plan. Plan at 54. As explained above, this doesn't change the Forests' obligation to restore NRV using the ecozone-by-ecozone reference conditions they have set for themselves.

The Forests seem to believe they have found a clever way to bypass the entire premise of the 2012 Planning Rule. Yet this last-minute attempt at cleverness has undermined the entire Plan. The agency's 60,000 to 90,000-acre desired condition for young forest[mdash]the overriding driver for action in this planning process[mdash]is simply an aggregation of NRV across ecozones. If the Forest Service means to abandon the ecozone desired conditions, then it has no basis for the primary objective in the Plan and must provide some other justification for creating these levels of ESH.

As explained elsewhere, the Forests have defined what restoration means by creating an ecological reference condition that describes key ecosystem characteristics at the ecozone scale. If the Forests have abandoned these reference conditions at this late hour[mdash]if they are changing the very definition of what restoration means here[mdash]then they must do much more than delete a few words. Indeed, the whole process would have to start over at the assessment phase.

The changes made to the Final Plan communicate a clear intent to undo the primary goal of the Draft Plan[mdash]restoring NRV as the Forests themselves have defined it (at the ecozone scale). Instead, the Forests now intend only to balance seral classes at the crude landscape level. That is also what the monitoring plan says will be measured in the future. Plan at 291. As a result, the FEIS skips over the Plan's effects on the single most important issue under the planning rule[mdash]understanding how the Plan will or will not restore key ecosystem characteristics consistent with the NRV.

In sum, the changes between the Draft and Final Plan elide the Forests' obligation to maintain and restore NRV as required by the Planning Rule and directives. The changes clearly

were made to evade Objectors' critiques on the draft[mdash]specifically, that the Draft Plan's components were incapable of meeting its desired conditions. DEIS Comments at 47-49. Rather than updating this analysis and management objectives to make them more consistent with the desired conditions, however, the Final Plan has instead backtracked and deleted its desired conditions. This attempt to bypass the planning rule requirements leaves the Plan without a compass direction and without a rational basis to pursue young forest goals that were specifically derived from ecozone-scale NRV. This is not an option under the Planning Rule.

2. The Plan Does Not Commit to Restore NRV for Species Composition or Fine- Scale Structure.

Despite the FEIS describing canopy composition as a key characteristic in all ecozones, the Plan does not commit to restore composition. Compositional restoration activities are required only in the Ecological Interest Area MA (EIA), which comprises about 2% of the forest. FEIS at 3-489. But Spectrum models just 7.3 acres of treatment per year in Group 2 MAs (including but not limited to EIAs), even under Tier 2 objectives.

The Planning Rule imposes obligations to maintain or restore "composition" and "structure" side by side. 36 C.F.R. [sect] 219.8(a)(1). And the NRV reference model[mdash]the Forests' ecozone descriptions[mdash]provides detailed descriptions of key characteristics for both. In the Plan, however, the Forests' obligations to manage for species composition are treated as an afterthought. This is backwards, because restoration of species composition will have structural benefits, Plan at 223, but structural manipulation

is not likely to restore species composition unless composition is the primary driver for locating and designing the prescription.

Indeed, structural manipulation is likely to cause continued degradation of species composition. The Forests have indicated that more harvest will take place in cove ecozones in Alternative E than in other alternatives. See FEIS at 3-545 - 3-546. Despite the FEIS's statement that "less is known about the silvics and reestablishment of mesic hardwoods compared to pines and dry oaks," it is in fact well known that regeneration harvest in these ecozones is at high risk of tulip poplar takeover. Our DEIS comments provided the Forests with multiple examples sufficient to make this point, see DEIS Comments at 73-74, and the DEIS itself revealed the Forests understand this risk, DEIS at 499. In addition, the risk to the herb layer from harvest in high-diversity rich coves is one of the most ubiquitous dangers of the harvest program.

Elsewhere, the Forests confirm (euphemistically) that structural manipulation will degrade species composition: "Some stands within the oak community landscape will need to be harvested with structural goals in mind (primary objective) now, to meet vegetation structure and wildlife habitat objectives . . . In these situations, there may be less opportunity to focus on the future stand's composition." FEIS at 3-534. Yet in analyzing the Plan's effects in these ecozones, the FEIS somehow concludes that composition will improve. E.g., FEIS at 3-148. To justify that conclusion, the FEIS "assume[s]" that there will be a "reasonable rate of active [compositional] restoration with advanced oak regeneration present in the understory" but nothing requires that outcome or explains why it will occur as a consequence of what is required. Id. The FEIS's assessments of compositional trajectories for most ecozones contain only conclusory statements that "vegetative composition is estimated to improve in [these] ecozone[s] over time" under Plan objectives. E.g., FEIS at 3-172 (shortleaf pine); 3-168 (pine-oak/heath); 3-164 (rich cove). This is not an "analysis" for purposes of NEPA.

In some cases, the FEIS explains what activities "would restore characteristic vegetation in this ecozone," FEIS at 3-160 (emphasis added), or notes that estimated improvements "assume[] that uncharacteristic vegetation is removed," id. at 3-156. But none of these assumptions correspond to Plan components. This simply is not the same as explaining how or whether the levels of activity the Plan commits to will restore those characteristics. The FEIS's optimistic assumptions and vague, descriptive language do not correspond to any plan components that will be operative at the project level. If the Forest Service wants its effects analysis to reflect an assumption that compositional work will occur, it must commit to that work in the Plan. But because the Plan makes no such commitment, the Forest Service lacks an analytical basis to conclude the Plan will have the claimed effects. The only plan content that the Forests could rely on to say that species composition will improve would be the amount of land in EIA, where that type of restoration will occur. FEIS at 3-489. Because such a small fraction of the landscape is actually allocated to this MA in Alternative E, the amount of such work is vanishingly small. See FEIS at xiv tbl.i. The treatments Spectrum models in this MA group cannot be relied on to show ecozone-level changes in compositional trajectory will actually occur.

What the Plan and the FEIS reflect, instead, is an unjustified and unlawful conclusion that compositional integrity is less important than meeting landscape-scale goals to balance age classes. As we emphasized in our draft comments, this "judgment" only reflects the Forests' resource constraints, not a science-based approach to restoration.8F DEIS Comments at 108-09.

Indeed, the Draft ROD confirms that the Plan's strategy eschews efforts to restore key ecosystem characteristics because of economics, plain and simple. Draft ROD at 56. This is especially problematic because the Planning rule Requires forests to restore ecological integrity and to set objectives within their fiscal capability. 36 C.F.R. [sect] 219.1(g); FSH 1909.12, Ch. 22.12(5). Here, the Forests ignore both requirements. Because the analysis of the Plan components relies almost exclusively on models of forest structure, with composition tacked on as an unsupported assumption, the Plan provides no basis to conclude composition will be restored rather than degraded.

Despite this clear preference for structural objectives, the Plan even fails to commit the Forests to managing for the full scope of key characteristics it describes for forest structure. Age class and the distinction between closed and open canopy are the only structural characteristics Plan components bind the Forests to observe. See, e.g., ECO-O-01 (young forest); ECO-O-05 (open canopy). But the Plan and FEIS describe many other key characteristics for structure. For example, each ecozone's NRV is described as characterized by gaps and patches of certain sizes and frequencies. Plan at 54-64. But no Plan components commit the Forests to restoring, maintaining, or monitoring for these structural characteristics.

The failure of the Plan to commit to management in accordance with the structural and compositional characteristics of NRV for ecozones has concrete, negative impacts on wildlife. The Forests know that a quarter of bird species use small gaps exclusively. FEIS App. D at D-12. The issue is even more acute for rare and federally listed species, such as the Indiana bat and Northern Long-Eared bat, "avoid larger openings (greater than 10 and 20 acres, respectively)." FEIS at 3-270. NRV conditions for ecozones where forest-dwelling bats are present are unlikely to have frequent gaps that exceed these sizes. Yet in forest-dwelling bat ranges the Plan green- lights gaps up to 40 or 80 acres, depending on ecozone, irrespective of NRV and species needs alike. See TIM-S-14. Similarly, cerulean warblers require a generally intact forest structure and trees with large crowns and branches resulting from gap-phase dynamics consistent with NRV conditions. Rare, sensitive, and protected species on the forests have needs that can only be met by NRV conditions. Failure to try to meet those conditions or disclose the effects of not meeting them violates the Planning Rule and NEPA. See Section II.A, supra.

3. The Forests' Ongoing Projects Show That It Will Certainly Deviate from NRV at the Ecozone Scale.

The Forests have argued, at least in the press, that the Plan's failure to make decisions that ensure progress toward NRV does not matter because those decisions can be made later at the project level. The Forests' current projects belie that assumption.

In the case of the Buck and Twelve-Mile Projects, a decision has already been made, but the projects haven't been implemented. In the case of the Crossover and Nantahala Mountains Projects, the projects have been scoped but are awaiting decision. The acreage numbers in the table below report the acreage of "high retention clearcuts" or "two-age leave harvest" anticipated as part of these projects, as compared to forestwide thresholds.

TABLE- Proportional Analysis of Regeneration Harvest in Mesic Ecozones for Projects to be Implemented Under the New Forest Plan

As shown, current projects forestwide are locating 60% of harvest in the cove ecozone and over 82% in mesic ecozones. If this trend continues, the Forests will be far outside NRV at the ecozone scale. As the Forests know, large patches of young forest (like those created by regeneration harvest) are rare in these ecozones. Plan at 57-59. Under the FEIS assumption of an average of 2,800 acres of regeneration harvest annually, the annual regeneration harvest in coves would be 1,680 acres if current trends hold. The decadal total would be 16,800 acres, which would push the cove ecozone far outside its natural range of variation for disturbance size and distribution. See Section II.B.2, supra (discussing landscape NRV for disturbances in coves).

The Plan contains no direction to prevent these levels of uncharacteristic structural manipulation. However, the Forests apparently balked at the potential results of such high levels in their analysis. The Spectrum model for Alternative E limits regeneration harvest in cove forests to 30% of all regeneration harvest. FEIS App. D at D-48. Yet this limit appears nowhere in the Plan, and the current suite of projects show that the Forests will not limit themselves at the project level.

4. Spectrum Modeling Shows that the Forests Will Deviate from NRV at the Ecozone Scale.

As noted above, the Draft ROD claims that "in some situations . . . it may be appropriate to locally deviate from the NRV..... It can be appropriate to be outside the range of key characteristics at the local scale in order to achieve economic, cultural, or ecological desired conditions at the landscape scale." Draft ROD at 67.

This explanation fails to satisfy the Forests' obligations with respect to NRV. There is no "local" scale for NRV. NRV is a landscape-scale measure, and it is meaningless at the local scale. Whether a particular patch size is characteristic or uncharacteristic within a particular ecozone is not a question that can be answered locally. The relevant question, instead, is whether the proportions of various patch sizes and total amounts are characteristic for that ecozone at the landscape level. A single large patch of young forest in cove forests is not uncharacteristic, either at the local or landscape scale. But as the Forests have themselves explained, such patches are "rare" proportional to the fine-scale gaps that predominate in coves. Plan at 57-58. Current and future conditions are the sum of many local disturbances and legacies, which are consistent or inconsistent with NRV because of their proportions and distribution in the aggregate.

The Plan places no limits whatsoever on the frequency and distribution of structural manipulations by reference to ecozone NRV. What the Plan must do but fails to do is, for example, ensure that these "local deviations" do not cause too many 40-acre gaps in cove hardwood landscape in a manner inconsistent with ecosystem NRV or it must justify the work on some basis other than "structural restoration."

The Forests' own analysis (though not disclosed in documents made available to the public) shows that the sum of the Forests' future decisions will deviate from NRV not at the local scale, but at the landscape scale for the ecozones by which NRV is measured. Taking coves as an example, the predominant driver of disturbance in coves is gap-phase dynamics, or "primarily single tree fall gaps, around 1/8 acre." Plan at 58. Typical disturbance in mesic oak forests is slightly more variable, but still primarily characterized by "single to multiple tree fall gaps, from 1/8 acre-1/4 acre." Plan at 59.

Spectrum shows that the Plan will have outcomes far different from these reference conditions. Throughout the analysis horizon, cove systems will be dominated by large patches with very few gaps, as shown below. This kind of imbalance simply cannot be justified as restoration of NRV.

FIGURE - 10 CoveHW Large patch vs small gap

Failure to Commit to Restoring NRV Inverts Planning Rule Requirements.

Timber production is only allowed to the extent that it is compatible with maintenance and restoration of ecological integrity. these objectives. 36 C.F.R. [sect] 219.11. As described above, however, the Forests have said they intend to prioritize structural manipulation and timber production rather than restoration of composition and characteristic structure necessary to achieve NRV at the ecozone scale. It says that its primary duty under the Planning Rule is "fiscally infeasible" at a "large scale." FEIS at 2-29; Draft ROD at 66.

This is not how the Planning Rule works. In fact, it is exactly backwards. Forests must ensure that their objectives both meet the planning rule's substantive requirements, e.g., 36 C.F.R. [sect][sect] 219.8, 219.9, and that those objectives are within its fiscal capability based on recent budgets. 36 C.F.R. [sect] 219.1(g); FSH 1909.12, Ch. 22.12(5) (requiring that objectives be attainable with respect to "recent past budget obligations for the unit (3 to 5 years)") Forests must therefore begin by determining what work is needed to restore NRV for key ecosystem characteristics, then determine how much of that work can realistically be accomplished with expected budgets.

As we explained in our comments on the Draft Plan, we understand the practical reality that timber receipts are necessary to fund some operations on the Forest. DEIS Comments at 108. But this does not excuse the Forests from its legal duty to restore NRV in terms of the desired conditions it has set for itself.

Because of the foregoing fundamental failures to follow the requirements of the Planning Rule and disclose the relevant effects under NEPA, the Forests are left with a difficult fix. The Forests must adopt a land allocation (like the Partnership's) that emphasizes ecological restoration for species composition on a greater portion of the landscape. It must also commit to ensuring that half or more of its harvests are intended to address the "priority treatments" that can reliably meet both structural and compositional needs at the same time. While these changes would not address the NEPA errors, they would at least ensure some progress toward restoring reference conditions for the key ecosystem characteristics.

III. Modeling

The Forests' Spectrum model is the foundation for its analysis. Errors in that model undermine the Plan's ability to satisfy the Forests' substantive and procedural obligations under NFMA and NEPA. We pointed out many of these errors in prior comments which were not addressed. See generally DEIS comments at 21-31. We appreciate the effort the Forests made to adjust these models between the draft and final analyses, as well as the materials and opportunities for further discussion Forest staff have provided since the Final Plan was released. Unfortunately, these discussions and our own analysis of the models' structure and outputs have confirmed that our initial concerns remain largely unaddressed. The data provided to SELC has only deepened our concerns that the models relied on by the Forests cannot support their analytical conclusions.

Rather than correcting its most fundamental modeling errors, it appears the Final Plan in many cases obscures them by reframing or omitting data presentations that had made those errors obvious in the DEIS. Meanwhile, the models remain riddled with internal inconsistencies and contradictions of accepted scientific facts about the Forests' structure and ecology. The Forests' suite of models, which are the basis for the FEIS, cannot support a reasoned conclusion that the Plan and its supporting documents comply with relevant legal obligations under NEPA, NFMA, the Planning Rule, and the APA, which we summarize below.

NEPA

The models' soundness is critical to the agency's satisfaction of its obligations under the National Environmental Policy Act (NEPA), 42 U.S.C. [sect] 4321 et seq. As with other major federal actions, the Forests are obligated by NEPA to undertake careful analysis of the environmental impact of the revised Forest Plan. 42 U.S.C. [sect] 4332(C)(i). This requires a "hard look" at how the Plan will directly, indirectly, and cumulatively affect the human environment. See Robertson v. Methow Valley Citizens Council, 490 U.S. 332, 350 (1989). Spectrum and NRV modeling are the factual basis for this "hard look."

Although NEPA does not require an agency to pursue the most environmentally friendly course of action, it does require that the agency undertake a meaningful consideration of alternatives to inform itself of the relative environmental impacts of the policy it has chosen to pursue and those policies it has rejected. In the forest planning context, an EIS must be specific enough to analyze the "actual" or "probable" impacts of implementing the Plan.

Accordingly, the plan's FEIS can only satisfy the Forests' NEPA obligations if the models are designed and interpreted in ways that provide a supportably accurate and specific account of how the Plan's implementation will affect the human environment. Conclusions about environmental effects drawn from inconsistent or incorrect assumptions used in the models do not satisfy NEPA's demands. Utah Shared Access Alliance v. USFS, 288 F.3d 1205, 1213 (10th Cir. 2002). Instead, ff the Plan's effects are uncertain or analytical shortcomings are unavoidable, NEPA requires that the Forests say so and make supportable characterizations of the range of possible effects within that range of uncertainty. See Lands Council v. Powell, 395 F.3d 1019 (9th Cir. 2005) (holding no (or limited) disclosures of the model's shortcomings failed to satisfy NEPA). As explained below, the Forests have obscured the limitations of the models rather than acknowledging them and filling in the gaps in violation of these requirements.

NFMA

In addition to NEPA, thorough analysis is required for the Plan to comply with the substantive obligations of NFMA, 16 U.S.C. [sect] 1604, and the 2012 Planning Rule, 36 C.F.R. [sect] 219, which, as explained above, requires that forest plans provide for the maintenance or restoration of ecological integrity. Models inform this analysis by quantifying future actions and how they will affect selected measures. If the models are unreliable, inconsistent, or simply ask the wrong questions, it is impossible for the agency to determine whether the Plan complies with the Planning Rule's directives, because it is impossible to say whether the Plan's implementation will produce the results the Planning Rule requires.

The Planning Rule also requires that the Plan be informed by the best available scientific information (BASI), 36 C.F.R. [sect] 219.3; 77 Fed. Reg. 21,162, 21,192 (Apr. 9, 2012) (describing how the draft 2012 Planning Rule was modified to clarify that rather than merely "take [BASI] into account . . . the responsible official must use the BASI to inform the process and decisions made during the planning process") (emphasis added). Basing a forest plan on model assumptions contradicted by the best available science violates this provision of the Planning Rule.

APA

Lastly, clear deficiencies of logic or decisionmaking[mdash]where the models ignore important variables or rest on assumptions contradicted by other facts in the record[mdash]also give rise to claims under the Administrative Procedure Act (APA), 5 U.S.C. [sect] 706(2)(A). The APA requires that final agency actions be set aside when an agency has failed to sufficiently consider an important aspect of the problem before it or make the "rational connection between facts and judgment required to pass muster under the arbitrary and capricious standard." Motor Vehicle Mfrs. Ass'n of U.S., Inc. v. State Farm Mut. Auto. Ins. Co., 463 U.S. 29, 43 (1983) ("State Farm").

Below, we explain in greater detail how the models fail to show that the Plan will produce lawful results (as required by NFMA), how they fail to support a conclusion that the Forests have adequately considered the Plan's environment impacts (as required by NEPA), and how their design and application is unsupported by logic or evidence before the agency (as required by the APA).

Model Outputs Are the Forests' Primary Support for Claims About Plan Effects.

Modeling processes provide the basis for the Forests' analytical conclusions. Two different sets of models are of particular relevance here: the NRV models, which look backward to quantify the ecological reference conditions defined at Plan 54-64, and the Spectrum model, which looks ahead to predict the effects of future management. These models are unreliable and internally inconsistent, and they cannot support the weight the Forests place on them.

In recent weeks, the agency has tried to downplay clear shortcomings in its models. Agency staff have responded to criticism of the model, its assumptions, and its inconsistent relationship to Plan components and the FEIS by insisting that "the model is not the plan.". Forest Plan Modeling Q&A (Feb. 15, 2022). True. But the model is the basis for the Forests' analysis of the Plan's effects. FEIS at 3-107. Without the model, the Forests would have no analysis of whether, for example, young forest habitat conditions would be too high or too low. The same is true if the model is unreliable.

The Forests Have Not Asked Spectrum to Model Outcomes Critical to Satisfying Its NEPA and NFMA Obligations.

One of many reasons the FEIS's models fail to support the Plan is that the Forests have simply not asked the

right questions of them. Consistent with the planning directives, the Forests developed an ecological reference condition based around "key ecosystem characteristics" in the major ecozone. See FSH 1901.12, Ch. 23.11a. The Plan describes these characteristics, including canopy composition, dominant natural disturbance regimes, and habitat connectivity. Plan at 54- 64. But Spectrum does not model changes to these key characteristics. Instead, it models crude metrics, primarily seral classes and volume outputs. Spectrum's failure to relate critical ecological variables to management activity means the FEIS lacks supportable conclusions about what implementing the Plan will mean for restoration of NRV.

The FEIS acknowledges that Spectrum is "better able" to model changes in forest structure than composition. FEIS 3-108. But this is a significant understatement given that none of the Spectrum outputs appears to provide any information about composition. Despite canopy composition's status as a "key characteristic" for ecological integrity, id., and its central role as a proxy for evaluating species composition in the ESE tool, id. at 3-136, the model does not make any relevant predictions about how implementing the Plan will make composition better or worse. This leaves the Forests in the position of having to hope for the best[mdash]to hope that somehow structural manipulations will also produce compositional benefits. Indeed, this is laid out in the FEIS: the analysis is based on assumptions about prerequisites for compositional benefits that do not correspond to any plan components and are not reflected in Spectrum. E.g., FEIS at 3-148.

The FEIS and Spectrum Are Not Analyzing or Describing the Same Forest.

The model's usefulness to the Forests' analysis is fundamentally undermined by the fact that the forest types modeled in Spectrum diverge significantly from the forest ecozones described and analyzed in the FEIS. And because the model is the Forests' only assurance that implementing Plan components will, in fact, move the landscape toward the required objectives for ecozone and landscape NRV, this difference is a fundamental error. Even ignoring how the Plan fails to constrain activity in ways that ensure progress toward ecozone key characteristics, the difference between the acres assigned to "ecozones" and to "forest type groups" is so vast that it appears the Forests could not possibly have used the Spectrum model to determine the effects of plan components by ecozone.

The Plan describes the ecological reference condition at the scale of "ecozones," which are repeating ecological communities described by the FEIS (at 3-133-34) and the Plan (at 54- 64). Spectrum, meanwhile, applies constraints to and models outcomes for "forest type groups" (FTGs). FEIS App. D at D-2. The FEIS acknowledges that ecozones and FTGs diverge to an extent, but it provides a "suggested crosswalk" in the FEIS, implying they can be functionally equated. Id. at D-3, tbl.1b. In the crosswalk, some ecozones are related to a single and ostensibly identical forest type group[mdash]the spruce fir ecozone and the spruce fir FTG, for example. Other ecozones are split among two or more FTGs; still other ecozones are lumped together into one FTG.

Again, the Forests' ecological reference conditions were developed for ecozones, and those are the units used throughout the FEIS. See FEIS at 3-108 ("State and Transition Simulation (ST-SIM) software [was] used to develop the seral states of ecozones for NRV."). Under NRV conditions, for example, the cove ecozone consists of between 27 and 32 percent mid-aged, closed-canopy forests. For mesic oak forests, those same mid-aged, closed-canopy forests should occupy between 12 and 15 percent of the total ecozone acres. For Spectrum to say anything useful about whether ecozone NRV will be achieved, ecozones and FTGs must be closely related. But they are not: For example, cove and mesic oak forests belong to the same analytical unit for Spectrum's purposes, despite the Forests' own analysis showing they transition among age classes at different rates and are characterized by distinct distributions of age classes within their respective NRVs. FEIS App. D at D-3, tbl.1b (showing how both cove and mesic oak forests are both crosswalked to Spectrum code 10CvHw).

The raw Spectrum data also reveals vast differences between the acres the Forests estimate belong to ecozones10 and those they estimate belong to forest type groups. 11 These differences are large enough that it

is fair to say the FEIS and Spectrum are analyzing two different forests. The most significant divergence involves the Forests' cove/mesic oak ecozones and the dry-mesic oak ecozone. Coves and mesic oak (within the ecozone framework) together account for 616,000 acres of the 1-million-acre landscape. These are the real-life acres of these forest types. Yet Spectrum recognizes only 232,000 acres as belonging to the single crosswalked forest type group into which those three ecozones (acidic cove, rich cove, and mesic oak) are merged (10CvHw, or "cove hardwood"). FEIS App. D at D-3, tbl.1b. Perhaps absorbing some of these missing mesic acres, FTG 09IOak ("intermediate oak") doubles the sum of its crosswalked ecozones' acres (144,600), clocking in at 321,000 acres in Spectrum. Id.

These two examples are not the only ecozone-FTG discrepancies, but they alone make clear that this disconnect has real consequences for the Plan's ability to claim it satisfies NEPA and NFMA. The forest modeled by Spectrum is far drier than the one described by the plan and by the FEIS: Cove forests are mesic, low-disturbance ecosystems, and Spectrum recognizes far fewer acres as possessing these characteristics. And as the FEIS's analysis describes, drier forests differ from wetter ones in ways that have significant consequences for their management. FEIS at 3-133, -134. Most notably, modeling more of the forest as drier and fire-adapted increases the ceiling for burning and other active management techniques, which create conditions less consistent with mesic forests. Drier forests experience more frequent large patches within their NRV. Wetter (mesic) forests experience patch-sized natural disturbance much less frequently; their disturbance regimes are characterized by small gaps. Compare Plan at 58 (describing fire frequency in mesic oak forests as between 18-25 years) with Plan at 61 (describing fire frequency dry oak forests as between 5-10 years). Accordingly, because Spectrum models real-life cove forests as needing (and receiving) more management than their ecozone dynamics would actually indicate, it is highly misleading.

The Forests cannot rely on the Spectrum outputs for ecozones where the crosswalk is so unreliable. In other words, the Plan's estimated effects in at least the cove and oak ecozones are fundamentally undermined. See FEIS at 3-142 to -164.

The Forests' Own Models Show the Plan Will Not Achieve NRV Goals.

As described above, the Plan must commit to management levels and strategies that "maintain or restore" ecological integrity as the Forests have defined it[mdash]i.e., NRV for the key ecosystem characteristics at the ecozone scale. 36 C.F.R. [sect] 219.8(a); 219.9(a); FSH 1909.12, Ch. 12.14a, 23.11a. The Forests' own model shows they will not meet this requirement.

1. Spectrum Models a Forest Well Outside Ecozone NRV for Seral Classes.

Alternative E's Tier 2 Spectrum outputs describe a forest landscape in which NRV for seral classes for ecozones is never achieved in a sustainable way. In other words, even if it were legitimate to simplify the forest to crude seral classes rather than considering whether key ecosystem characteristics are being restored (which it is not), and even if the model were reliable (which, as discussed throughout this Objection, it is not), the model tells us that the Plan will not achieve the requirements of the Planning Rule.

We summarized Spectrum data for forestwide changes in seral classes and seral class outputs for the few Forest Type Groups for which a workable ecozone comparison is possible (cove, spruce fir, northern hardwood, and dry oak). Alternative E's Tier 2 outputs show severe and consistent departures from NRV for those forest type groups.11F Draft Plan at 58. One of the most conspicuous results in the data is that mid- and especially late-age forests are almost entirely liquidated[mdash]brought to virtually zero levels[mdash]over time.

4 FIGURES

At the same time, young forests and old forests are shown as being over NRV levels.

Cove forests illustrate the problem well.

FIGURE Cove Hardwood Tier 2

In this graph, a large bolus of mid-age forests (currently 60-100 years old) transitions into late-age forests (in periods 1 to 4) and then into old forest (in periods 4 to 8). Meanwhile, late-age forests decrease to essentially zero.

FIGURE

Over time, all of these seral classes trend far outside the NRV.

Within NRV, the forest would have young seral classes, mid- and late-age classes, and old forests in the proportions described as the ecological reference model for each ecozone. Draft Plan at 58. Gap-phase dynamics would be the primary driver for disturbance in cove ecozones.

Plan at 56-58. Such disturbances would primarily affect older forests, with rarer wind and weather events affecting other age classes. FEIS at 3-125. Canopy turnover would progress from old to young in primarily small gaps, moving through the mid- and late-age classes and then again into old forest. That is not what the model projects.

Under a rotational forestry paradigm, forests would be harvested as they reach economic maturity, in the mid-age seral class. Forests available for timber harvest (i.e., not prohibited by regulation or unavailable due to operational limitations) would be harvested at maturity and would not reach late-age status. Unavailable forests would transition into old forest. This is precisely what the model shows.

Comparing movement among young forest and mid-/late-aged forest levels shows that the Forests are relying on constant harvest of mid- and late-aged forests to meet young forest goals, with almost no turnover taking place in old forests. This is easy to see during periods 12 to 20, after the old forest class has stabilized. During those later periods, the change in the amount of young forest in each period is almost perfectly offset by the change in the amount of late and old forests. (Note: where the yellow line is at zero, 100% of early forest is coming from mid- and late-age forests.)

FIGURE Coves: where is the young forest coming from in periods 12-20.

Rather than small-gap turnover in the old forests[mdash]the dominant driver for disturbance in this ecozone under NRV[mdash]the Spectrum model predicts large-patch young forest creation primarily in in mid-age forests. The Spectrum model is producing these results because it has been asked to hit targets for young forest derived by a model using a different set of assumptions about how natural disturbance operates on the forest. Without the substantial turnover in the old forest the NRV model predicts, effectively all of the unavailable forests become old and stay old. Spectrum (unlike the NRV model) includes vanishingly little age-resetting natural disturbance, especially in mesic systems. Indeed, Spectrum models only about 40 acres per year of natural disturbance for Alternative E's Tier 2 in all moist forests combined.

FIGURE

Spectrum treats old forest as an essentially static seral class that continues to accumulate unless acted upon by timber harvest. Spectrum therefore aggressively harvests mid- and late-age forests to create young forest and prevent additional old forest recruitment. The end result: Spectrum models a landscape in which those middle-aged forests are liquidated and nearly all forest is either very young or very old.

The assumptions Spectrum relies on to reach this result are not consistent with reality. As the FEIS explains, older forests have increasing levels of disturbance. FEIS at 3-157. And these increasing levels of disturbance are of the scale and distribution that the Forests have based their NRV models on. See Plan at 57-58. And this is precisely what wildlife associated with this ecozone needs: species density increases with increasing age and structural complexity. FEIS at 3-158. In other words, these older forests will trend toward NRV without harvest, and the retention of a steady state of old growth in perpetuity is simply impossible.

Notwithstanding the high level of departure shown in the graphs above, the FEIS states that structure would improve because both young and old forests will increase. FEIS at 3-160, 3-164. It consequently concludes that plant and animal species associated with coves would persist. FEIS at 3-161, 3-165. Yet this conclusion is based only on the seral classes that improve over the arbitrary timescales chosen (20 and 50 years), and it does not consider the seral classes that are slashed or eliminated. Specifically, the FEIS bases its analysis only on young and old age classes, both of which are predicted to increase. It simply does not consider mid and late age classes, which crash dramatically. FEIS at 3-160, 3-163, ESE Indicator Summary Table (Attachment 1). The FEIS ignores these Spectrum outputs showing that the Plan will cause significant departures from NRV. Had the Forests looked at this data, they would have realized that the Spectrum results are implausible and that the target levels of large-patch creation cannot be sustained consistent with the ecological reference model.

This problem repeats in all the ecozones, with minor differences in the details. But across the entire forest, late forests are simply eliminated.

FIGURE Late Seral trends by moisture class

This highlights a troubling reality that the FEIS utterly fails to address: the Plan's approach would create a forest without any resilience to natural disturbance. Because there won't be any late forests to replace the old forests, any substantial level of natural disturbance in old forests would result in a loss that would not be replaced for many decades at the soonest. The Forests have modeled a landscape that is not at all resilient, contrary to what the Planning Rule requires. 36 C.F.R. [sect][sect] 219.8, 219.19. The model has forced the landscape into a polarized state and ignores the continuing and increasing levels of natural disturbance that will occur in older forests, particularly in light of climate change. It therefore cannot be relied on to show that ecozones will be restored. Finalization of the Plan under these circumstances would be arbitrary and capricious.

The profound problems apparent in the Spectrum model outputs themselves are further compounded by internal inconsistencies, modeling inputs that fail to use best available science, and modeling inputs that do not correspond to plan components. These errors together undermine the FEIS's reliability and the usefulness of any model outputs. Without exception, these errors bias the models' outputs and interpretation in favor of increasing levels of harvest regardless of effects on ecological integrity.

The Forest Service Improperly Interprets the NRV Model to Show an Excess Need for Young Forest Creation in Large Patches.

The two models the Forests have used to craft the Plan and its analysis are distinct from each other in purpose and function. One model, Spectrum, is forward-looking. It is used to project how constraints and targets applied to management actions will affect the forest's future condition. The other model, ST-SIM (or the "NRV model"), looks backward. It is used to estimate what the forest landscape looked like in the past, including the frequency and effects of characteristic natural disturbances.

Even though ST-Sim and Spectrum both purport to model disturbance processes on the same landscape, they do not make the same assumptions about how the same disturbances affect the landscape. More specifically, they disagree about the scale at which a disturbance resets forest age to zero. ST-Sim assesses canopy

turnover at all scales, while Spectrum categorically assumes gaps smaller than a half-acre will not create young forest but rather melt back into the age of the surrounding forest after 10 years. Compare ST-Sim charts with FEIS App. D at D-12. Attachment 2. Thus, a modeled eighth- or quarter-acre disturbance in ST-Sim may reset age to zero while the same disturbance modeled in Spectrum will not count toward the landscape's ESH totals after year 10. This is comparing apples to oranges.

Using ST-Sim's broader parameters for assessing past young forest conditions, the Forests aggregated the NRV model results from all ecozones to estimate a reference condition for young forest between 60,000 and 90,000 across the Pisgah-Nantahala landscape.

Accordingly, the Forests have adopted this range as a target for young forest. See FEIS at 3-109, FEIS App. D. at D-39, D-48. But Spectrum assumes that some of the same kinds of natural disturbances that count toward this need in the NRV models (including gap-phase disturbances) will not create young forest in the future, incorrectly showing a need to create the bulk of young forest creation to be achieved through regeneration harvests. FEIS App. D. at D-12.

We are not alone in concluding this divergence in model assumptions constitutes a fatal flaw in the Forests' analysis: Peter White, a scholar of forest ecology whose work the Forests cite extensively to explain their use of return intervals for natural disturbance (FEIS App. D at D- 17) and to describe past conditions in the forest's ecozones (id. at D-13, -15) has reviewed the models and arrived at precisely the same conclusion:

The rate of natural disturbance in the NRV model inflates the expectation for disturbance creation of early successional habitat on the landscape. Further, the rates of natural disturbance in the Spectrum model are too low to achieve the amount of early successional habitat that has been inflated, in part because the NRV model uses natural disturbance rates that are too high. The net result seems to be the potential for harvest to be used to fill in the gap between natural and presumed targets for early successional habitat..... 13

Below we explain in greater detail how the models each understand natural disturbance and explain why it matters that the Forests' analysis fails to account for these differences.

1.
1.
The Discrepancies Between Return Intervals in the NRV and Spectrum Models Show That the Two Models Are Using Different Scales of Disturbance.

In the DEIS, the Spectrum model included zero natural disturbance transitioning to young forest. DEIS Comments at 30. A very small level of natural disturbance was incorporated in the model, but it was modeled as creating "gaps" that blended into the age class of the surrounding forest after a single decade. DEIS at 160. In contrast, the NRV model described significant levels of natural disturbance, informing the Forests' estimate that the aggregate NRV for young forest is between 60,000 and 90,000 acres.

ST-Sim does not apply a threshold below which natural disturbance could not create young forest. Unlike the Spectrum model, ST-Sim clearly counted at least some gap-phase dynamic disturbance[mdash]that is, it applied transition probabilities to disturbance smaller than a half-acre[mdash]as transitioning forest acres into an early seral state. Gap-phase dynamics describe small gaps in the forest canopy consisting of single to multiple trees. In the ecological literature, these gaps are not regarded as typically changing the surrounding forest's structural class or succession stage.13F 14F

The FEIS does not show any changes have been made to correct this fundamental inconsistency between the

NRV and Spectrum models: NRV continues to model disturbance creating young forest in the past that Spectrum would not recognize as transitioning to young forest in the future. There is no reason to think[mdash]and the Forests do not suggest[mdash]that future disturbance behaves differently than past disturbance. The problem therefore lies with the models.

The NRV model applies disturbance probabilities to model transitions from one seral class to another, including, as relevant here, transitions to young forest. These disturbance probabilities are derived from disturbance return intervals. 16 Return interval is a measure, usually in years, of the average length of time between individual occurrences of a given disturbance type at the same location. A disturbance probability is equal to 1 divided by the return interval. It is the likelihood that the particular disturbance event will affect a given unit of land in any single year. Disturbance probabilities are correlated to "transitions" in the NRV model. For example, ST-Sim applies disturbance probabilities ranging from .005-.002 (corresponding to a 200-500-year return interval, depending on seral class) to estimate the likelihood that wind/weather/stress will reset an acre of old closed mesic oak forest to young forest in a given year. ST-Sim Charts, Attachment 2. Other disturbances besides wind/weather stress, including replacement fire, insects/disease, and a catchall disturbance referred to as Optional1 (which include gap-phase disturbances), also transition forest from later seral stages to young forest. The total probabilities are the sum of the probabilities for each of these disturbance types.

Disturbance transition probability is an important variable in the NRV model because it determines how much of the forest transitions from one state to another (e.g. from old growth to young forest) due to natural disturbance. A forest with more frequent disturbance (i.e., shorter return intervals) will have more young forest on average than one where age-resetting disturbance is less common. Disturbance probability then used to derive a landscape-wide steady state range for young forest[mdash]here, ultimately between 60,000 and 90,000 acres.

Below, we show how Spectrum and NRV use different disturbance intervals. We then explain how the disturbance probabilities ST-Sim applies are inconsistent with the best available science for estimating disturbance probabilities.

Spectrum and ST-SIM Are Inconsistent With Each Other Because They Use Different Return Intervals.

The Forests' planning documents do not disclose how the return intervals used in the NRV model were derived from the scientific literature. But below is a table of the overall return intervals indicated for all events transitioning to young forest for each ecozone 17:

TABLE

Note that the highest return interval for canopy turnover in the NRV model for any ecozone is just 229 years (northern hardwoods).

Although disturbance modeled in Spectrum is not presented in terms of return intervals or disturbance probabilities, these figures are simple to derive from the acres of disturbance modeled and the area of the landscape to which they are applied. And without exception, Spectrum's return intervals are orders of magnitude greater than the ST-SIM numbers listed above:

Young forest-creating natural disturbance in the Spectrum model averages 280 acres/year throughout the 200-year planning horizon. Applied across a 1,036,893-acre landscape, this equates to a probability of 0.00027, which equates to a 3,703-year return interval.

The discrepancies are shocking for specific ecozones. Over all 20 periods, natural disturbance creating young forest in cove forests totals a mere 9.3 acres/year[mdash]a disturbance probability of 0.00004 across the forests modeled as cove in Spectrum. This equates to a return interval of nearly 25,000 years, compared to 211 years in

the NRV model.

Even without determining which set of return intervals is closer to the truth, it is clear the Forests acted arbitrarily and capriciously by ignoring the vastly different estimates of natural disturbance produced by each of its models. But for reasons explored below, we believe the Forests also failed to properly consider the conclusions drawn by the best available science relating disturbance size to return intervals. In short, ST-Sim uses disturbance probabilities that include smaller and more frequent disturbances, but the Forests interpret them arbitrarily and capriciously as probabilities for much larger and less frequent disturbances.

BASI: Disturbance Return Intervals Used in the NRV Model Are Consistent with Gap Phase Dynamics Rather Than a Half-Acre Disturbance Threshold.

The scientific literature shows that disturbance return intervals increase with disturbance size: Larger disturbances are less common than smaller ones. 18,19 Consistent with this general relationship, the scientific literature is also clear that natural disturbance in the mesic forests of the Southern Appalachians is predominantly driven by gap-phase dynamics, or gaps in the canopy small enough to allow for lateral closure by nearby trees rather than resetting forest age to zero. In other words, the most common disturbances on the Nantahala-Pisgah are not large enough to create young forest. Sources we reviewed, including sources cited in the Nantahala-Pisgah EIS and process papers, are unanimous on this point. See NRV Process Paper at 9-11.

Gap-phase disturbance is particularly dominant in mesic forests (e.g. cove hardwood, mesic oak, northern hardwood, spruce fir). Plan at 56-58. The Plan recognizes this fact when describing the ecological reference conditions for ecozones, although it also notes larger gaps are characteristic of spruce-fir forests because of additional disturbance caused by balsam wooly adelgid, although these disturbances are not within the timeframe of the NRV model. Id. at 54, 55, 57, 58, 59.

Despite consensus that gap-phase disturbance is not generally regarded as creating young forest, disturbance intervals used to model young forest creation in the Forest Service's NRV model are consistent with or even shorter than return intervals counting gap phase dynamics in the literature.

The Lorimer and White study, cited in the NRV process paper, estimates presettlement old growth (stands older than 150 years) for northern hardwoods in the northeast as 70-89% of the forest landscape.19F This high level of old growth in NRV reflects a disturbance regime consistent with sources documenting the dominance of gap phase disturbance and old growth conditions. For example, Lorimer and White estimate this amount of old growth in northern hardwoods suggests a 1,364-year rotation period (disturbance return interval) for catastrophic wind and stand replacement fire. These disturbances would not be gap phase dynamics and would be consistent with larger disturbances of 0.5 acres and above used in the Spectrum model. The authors also suggest that smaller size disturbances (less than 300 square meters, or 0.074 acres) at disturbance intervals of 60-400 years would be consistent with the old growth levels documented in these northern hardwood forests. 20F.

Contrast that with the Forest's NRV model for the northern hardwood ecozone, which uses a disturbance return interval of 222 years for all age-resetting disturbances. This figure is near the middle of Lorimer and White's estimated range of return intervals for gap-phase dynamic disturbance. But it is used to estimate the frequency of age-resetting disturbance, which the same paper describes as requiring larger and less common disturbance events. This is a case where the literature on which the Forest Service is relying gave the Forest the information needed to identify a return interval for larger patch disturbances. It further confirms that the NRV models do incorporate gap-phase dynamics. The consequences of this mismatch can be seen when NRV results for Northern Hardwood are compared for key conditions below:

FIGURE State Classes Proportion

Many of the Forests' references for its NRV assumptions describe fire-adapted ecosystems, in which larger patch disturbances are more common. See NRV Process Paper at 9- 11 (listing 21 papers cited, of which 11 are concerned with fire disturbance). Natural disturbance in some xeric forest types is heavily controlled by fire return intervals. However, for mesic ecological types, other disturbance factors (e.g., wind/weather/stress and optional1) play larger roles than fire within the NRV model. For ecological types intermediate between mesic and xeric, these non-fire factors also play very significant roles.

References for disturbance regimes that could be considered non-fire related consist of two papers by Lorimer, one paper by Lorimer and White, and a 2011 book edited by Greenberg and Collins on sustaining young forest communities. A 1994 paper by Morgan et al that is considered the foundational paper on historic range of variation is also referenced. 21F None of these references except the Lorimer papers, the Lorimer and White paper, and the Greenberg and Collins book even discuss non-fire disturbance patterns that would be specific to mesic forests on the Nantahala-Pisgah. These references are sparse in any detail that would tie non-fire return intervals to specific forest except for gap phase dynamics, and where values are specific as in the Lorimer and White return interval for northern hardwood, the NRV model uses return intervals more appropriate for gap phase dynamics than for larger disturbances. The Greenberg and Collins book contains a chapter that seems relevant to the question of natural disturbance by Peter White, Collins, and Wein: "Natural Disturbances and Early Successional Habitats". The abstract for this chapter states: "Although natural disturbance types and frequencies vary within the region, large stand-replacing natural disturbances have always been infrequent[hellip]". The chapter does not seem to provide sufficient detail to associate specific disturbance return intervals to ecological forest types. 23 The NRV paper also references Landfire as a source for natural disturbance intervals, but Landfire biophysical models used to set return intervals and probabilities also only reference fire studies or general discussions of disturbance that don't reference return intervals.

These references provide an insufficient basis for the return intervals used in the NRV model. Where specific levels of disturbance are discussed in these sources, they are usually related to gap phase dynamic level disturbance. Where larger disturbance returns are contrasted to gap level returns, return intervals relevant to gap phase dynamics are used rather than larger disturbance return intervals as in the Lorimer and White reference to return intervals for both gap phase dynamics and larger disturbance. There is no rationale provided in the NRV process paper connecting the information contained in the references to return intervals used in the NRV model. There is not a coherent rationale provided for the return intervals used in the NRV model.

It is not inherently problematic to include gap-phase disturbances in the NRV model if the agency is attempting to model rates of canopy turnover at all scales. Nor is it inherently problematic to exclude gaps smaller than 1/2 acre in the Spectrum model if the agency is attempting to predict future levels of habitat for wildlife associated with larger patches. It is arbitrary and capricious, however, to compare these models to each other without acknowledging and resolving their discrepancies. There is simply no discussion anywhere of the return interval for disturbances greater than 0.5 acres in the NRV models. This leaves the NRV model fundamentally incapable of comparison to the Spectrum model, which indisputably uses a 0.5- acre threshold. The scale of disturbance used in NRV modeling is a fundamentally important factor to the accuracy of the model and to whether its results can be compared with any validity with Spectrum results, but this is not even discussed in the EIS and related materials, despite the issue being raised in great detail in DEIS comments. The Forest Service has simply ignored a critically important aspect of the problem they were attempting to solve. See State Farm, 463 U.S. at 43.

To be clear, we are not making the case that disturbances greater than 0.5 acres did not occur, even in mesic ecosystems, in the NRV. The literature acknowledges that larger disturbances did occur, especially in drier ecozones. However, the EIS and process papers cite references that either document return intervals for gap phase dynamics or describe shorter return intervals for gap-phase disturbance and longer return intervals for larger disturbance (Runkle and Yetter, 1987, Lorimer,1980, Lorimer, 2001, Lorimer and White, 2003). The FEIS does not explain how the references cited were used to derive return intervals in the NRV model, but these are

clearly consistent with gap phase return intervals and inconsistent with larger return intervals greater than 0.5 acres. Yet the comparisons of Spectrum results to NRV are applied to justify a "need" for ESH that counts small gaps as creating young forest.

The Spectrum Model Shows the Plan Objectives are Too High Relative to the Need for ESH Creation.

The Starting Point is Already Too High.

Even setting aside the internal inconsistency between the models and accepting, arguendo, that the NRV model shows a need for up to 90,000 acres of ESH in larger patches at any given time, the models show that the Plan objectives overshoot.

At the draft stage, the Forests' DEIS showed that adding additional (that is, any) natural disturbance to their modeled harvest levels would push the forest over the NRV's upper bound for early successional habitat: 90,000 acres. DEIS at 161, fig. 49, DEIS Comments at 30, 35.

Now, having released the FEIS and responded to comments by adding some (but far too little) natural disturbance, the Forests have not explained why this would no longer be true[mdash]that is, why its Plan would not permit taking the Forest outside its natural range of variation for ESH.

Graphing the two categories contributing to young forest conditions in the Spectrum model shows that Alternative E Tier 2 takes the Forest outside NRV for young forest in 13 out of the 20 periods modeled.

FIGURE Total ESH

This is without accounting for the additional ESH that the Forests have not included in this model, discussed below.

In addition, Alternative E appears to have been modeled using Spectrum constraints that did not observe the 90,000-acre upper bound for young forest expressed as a "desired condition." FEIS at 3-109. Rather, the constraints listed in FEIS Appendix D show that the Spectrum run used to produce Alternative E assumed an upper bound for young forest of 95,000 acres. FEIS App. D at D-48. Appendix D shows this upper bound as operating to limit the model's outputs in 12 out of the 20 decades modeled for Alternative E. Id. In other words, even after relaxing the model's upper limit to allow outputs in excess of the upper bounds for young forest, the model must hold the Plan back from going even further. The Plan's objectives are simply too high relative to the need for ESH creation.

Spectrum Does Not Account for Non-ephemeral ESH

The Forests acknowledge that permanent openings, like balds, linear rights of way, and wildlife openings contribute to young forest conditions on the forest landscape. FEIS at 3-188. The Spectrum model, however, does not include any such acres of ESH. Perhaps attempting to justify that decision, the FEIS argues that there aren't very many such areas, stating that they may be important locally, but they "do not contribute significantly to the amount of young forest conditions at the landscape scale." FEIS at 3-188. That is inconsistent with the remainder of the FEIS. We raised this issue in our DEIS comments, but we can find no evidence it was addressed. DEIS Comments at 32. The failure to account for these acres in the model or elsewhere in the analysis is arbitrary and capricious.

Wildlife openings comprise 5,142 acres on the Nantahala and Pisgah NFs, including linear openings, as disclosed in this table from the recent Wildlife Openings Management Project EA.

TABLE 1

In addition, utility right-of-way openings and special uses provide an additional 7,082 additional acres of openings. See FEIS App. B at B-41, 42 (subtracting acreage without ROWs from acreage with ROWs). Although the acreage of special uses is not given separately, the bulk of this acreage is in linear rights of way.

Balds and Graveyard Fields provide another several thousand acres of ESH. There are at least 2,000 acres of ESH in the Black Balsam area, and Roan Mountain provides another large acreage, in addition to other balds with substantial acreages. The 1994 Amendment's Balds Management Area included 3,880 acres, exclusive of Roan Mountain.

Because the Forest Service did not analyze this issue, determining a precise acreage of permanent ESH is difficult. It appears, however, that there are approximately 15,000 acres of permanent ESH on the Forests.

Again, the Forests describes its goals for "young forest" by reference to the conditions provided by these permanent openings[mdash]"early successional conditions and open, grassy, herbaceous and shrubby areas." FEIS at 3-109. The failure to account for this habitat as contributing to ESH is an extraordinary omission for a forest plan where the agency believes young forest is its single biggest need. To put the number into context, assuming that ESH created by rotational harvest persists on average for about 15 years, this amount of permanent ESH is equivalent to 1,000 acres of annual ESH creation. Or stated differently, maintaining 15,000 acres of ESH over time using timber harvest on a 100-year rotation would require an additional 100,000 acres of land suitable for timber production. The following graph shows the levels of ESH that would be produced by the Plan (based on Spectrum) if permanent ESH had been added.

By not counting these acres, the Forest Service is vastly overstating its need for "structural restoration." Recognizing that permanent ESH provides the same habitat benefits but failing to count them toward the Forests' ESH habitat goals is contrary to fact and is arbitrary and capricious.

1.
Spectrum Does Not Model Enough ESH from Its Own Objectives.

2.
Fire assumptions in NRV model

Spectrum does not appear to accurately model changes in the forest landscape produced by the high levels of burning it prescribes. Instead, the Forests are using insupportably low estimates of how much young forest will be created by prescribed fire and wildfire: between 24 and 40 acres per year under Tier 1 and between 98 and 145 acres per year under Tier 2 over the 20-year life of the plan. FEIS at 3-429. Spectrum models an additional 128 acres per year occurring on average, although due to the cyclical model of natural disturbance the Forests have applied, this ranges from 38 to 278 acres per year. The Plan sets the upper bound for prescribed burning at 45,000 acres per year. ECO-O-06. And indeed, Spectrum's Tier 2 model projects an average of between 43,000 and 45,000 acres of burning per year over the life of the plan. This means that on average, the Forests expect burning to create young forest on less than one third of one percent of burned acres (between 100 and 140 acres out of 45,000, or 0.022%-0.031%).

FEIS at 3-429.

These figures are inconsistent with the proportion of burned area the FEIS's analysis predicts as being turned into young forest patch[mdash]"approximately 3 to 5 percent." FEIS App. D at D-17. Steve Norman's work shows a single application of prescribed fire historically moved about 1.3 percent of the landscape into a young forest

condition, on average. This proportion is roughly consistent with what our own analysis of burning for young forest[mdash]1,050 acres out of 97,000 treated[mdash]in recent years on the Nantahala-Pisgah. DEIS Comments at 28, 29. This means that Spectrum should model at least 5,800 acres of young forest created by fire alone each decade of in Tier 2.

Norman's 1.3 percent figure is the most conservative estimate the Forests could justify for young forest creation resulting from generally low intensity, low frequency prescribed fire. However, as discussed below, Norman explains that repeated passes of fire should create young forest on a greater proportion of the acres burned. Burning at the levels expected in Alternative E would involve frequent and repeated burns. For Alt. E, Tier 2, a total of 307,738 acres are allocated for prescribed fire. An additional 29,794 acres are allocated to burning for young forest creation. On this footprint, approximately 44,000 total acres of fire would occur each year, with an average fire return interval of about 7.7 years.

Prescribed fire is currently being applied at a rate of 8,500 acres per year (i.e., the levels that produced the effects described by Norman). See FEIS at xiv. On the same footprint available for prescribed fire, that would equate to a 40-year return interval. With such low frequency, it is not surprising that Norman did not detect levels of young forest creation consistent with the NRV. However, as Norman observed, increased frequency will increase levels of young forest creation. NFNC Report at 16. Attachment 7. The best available science shows that burning with this frequency should move a substantial portion of the treated acres into young forest, and an even greater portion into "open" forest. Indeed, when the Great Smoky Mountains National Park modeled the effects of fire, it assumed that three "passes" of fire with no more than 10 years between them would lead to 20% of the acreage moving into young forest conditions and 60% moving into open forest conditions. Great Smoky Mountains National Park LCF Report at 37, Attachment 8.

Applying the Smokies' assumptions here, where the entire burning footprint would receive at least three passes of fire on average in the first 20 years, up to about 58,447 acres of ESH would be created, along with about 175,341 acres of open forests.23F In other words, the Forests could achieve NRV for young forests and half of their open forest objectives without cutting a single tree.

Another coefficient for the effects of fire falls between Norman's observations and the Smokies' assumptions, and it is the figure that the Forest Service saw fit to use in its own NRV models. We calculated the percent of total fire for Dry Mesic Oak and Dry Oak modeled to create young forest per NRV. According to the Forests' NRV models, 4.4% of fire in Dry Mesic Oak is "replacement" fire, and 5.2% of fire in Dry Oak is replacement fire. 2

2 FIGURES DMO

These NRV estimates are roughly consistent with the FEIS's prediction that 3-5% of fire should be high severity, which the Norman work shows will create young forest on 95% of the acres burned. NFNC Report; FEIS App. D at D-17. Five percent young forest-creation rates for prescribed fire during the life of the plan would create about 2,200 acres of young forest each year at Tier 2 levels of burning[mdash]more than an order of magnitude greater than the figures used by the Forests' models.

While the best available science cannot predict precisely how much young forest will be created by fire, it is absolutely clear that it will be more than the Forests have predicted. Again, the Spectrum model and FEIS project less than 1/3 of one percent. But even if fire is infrequent, 1.3% is the lowest defensible figure that can be based on actual observations, and this would result in about 572 acres per year caused by burning rather than 140[mdash]an increase of 432 acres per year that the analysis does not account for. This would add up, in dry forests where ESH lasts for 20 years, to 8,640 additional acres of ESH at a given time.

Furthermore, it is mathematically impossible for Tier 2 levels of fire to affect the same areas only infrequently on the landscape where it will be applied. The best available science says that frequent, repeated fire will lead to

substantially greater levels of young forest habitat than historical levels. Even if the Forests do not apply the same coefficient as the Smokies, they must at least ensure that the Spectrum model assumptions are consistent with the NRV model's estimate of 5%, which would yield approximately 2,200 additional acres of young forest each year. This would add up to an additional 44,000 acres of ESH.

As shown in the two graphs below, adding even conservative effects of repeated fire, plus the permanent ESH discussed above, to Tier 2 levels of regeneration harvest will take the forest landscape even further outside the NRV for young forest.

FIGURE Spectrum YF

To satisfy the Planning Rule's BASI requirement and NEPA, the Forests must engage with this issue and the literature it relies on and explain its predictions of the effects of repeated fire treatments. Currently, that explanation is absent.

Spectrum fails to account for ESH created by planned daylighting.

In addition, Spectrum fails to model the effects of daylighting to create ESH. We raised this issue in our DEIS comments, but it was not addressed in the FEIS. DEIS Comments at 32-

The Plan sets an objective to daylight two miles of road per year at Tier 1 and five miles of road per year at Tier 2, for the express purpose of creating ESH.

Assuming that daylighting creates ESH up to 80 feet away from the road (the radius of a 1/2-acre circle), 5 miles of this activity would create 100 acres annually of ESH, or 1,000 acres per decade. If half the acres persist in ESH condition for 10 years (mesic forests) and half persist for 20 years (dry forests), then this would create an additional 1,500 acres of ESH that the Forests have not accounted for anywhere, as shown in the following graph along with the cumulative effects of the previously discussed errors.

FIGURE Spectrum YF

Spectrum Doesn't Model Enough ESH from Natural Disturbance.

In addition to setting an insupportably high desired condition for young forest, it is almost certain the Forests are underestimating the proportion of young forest likely to be created in the future by natural disturbance. Like many of the Forests' other errors, this shows a higher need for regeneration harvest than is supported by the best available science.

Levels of natural disturbance critique

a.Facts.

In Alternative E, and unlike any of the other action alternatives analyzed in the DEIS, Spectrum models a total of 56,162 acres of large-patch disturbance contributing young forest to the landscape during the 200-year planning horizon. See Attachment 9. On average, this works out to about 280 acres per year. Natural disturbance is described by the Spectrum model as a repeating, five-decade cycle of disturbance. This cycle was developed simply by repeating measured decadal disturbance from the past five decades[mdash]excluding large wildfires in the Eastern Escarpment, which are regarded as outliers[mdash]indefinitely into the future. FEIS, App. D, tbls. 9, 10. Within Spectrum, these forestwide disturbance totals are distributed both across moisture classes, reflecting

higher concentrations of disturbance expected in xeric ecosystems, and geographically, to reflect historically higher levels of fire disturbance in some areas of the forest landscape than others. See Spectrum Alternative E Tier 2 Spreadsheet, Attachment 10.

b. 50-year reconstruction critique.

The Forests' choice to model future disturbance by simply carrying forward and repeating the five-decade cycle over the 200-year planning horizon is statistically and scientifically unsupported. The Forests do not seem to have interrogated whether Norman's 50- year dataset, or any such five-decade period, could be treated as a statistically representative sample for the purposes of projecting cyclical disturbance over 200 years. Fifty years of measurement cannot support an inference of a 50-year cycle. The Forests have not explained their basis for assuming large disturbances behave cyclically on the Nantahala-Pisgah, much less what supports their assumption that such a cycle would have a period of five decades. This crucial model assumption is not a product of scientific reasoning, or even an educated guess.

Rather, it is purely a reflection of the data the Forests happen to possess. The Forests' explanation for this decision does not comply with the Planning Rule's BASI requirement, which requires that planning decisions be informed by the best available scientific information and that responsible officials explain how that information was identified and "applied to the issues considered."

The Forests simply have not engaged with basic statistical methods that, along with the best available climate science, would have suggested these data reflect a trend rather than a cycle. Below we have shown what the Forests would have seen if they had considered a line of best fit for the decadal disturbance data. Applying a linear trend would have predicted approximately 3,800 and 4,300 acres of natural disturbance in the first two decades (380 to 430 acres annually, more than twice what the Forests have predicted).

FIGURE

c. LiDAR problems.

The Forests primarily rely on a LiDAR survey of the forest canopy to validate their estimates of natural disturbance in Appendix D. The measurements returned by their LiDAR surveys, however, were implausibly low. Table 10 in Appendix D indicates that Forests attribute just 1,300 acres of openings detected to natural disturbance. FEIS App. D at D-16. It should have been immediately obvious to the Forests for several reasons that these LiDAR outputs were incorrect, or at least wildly inconsistent with their other analyses. Instead, they were used to show that the low levels of natural disturbance they projected were reasonable. We realize that this analysis was performed by analysts outside the local planning team, and at the last minute.

However, that does not change the fact that the LiDAR analysis is simply unreliable.

First, these surveys produced an estimate for total openings on the forest less than the acreage of permanent and human-caused openings otherwise cataloged on the Forests, to say nothing of the ephemeral natural openings of which the LiDAR was supposed to provide a snapshot. We estimate existing permanent openings total approximately 15,000 acres. See Section III.H.2 supra. In addition, using recent harvest levels of 650 acres per year young forest creation (see FEIS at xiv) and assuming that ESH persists on average for 15 years, there should be 9,750 acres of ESH created by timber harvest. Combined, there should be just under 25,000 acres of human-caused openings on the forests. The 2017 LiDAR analysis, however, detected only 3,730 acres of human-caused openings, which would include both permanent ESH and timber harvest. In other words, the LiDAR analysis detected only 15% of the total openings.

Second, the Forests' 2017 LiDAR survey somehow returned an estimate of natural disturbance in patches much

lower than estimated by a similar 2005 analysis, despite post-dating severe wildfire seasons in 2007 and 2016 that created so much young forest that those entire events were treated as outliers for the purposes of estimating future high-severity fire. See FEIS App. D at D-17. Even with wildfire effects from the Eastern Escarpment removed entirely from the data, the Forests modeled 4,527 acres of young patch from wildfire in the last two decades. See Base Disturbance Spreadsheet (WF/noEE). In 2017, all of these acres would be still classified as "young forest." FEIS at 3-119, tbl.32. But the 2017 LiDAR run apparently only detected only 1,300 acres of natural disturbance in patches.

It is clear that the Forests' analysts interpreted the raw LiDAR data inaccurately, with implausibly low returns. To translate raw LiDAR data into an estimate of "gaps," the Forests set parameters for the returns to assess whether a given 10-meter-by-10-meter "pixel" of forest was counted as a "gap." LiDAR metadata show each pixel was characterized using a total of eight points per square meter, or 800 points per pixel. If any one of those 800 points returned a height greater than 15 meters, then the entire 10-meter pixel was disqualified from being part of a "gap." Snags, lone trees in a wildlife field, overhanging branches, poles, or even wires would disqualify patches, which the LiDAR analysis would then treat as "forest." This explains how the LiDAR seems to have failed entirely to detect larger patches, but the same flaws would likely cause the analysis to undercount small gaps to an even greater extent.

In addition, the Forest Service created a "canopy density" model at 10-meter pixel size. Canopy density models, unlike canopy cover models, use all returns. LiDAR uses laser pulses to measure the relative height and texture of a plane. They do this by firing a laser from a known location and measuring the time and intensity of the refracted beam of light returned from the measured surfaces. The first beam from each pulse to return to the LiDAR device is termed the "first return." Refracted light from the first return bounces in different directions and bounces off more surfaces before returning to the measuring device. The returns from the original pulse that arrive after the first return are termed second, third, and fourth returns[mdash]and so on. By using "all returns," a canopy density model measures the density of vegetation in a certain vertical zone.

We are unsure of the height threshold used by the Forest Service in this case, because there is no documentation of that in the FEIS, but we believe that pixels with a canopy density of less than 25% were classified as "gaps" and pixels with canopy density greater than 25% were considered "forest." If a patch of ground was classified as "forest" by either the canopy height model or the canopy cover model, it was conclusively classified as "forest."

In other words, even if ESH passed through one excessively sensitive filter for height, its inclusion in the Forests' inventory of patches could still be thwarted by another excessively sensitive filter for density.

The thresholds used for both the canopy height and canopy density models were incorrectly calibrated, as we will show in a series of examples. The consequence of these errors was in each case a systematic undercount the area of openings of all types. Starting with the canopy height model, the height threshold (15 feet) for the cut-off was set too low. The purpose of the LiDAR gap study was to measure openings and disturbances that function as young forest habitat. The minimum duration of early seral habitat, as defined by the Forest Plan, is 10 years, and many of the ecozones have an early seral duration of 15-20 years. Draft Plan at 58-59. The Southern Blue Ridge boasts some of the most productive temperate hardwood forests in the world. Yellow poplar, one of the most common pioneer trees in the Southern Blue Ridge following timber harvest, often grows above 15' within 5-7 years. Brooks (2013), Attachment 37.25F Accordingly, use of the height threshold caused the LiDAR data to severely undercount young forest relative to the FEIS's parameters for its presence in the NRV.

These thresholds mean the LiDAR failed to accurately capture timber harvest areas, which should have been easy for the Forests to recognize and validate. Examining aerial imagery of certain timber harvests shows why the LiDAR analysis would have failed to correctly categorize them as large patches. These timber harvests, termed "two-age leave harvests" by the Forest Service are similar to clearcuts with reserves and remove 70-90%

of the stand's tree cover. This leaves individual stems surrounded by areas with no tree growth shortly after harvest.

These areas are considered high-quality early seral habitat by the Forest Service. See, e.g., Crossover Scoping Document; Shope Creek EA.

The LiDAR gap study does recognize these areas, but it tends to recognize them as numerous small patches rather than one large patch of habitat. For example, the Bear Branch timber harvest from the Brushy Ridge Timber Sale was harvested in 2015. The LiDAR data were acquired in late winter/early spring 2017. Mapping by field observation and aerial imagery shows the Bear Branch unit to be approximately 32.9 acres. The LiDAR gap study characterized the area as 58 individual patches, only seven of which were larger than 0.5 acres, for a total of 18.1 acres. The LiDAR gap study therefore counted only 55% of the area as young forest because every leave-tree in the area caused a 100 square meter polygon to be subtracted from the total harvest area.

FIGURE Bear Branch Timber Harvest

The Forests' inconsistent definitions of "young forest" also caused the LiDAR to undercount patches relative to how the Forests define young forest for the purposes of assessing NRV. Surveying an area between five and nine years after a clearcut-with-reserves timber harvest, the LiDAR gap study barely registered any openings. But young, rapidly growing trees can exceed the 15-foot height thresholds in the canopy height and canopy density LiDAR layers in under 10 years[mdash]even though stands younger than 10 years are considered young forest in every ecozone's NRV by the agency. Indeed, it appears that most stands between five and 10 years old were not counted as young forest gaps in the LiDAR study. This is illustrated by activity at Shope Creek on Pisgah National Forest, where Stand 23-15 was harvested in 2010.

Aerial imagery from October 2010 clearly shows the recent harvest, but the LiDAR gap model fails to effectively detect or count this harvest in the forest total for gaps. The area harvested is approximately 15.9 acres, yet the LiDAR gap model detected seven small gaps totaling less than 0.2 acres for the entire area[mdash]just 1.3% of the what the FEIS would conclusively recognize as young forest.

FIGURE Shope Creek Timber Harvest

The LiDAR also missed other openings, such as mowed open areas, transmission line corridors, young forest created from fire, and more. Even at Max Patch, a large and well-known opening in the forest, these issues are easy to spot. On the left side of the figure, below, is a small electrical transmission line. This line is captured by the highly sensitive LiDAR model, and the path of the line is excluded from the grassy open area of Max Patch. The presence of the transmission line makes Max Patch no less grassy or open, but it is still excluded. Irregular trees in otherwise open areas present the same problem: Transmission lines are the diameter of small tree branches, and indeed, the branches of trees and shrubs are also captured and excluded from the LiDAR gap model, even when they occur in open fields. The extreme sensitivity of LiDAR, combined with the parameters of height and canopy density chosen, serves to improperly exclude a huge acreage of gaps throughout the planning area because the tree height threshold and canopy density threshold are both too low. The pixels returned by the "canopy height" analysis are displayed as smaller, 1 square meter pixels; those excluded by the canopy density model form the larger, blockier features reflecting a 10 square meter pixel size. In Max Patch, the LiDAR Gap Model underestimated the opening by 42 acres[mdash]a 27% underestimate of the actual size of the open area.

Max Patch Open Area Acreage

TABLE

2 FIGURES Max Patch

Last, we note that the LiDAR parameters are especially poorly suited for detecting young forest created by fire. When fires kill trees, the dead trees are often left standing. LiDAR has no way of distinguishing live trees from dead trees; it thus misses many gaps and patches created by fire. One example of this is from the Rock Knob Fire (2016) in Southern Nantahala Wilderness. Aerial imagery from 2017 clearly shows at least 16 acres of forest completely charred by wildfire, but the LiDAR gap model detected gaps totaling less than an acre, and no patches larger than 0.5 acres that would contribute to the Forests' estimates of "young forest."

FIGURE Rock Knob Fire

Relying on these flawed data and inconsistent definitions of ESH on the forest landscape to assess current and future conditions is patently arbitrary and capricious. The magnitude of the problem cannot be determined unless the Forests re-do the analysis correctly, but it can be estimated, at least for larger patches. If the LiDAR analysis captured only 15% of anthropogenic large patches, then it likely undercounted natural large patches by a similar magnitude. This would mean that there were 8,626 acres of natural openings greater than 1/2 acre when the analysis was conducted[mdash]about 4,700 acres more than provided in the most recent decade per Table 10 of Appendix D. This higher figure immediately invalidates the natural disturbance estimates in Table 10. Had Spectrum modeled realistic levels of natural disturbance, it would have shown another 4,700 acres of young forest above modeled levels, shown below cumulative with the preceding errors.

TABLE

d. Alternative to LiDAR analysis.

Even if the Forests' LiDAR analysis had been acceptable, a moment-in-time LiDAR survey is not the best available scientific method for tracking canopy loss across a landscape. In our comments on the DEIS, we directed the Forests toward a more complete dataset, which tracked canopy loss on the forests between the first LiDAR survey (2005) and 2020. DEIS Comments at 23-27. Unlike the Forests' LiDAR survey, the dataset (Hansen et al.) is easy to validate against phenomena the Forests should otherwise have been aware of: It accurately detected the 11,000 acres of new young forest created from 2007 to 2008 and from 2016 to 2018 by wildfire and hemlock wooly adelgid outbreaks. DEIS Comments at 23.

In the FEIS and its accompanying documents, the Forests have not demonstrated that they considered this account of disturbance of the Forest. Nor have they explained why they continue to rely on moment-in-time snapshots of disturbance on the Forest that have apparently failed to detect highly visible and well-known young forest-creating events.

Climate modeling was not incorporated into Spectrum or otherwise used to inform analysis of plan effects

The effects of climate change are difficult to predict with precision. FEIS at 3-438; DEIS at 64-65; DEIS Comments at 240. But there is no room to ignore the settled fact that there will be effects. As the Fourth Circuit recently observed in a decision vacating an insufficiently rigorous biological opinion: "[E]ven if random departures from a simplistic model could be chalked up to 'climate change,' the model failed to account for the one thing we know about climate change: that it will get worse over time." Appalachian Voices v. U.S. Dep't of Interior, No 20-2159 (4th Cir., Feb. 3, 2022), at *30.

The Forests have shown they are aware of this view by developing a scenario in which disturbance levels during the final 90 years of the planning horizon would be 138 percent higher than under the disturbance regime used to model Alternative E, primarily due to more frequent and severe wildfire, but then failing to consider how that scenario would interact with the Plan's effects, and particularly the effects of timber harvest. FEIS App. D at D-19. The climate-realistic scenario was simply never fed into the Spectrum model. In other words, the Forests did not

consider the cumulative effects of climate-driven disturbances and their own actions, in violation of NEPA. This choice amounts to failure to use the best available science, which shows climate change will make fire and storm events more severe. FEIS at 3-438, -439.

Today, carbon dioxide in the atmosphere is almost 100 parts per million higher than it was in 1970.26F The levels of natural disturbance the Forests predict for the next decade correspond to this now-distant historical benchmark. FEIS App. D at D-19 - D-20. These concentrations will continue to climb during the life of the plan and likely throughout the 200- year planning horizon.

By choosing to model future natural disturbance in a way that does not even attempt to account for the difference in climatic circumstances between 1970, now, and throughout the planning horizon, the Forests are acting in a way that "runs counter to the evidence before the agency." State Farm, 463 U.S. 29, 43. Agency decisions must also be "'based on a consideration of the relevant factors.'" Sierra Club, 899 F.3d at 270 (quoting Marsh v. Or. Nat. Res. Council, 490 U.S. 360, 378 (1989)). Any agency decision that entirely fails to account for the scientific consensus that climate change will occur, especially when modeling the long-term trajectory of a landscape characterized by small variations in microclimate, cannot have been sufficiently "based on a consideration of the relevant factors."

The failure to consider climate change is particularly worrisome because, as explained at length above, Section III.D.1 supra, the Plan will create an age-class distribution that is not resilient to increasing (or even current levels of) natural disturbance. It is clear that early successional habitat will be overrepresented, while mid- and late-aged forests are underrepresented. As increases in natural disturbance takes out old forest, the result will be a very unbalanced forest that lacks resilience. Climate-driven disturbances are unlikely to increase in a smooth or gradual way. Instead, periods of apparent normality will be punctuated with increasingly severe events. The Plan leaves no buffer of resilience for these future events.

iii. The Forests Dramatically Underestimate Future Young Forest

Because "it is harder to create old growth than it is to create young growth. . . protecting older forests and setting the right goal for the proportion of early successional forest is critical." White Statement at 2, Attachment 3.

Above, we have explained that it was arbitrary and capricious of the Forests to base the Plan's ceiling for young forest on assumptions about natural disturbance the rest of the analysis contradicts. We have shown that even the Forests' analysis shows the Plan permits young forest creation to exceed this ceiling. And we have described each additional source of ESH on the forest landscape the Forests have failed to account for. These are illustrated on a single graph below, making clear how these errors accumulate. Our most conservative estimate of how much the FEIS undercounts steady-state ESH under Tier 2 is 30,000 acres, see below. A more realistic estimate that accounts for the effects of repeated burning shows FEIS has undercounted ESH on the forests by almost 70,000 acres in Tier 2, see below.

FIGURE

Every acre of disturbance the model fails to account for is an acre that the Plan allows in excess of NRV. Harvest levels are clearly set too high in the Plan to be justified merely by reference to the need for ESH creation. If the Forest Service intends to work at these levels, it must articulate a reason that is consistent with restoring ecological integrity. Restoring species composition is a need that could justify some of the excess harvest, but the Forests may credibly find that they will restore species composition only if they add plan components that require it. Shifting acres into the EIA MA and adopting a requirement that at least half of harvest activities be in priority treatments would be a good start.

Model Does Not Correspond to the Plan.

The relationship between Plan components and Spectrum is complicated. Both deal in constraints[mdash]targets, and upper and lower bounds[mdash]for management activity. But many constraints present in Spectrum are found nowhere in enforceable Plan components. In other words, Spectrum appears to model one possible exercise of discretion within a much broader range of permissible management levels circumscribed by the Plan. The FEIS likewise makes highly optimistic assumptions about management actions to show that the Plan will meet objectives for forest ecology[mdash]but these assumptions are not binding.

This disconnect between what is analyzed and what is permitted creates both a NFMA and a NEPA problem for the Forest: The Plan comes up short in "providing for" NFMA's ecological goals, while the FEIS fails to analyze the full range of possible environmental impacts the Plan authorizes. Because the FEIS only analyzes a single possible scenario within the Plan's much broader grant of discretion, it is unknowable whether the impacts it analyzes are the"actual" or even "probable" impacts of the Plan's implementation, as NEPA requires. Cf. WildEarth Guardians v. Montana Snowmobile Ass'n, 790 F.3d 920, 924 (9th Cir. 2015) (describing EIS adequacy as requiring discussion of "significant aspects of the probable environmental consequences") (quoting City of Sausalito v. O'Neill, 386 F.3d 1186, 1206 (9th Cir. 2004)).

1. Spectrum's constraints do not correspond to plan requirements.

One notable example of this mismatch is a Spectrum constraint in Alternative E limiting harvest in cove forest types to 30 percent of total regenerative harvest. FEIS App. D at D-48. It is unclear why this constraint was added, because it distorts the analysis without corresponding to any plan component. The analysis cannot support the agency's conclusions about effects in cove forests unless the Forest adds this same cap as a plan component. That would not be our preference, however. We would prefer that the Forests Service adopt a more holistic commitment to ensure that at least half of its harvests are priority treatments. This would allow for significant levels of cove harvest, but would ensure overall that they shift into coves with restoration needs that can be met with timber harvest. See DEIS Comments at 74-76.

Unlike the Plan components, Spectrum also limits "thin and burn" treatments exclusively to acres in the xeric moisture class. ECO-O-05 provides annual targets for thin and burn treatments but does not commit the forest to meeting those targets in xeric forest types. Plan at

70. We have seen the Forest Service try (and fail) too many times to create woodlands in mesic to moderate forests, and this limitation should be reflected in plan content.

2. The Plan fails to adopt limits that Spectrum shows are necessary.

The Plan is similarly untethered to modeled outputs. ECO-O-02 permits the Forest to create young forest conditions on up to 3,200 acres annually under Tier 2.27F But in the Spectrum model for that Tier 2, forestwide regeneration harvest levels are constrained to between 28,000 and 30,000 acres per decade (or, on average, 2,800 acres and 3,000 acres per year over the life of the plan). FEIS App. D at D-46. Model outputs for regeneration harvest actually average below 2,800 acres per year throughout both the plan life and the planning horizon. Prescribed burning is the only other management activity modeled as creating young forest. But the Tier 2 Spectrum model assumes prescribed burns contribute at most 145 acres per year during the life of the plan.

To analyze the effects of a Plan where 3,200 acres of regeneration harvest is permitted, the Forests have modeled a landscape where active management (regeneration harvest plus burning for young forest) creates at most 2,980 (decade 1) and 3,020 (decade 2) acres of young forest per year. 29 In this and similar cases, the Forests simply have not modeled[mdash]and thus have not analyzed[mdash]what the forest landscape will look like and how other management choices will be affected if the limits set by Plan component are actually achieved. But, as shown by the preceding graphs showing that ESH will exceed NRV even under the Forest

Service's too-low projections, it would contribute to additional departure from reference conditions. An "extra" 400 acres per year of timber harvest would accumulate, on average, to about 6,000 additional acres of ESH at any given time.

Similarly, the model limits harvest of old forest acres during the model's first two periods[mdash]the life of the Plan[mdash]to an extent greater than the Plan components or the model, which do not limit management activity with respect to old forest at all. See Plan at 90-96 (timber components) and 69-71 (integrated ecosystem and wildlife habitat components); FEIS App. D at D-9; D-46-41 (showing Alt. E's Spectrum model was not constrained by reference to "OldSerlOpen" or "OldSerlClose" outputs). Even at Tier 2 levels of harvest, Spectrum models only 260 acres per year of harvest in old forest. If the Forests exceed this in practice, they will lack any basis to conclude they are on track to restore old forest consistent with their analysis.

Similarly, in later periods where old forest harvest levels increase, it is primarily limited in Spectrum to "thin and burn" treatments to create old-open conditions. This does not appear as a limitation in the Plan either.

The Forests' Model Does Not Correspond to Reality.

1. Management lock makes it impossible to rely on Spectrum at all.

Some model assumptions require more guesswork than others. For example, it is difficult to project the precise effects of climate change on the landscape or account for the behavior of nearby private landowners. But when a model assumes something flatly contrary to what can easily be observed, and agency action relies on that analysis, the APA requires that the agency action be set aside. State Farm, 463 U.S. at 43. Contrary to ongoing management practices on the Nantahala-Pisgah, Spectrum appears to treat acres on the forest as being reserved, once assigned, for a single management action for the remainder of its 200-year planning horizon. For example, an acre modeled as "burned" becomes unavailable for subsequent regeneration harvest action throughout the planning horizon, even though the vast majority of acres subject to prescribed fire management actions will remain available for timber harvest. The Forests have referred to this arbitrary constraint as "management lock."

Management lock ignores the practical fact that multiple treatment types can often be (and should be) sequentially applied to the same acres. For example, harvest and prescribed fire should almost often go hand in hand under a program of ecological restoration. The Forests have not justified this modeling assumption or acknowledged how it distorts the analysis. It is contrary to fact and thus unlawfully arbitrary and capricious.

This arbitrary limit distorts the Forests' choices and analyses. It likely causes Spectrum to "need" a larger suitable base to meet its treatment objectives than a realistic model of management activity would require: Acres that could accommodate (or even benefit from) multiple treatment types are not permitted to pull double duty, even after many decades have passed. Spectrum is therefore forced to spread treatments over a larger suitable base, which we suspect biased the decision in favor of expanding the suitable base dramatically in the Plan. In a very real sense, Spectrum is therefore incapable of modeling management scenarios that would actually restore forests at the ecozone scale

Correcting Modeling Problems

Because of these cumulative and fundamental problems with the models, the Forests' FEIS cannot support the weight of its decision. Put simply, the Forests have no basis to conclude that the cumulative effects of their future decisions will be anywhere close to the modeled effects, which themselves indicate that the Plan does not set a course to restore NRV.

The Forests' response promises that restoration needs will be part of project-level analysis. But as we stressed in

our comments on the DEIS, the project level is too late to answer or analyze goal-setting questions, which can only properly be answered at the landscape scale: How much habitat is enough? How much harvest is too much? A stand survey, however thorough, cannot shed light on these questions. Only this Plan's FEIS can. If the Forests mean to conduct a cumulative impacts analysis at the project level, as they would be required to with nothing to tier to, this could meet their NEPA obligations, but it would be highly impracticable.

As the Forests reminded us, "the model is not the plan." Forest Plan Modeling Q&A (Feb. 15, 2022). But as explained above, it is only because of the Spectrum model that the Forests can draw any conclusions about whether the Plan's commitments are feasible and lawful with respect to its ecological obligations. As a result, the Forests must supplement the FEIS and modify the Plan's components to show that the Planning Rule's obligations will in fact be met. And, if the Forests continue to rely on the Spectrum model, it will have to be reworked from scratch. We propose a shortcut: the Partnership alternative would avoid the problems discussed above in a more elegant way. Rather than bending over backward to justify too-high levels of structural manipulation, the Forests could justify higher levels of harvest in this planning cycle by showing that they will in fact meet other restoration goals in the EIA and with priority treatments.

IV. The Forest Plan Has Not Met Obligations Under the NFMA and ESA to Provide for Biological Diversity and Contribute to the Recovery of Listed Species

Protecting the rich biodiversity of our nation's forests has never been more critical. In the Southeast especially, increasing threats from the climate crisis, habitat destruction, and ecosystem degradation imperil the species that make our region unique. National Forests provide some of the last, best habitat for safeguarding rare plants and wildlife. The Forest Service understands that it has a responsibility to "sustain the health, diversity, and productivity of the Nation's forests present and future generations."29F However, the Forest Service's responsibility to balance production and protection is not just a moral one. Congress has directed the Forest Service to steward its lands and waters for the protection of native species, to aid the recovery of threatened and endangered animals and plants, and to maintain the persistence of other rare and sensitive species in decline to the fullest extent possible within its authority. The proposed Nantahala Pisgah Forest Plan falls far short of meeting these statutory mandates.

Under the National Forest Management Act, forest plans must "provide for diversity of plant and animal communities." 16 U.S.C. [sect] 1604(g)(3)(B). The Forest Service is directed to support "social, economic, and ecological sustainability within Forest Service authority and consistent with the inherent capability of the plan area." 36 C.F.R. [sect] 219.8. Section 219.9 of the Planning Rule directs forests to adopt "a complementary ecosystem and species-specific approach to maintaining the diversity of plant and animal communities and the persistence of native species in the plan area." 36 C.F.R. [sect] 219.9. As the primary requirement of this "coarse filter," the Forest Service must include plan components, including binding standards or guidelines, to "maintain or restore ecological integrity" of ecosystems "[a]s required by [sect] 219.8.

Ecological integrity is discussed at length elsewhere in this objection, see Section II.A, supra, but to summarize: ecological integrity is the condition of being within the natural range of variation for structure, function, composition, and connectivity. 36 C.F.R. [sect] 219.19. Composition is defined as "the biological elements that comprise the ecozone from genes, to species, to ecological communities and ecosystems," and structure "refers to the organization and physical arrangement of biological elements such as snags and down woody debris, vertical and horizontal distribution of vegetation, stream habitat complexity, landscape pattern, and connectivity." FEIS at 3-102 (citing FSH 1909.12, Ch. 05.1); see also 36 C.F.R [sect] 219.19.

Function is defined by the "[e]cological processes that sustain composition and structure, such as energy flow, nutrient cycling and retention, soil development and retention, predation and herbivory, and natural disturbances such as wind, fire, and floods." FSM 1909.12; 36 C.F.R. [sect] 219.19. Under section 219.8, the agency is also charged with developing plan components for riparian areas that address, among other things, "aquatic and

terrestrial habitats" and "ecological connectivity." 36 C.F.R. [sect] 219.8(a)(3)(i)(D), (E).

To complete the coarse-filter approach, the sustainability plan components required by [sect] 219.8(a) are paired with ecosystem-level components "to maintain or restore the diversity of ecosystems and habitat types throughout the plan area." 36 C.F.R. [sect] 219.9(a)(2). Specifically, a plan must include components "to maintain or restore:

1. Key characteristics associated with terrestrial and aquatic ecosystem types;
2. Rare aquatic and terrestrial plant and animal communities; and

iii. The diversity of native tree species similar to that existing in the plan area." Id.

Next comes the "fine filter." Where it is determined that ecosystem plan components are "insufficient" to "contribute to the recovery of federally listed threatened and endangered species, conserve proposed and candidate species, and maintain a viable population of each species of conservation concern within the plan area," "then additional, species-specific plan components, including standards or guidelines, must be included in the plan to provide such ecological conditions in the plan area." 36 C.F.R. [sect]219.9(b)(1).

The Forest Service's overriding obligations in plan development are to restore and maintain ecological sustainability and biological diversity. See, e.g., 36 C.F.R. [sect] 219.10(a)(7) (noting multiple-use plan components must "meet the requirements of [sect][sect] 219.8 and 219.9"); [sect] 219.11 (similar). To summarize, the Planning Rule works by requiring binding plan components.

to maintain or restore ecological integrity, (2) to adopt additional components to protect rare communities, and (3) to fill in the gaps with "fine filter" components for species whose needs are not met by the first two requirements.

The Forest Service also bears the responsibility under the Endangered Species Act (ESA) to consult with the Fish and Wildlife Service (FWS) to "insure that any action authorized, funded, or carried out by such agency. . . is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species" and to comply with any "reasonable and prudent alternatives" suggested by FWS to minimize the impact of agency action on imperiled species. 16 U.S.C. [sect] 1536(a)(2), (b)(3)(A). The agency must also utilize its authority to further the aims of the ESA "by carrying out programs for the conservation of endangered species and threatened species." Id. at (a)(1). The Forest Service has not yet completed its consultation with FWS, and our review of the FEIS causes us deep concern that the Forest Service has not complied with its obligation to provide FWS with accurate information to inform the consultation process. The ESA [sect] 7(a)(2) mandates that "each agency shall use the best scientific and commercial data available" when consulting with the FWS under the ESA. 16 U.S.C. [sect] 1536(a)(2). We must urge the Forest Service in the strongest terms to correct the misleading information that we identify in this Objection and to fulfill the agency's obligation to present best available information about Plan impacts to FWS. In addition to fulfilling its NFMA and ESA obligations, the agency must also satisfy NEPA. NEPA requires that the Forest Service identify and disclose the environmental consequences of each proposed alternative to the public. 42 U.S.C. [sect] 4332(C). NEPA also obligates the Forest Service to take a "hard look" at the direct, indirect, and cumulative effects of the Forest Plan revision. See Robertson v. Methow Valley Citizens Council, 490 U.S. 332, 350 (1989). That includes taking a hard look at impacts from the plan on federally listed threatened and endangered species, species of conservation concern, and other sensitive species in the planning area. In developing plan components related to ecosystem integrity and evaluating impacts on species, the Forest Service must utilize the best available scientific information. 36 C.F.R. [sect] 219.3.

The Plan's attention to terrestrial ecosystems begins with an extensive and well- supported description of the ecological reference condition for the forest landscape, which differs by ecozone. These are the "key ecosystem characteristics" identified at Plan pages 54-64 and referred to elsewhere in the FEIS as "desired conditions" for ecozones. This narrative description of reference conditions for key ecosystem characteristics is based on the best available science and addresses many of the necessary considerations for evaluating species persistence and recovery in the Forests. We agree with the Forest Service that maintaining and restoring key ecosystem characteristics of structure and composition, as described in the reference model for key ecosystem characteristics at the ecozone scale, will meet "most" wildlife habitat needs. That is, of course, the very premise of the coarse filter approach.

However, the agency failed to carry these ecozone-scale characteristics into binding plan components. As a result, the Forest Service stopped short of fulfilling its obligations under section 219.9. It also thereby failed to provide a set of plan-level decisions that could be meaningfully analyzed to fulfill the agency's responsibility under NEPA to show that future projects will not cumulatively impair the viability and recovery of rare species.

In addition, the Forest Service failed to complete the second part of the coarse filter[mdash] protecting rare communities. In particular, the Forest Service failed to protect several geographic areas which house the majority of rare species on the Forests (1) state-delineated natural heritage natural areas (NHNAs), which are areas of confirmed biodiversity, (2) existing old growth forests, which are vanishingly rare in the East and therefore meet any reasonable definition of rare habitat alongside supporting a host of rare species, and (3) tens of thousands of wilderness inventory areas known to be of national significance for biodiversity and ecological integrity.

Furthermore, the inadequate coarse filter left rampant gaps in biodiversity protections which the Forest Service did not fill with fine filter components.

Moreover, without specific and clear diversity requirements to analyze, the FEIS analysis struggles to provide a basis for concluding that plan-area wildlife will be adequately protected.

As a result, the FEIS makes assumptions for limiting protections that do not correspond to plan components. In other words, the Forests gave themselves an impossible task[mdash]justifying that a generally unconstrained logging program will meet the Planning Rule's viability and recovery requirements. The FEIS's analysis, untethered to binding plan components, fails to show the agency took a "hard look" at the effects of the Plan itself (as opposed to nonbinding intentions).

Coarse Filter

For reasons discussed in more detail below, the Forest Service must make several analytic and allocative changes to correct problems with its coarse filter analysis and conclusions.

First, the course filter analysis must include NHNAs. The agency must provide supplemental analysis comparing the alternatives' relative ability to protect biological diversity in the long-term, and such an analysis would have to recognize the acreage of NHNAs that would be available for timber production. It is not credible to fail to provide protection for these areas but also fail to disclose that they would be regenerated, if not in this planning cycle then in future cycles. For each alternative, this analysis must therefore analyze the effects of losing those rare and exemplary habitats on the Forests' ability to maintain and restore biological diversity.

NEPA requires a robust comparison of alternatives to be completed and published. If the Forests do not undertake the required analysis for NHNAs, the Final Plan must reallocate NHNAs to more protective management areas, such as SIA, WIA, and backcountry, to avoid causing the impacts it fails to disclose.

The Forest Service should reclassify old growth conditions, the Rich Subtype of Rich Cove Forest, the Rich Subtype of Northern Hardwoods Forest, and the Basic Subtype of Montane Oak Hickory Forest to the list of rare habitats for Pisgah and Nantahala National Forests. This would provide necessary protection for sensitive, dispersal-limited old-growth species left behind by the current coarse filter analysis. If the Forest Service does not make these reallocations, it must include fine filter components for bark and leaf epiphytes, identifying and protecting suitable habitat for those species, including standards and guidelines on buffers to prevent edge effects such as desiccation from increased light and temperature. These plan components would be particularly important for cove and northern hardwood ecozones.

The Forest Service must also reallocate SCC salamander habitat outside of Matrix and Interface or else rectify errors in salamander impact analysis done at the coarse and fine filter scale. First, the Forest Service must explain why it found no meaningful difference in Alternatives (C and E) which place a much different acreages of such habitat into Matrix. An analysis which is not sensitive enough to detect obvious differences between alternatives does not satisfy NEPA. Additionally, the Forest Service must account for all salamander microclimate needs in Plan standards. Relying on coarse woody debris only in recently harvested stands is not credible to meet the habitat requirements for salamanders, which require both CWD, appropriate moisture regimes, and canopy cover.

Finally, the Forest Service must undergo a proper coarse filter analysis with the appropriate number of road density miles, including unofficial open roads, and issue a more logical threshold for species well-being based on road density. The proper analysis of open-road density impacts on sensitive species at the MA scale, with all roads on the Forests included, must be part of the Final Plan. The Forest Service must also commit to conducting road density analysis at the logical, local scale. If it fails to do so, it must at least follow the Partnership's recommended allocations for WIAs, placing those areas into a mix of recommended wilderness, backcountry, SIA, and EIA.

Background

As described above, the Plan and FEIS utilize a "coarse filter" (ecosystem and rare habitat) and "fine filter" (species) approach to fulfill NFMA's species-related requirements. The coarse filter "identifies conditions to maintain or restore ecological integrity and resilience of ecosystems, and by doing so, should account for the needs of most native species that occur on the forest." Plan at 74. The "Terrestrial Ecosystem" section of the document is intended to "serve[] as the coarse filter of the plan in that it identifies plan direction to meet the needs of ecosystems and most species." Id. Where species are not adequately protected, the fine filter is intended to "provide[] for specific habitat needs that are not met by the coarse filter," housed "primarily" in the Plant and Animal Diversity section of the Plan. Id.

As documented piecemeal in the Plan, the FEIS, Appendix C, and additional documents not made broadly available, the Forest Service utilized the Ecological Sustainability Evaluation (ESE) Tool to analyze the effects of coarse filter components, evaluate ecological sustainability, and ultimately to draw conclusions about impacts to species. In that process, the Forest Service determined a comprehensive and inclusive list of rare and sensitive species on the Nantahala and Pisgah forests that warrant consideration in the Plan. That list includes federally listed species, SCC, and other vulnerable species on the Nantahala and Pisgah Forests. Planners then defined elements based on the coarse filter, including watersheds, ecozones, and unique habitats, as well as species groups. These coarse filter elements were linked back to individual species, such that a species was grouped into a number of coarse filter categories representative of its habitat needs and life cycle. For each species in the species group coarse filter elements (e.g., closed canopy associates), the element is assigned a weight, representing how important that element is for the particular species. Ecozone and unique habitat elements were not assigned a weight for each species, so the analysis is not sensitive to different ecozone preferences between species within a given group.

Key characteristics/indicators were then identified for each coarse filter element.

Indicators represent needs or stressors that the Forest Service believed would affect the species associated with the coarse filter element in question. Indicators for species groups (not individual species) are weighted for each element, representing the strength of the relationship between the indicator and the species group element. For each indicator, the Service estimated outcomes for the 10- and 50-year horizons under each alternative. Those estimated outcomes were used within the ESE tool to estimate a composite "ecological sustainability score" for each ecological system (coarse filter element) considered. From the perspective of the forest planners, "it is assumed that plant and animal species associated with the ecozone or species group would persist and potentially even expand" where the ESE tool shows an improving ecological sustainability score over time. FEIS at 3-107.

Appendix C, along with a table30F of indicators and thresholds provided to SELC, documents how the Forest Service matched plan components to related species groups and ecosystems, creating a table that shows which plan components are assumed to have impacts on which coarse filter elements. After that process, and presumably where the ESE model scores did not show maintenance or improvement, the Service considered fine-filter components to address specific species needs outside of age class and ecozone preference.

The Plan focuses on restoring young forest primarily through timber harvest and restoring old growth through a patch network and a landscape trending towards older age-classes. While it attempts to ensure that ecozone types will be fully represented in the old growth patch network, the Plan disclaims any similar limitation by ecozone for creation of young forest. As discussed elsewhere in this Objection (see section II.B, supra), the plan components themselves do not limit or prioritize harvest needed to restore reference conditions for the key ecosystem characteristics described at pages 54-64 of the Plan.

Although the Plan does not limit itself, the FEIS is based on an analysis of how future activities are expected to play out across the forests in a single future scenario assumed to be consistent with Plan components. The Spectrum model schedules 2,800 acres annually of regeneration harvest on approximately 247,000 acres, with an average rotation of 88 years. Other kinds of harvest play a less significant role. Group selection and thin & burn prescriptions are allocated to only about 20,000 acres each. Spectrum constraints drive the allocations for regeneration harvest in the moist and moderate moisture classes, while burning and natural disturbance are modeled disproportionately in the xeric moisture class (see Total Management by Moisture Class Figure, below).

FIGURE

These activities, furthermore, are modeled as occurring in specific forest type groups. While not equivalent to ecozones, they are crosswalked to ecozone and there is some general overlap between the two categorizations. Spectrum provides a prediction for how seral classes will change over time in each forest type group. For an example of this in cove forests, see Cove Hardwood Figure.

These outputs from Spectrum become inputs for the ESE tool. For young forest and old forest (but not for other seral classes), the ESE tool asks how close that age class is to the reference condition for the ecozone, see Acidic Cove Forest Figure, below.

FIGURE

Fungibility Problem: The Coarse Filter Presumes All Acres of the Same Ecozone on the Forests are Interchangeable, which is Scientifically Inaccurate and Against the Weight of the Forest Plan's Own Analysis.

What is striking about the ESE approach as constructed here is that any acre, anywhere, within the forest type

and age class, is "worth" the same in the model. The model does not consider whether existing old growth is being cut down while younger stands are getting older elsewhere. It does not consider whether occupied habitat is being cut down while unoccupied habitat is coming online elsewhere.

The exclusive focus on seral classes is at odds with the Forest Service's own analysis in the FEIS. As the Forest Service acknowledges, "[g]eophysical variables explain 92% of the variation of species diversity of eastern states and provinces (Anderson M.G. et al. 2014)." FEIS at 3-390. Biodiversity is where it is, in other words, because of these geophysical variables.

While the Forest Service utilized Anderson et al. to discuss appropriate patch size and associated heterogeneity alone, this work also underscores exactly why the Plan components won't achieve stated desired conditions to provide needed habitats and maintain viability - acres within the Forests aren't fungible for many species and can't replace one-another by aging into an appropriate seral class somewhere else. Instead, when understanding forest biodiversity, researchers have found that the "highest predictors were elevation and carbonate geology (Simon Steve A., 2011) followed by other subclasses of geology such as sulfidic, mafic, and siliciclastic geology. Other important variables also included landform shape, slope steepness, and landform index." Id. In other words, where ecosystem characteristics occur in the Forests and how those unique parts of the landscape interact influence the biological activity in those areas.

Accordingly, there is strong consensus in conservation biology that the most important step in maintaining biodiversity is to protect areas of confirmed biodiversity for their rare and unique values.31F

These well-understood principles of conservation biology are exactly why the Forest Service is required not only to restore key ecosystem characteristics, but also to "maintain or restore [hellip] [r]are aquatic and terrestrial plant and animal communities" as twin requirements of the coarse filter approach. 36 C.F.R. [sect] 219.9. Ignoring this requirement is unlawful and is contrary to best available scientific information (BASI). See Id. [sect] 219.1. The approach also fails to engage with serious environmental impacts that can be estimated in advance, in violation of NEPA, and fails to consider an important aspect of the problem, in violation of the APA.

In comments on the DEIS, Objectors pointed out that the coarse filter overlooks the needs of dispersal-limited, rare, and other species for which location is the primary concern by analyzing actions at the landscape level alone. Many of these species are federally listed, designated as Species of Conservation Concern, or carry other legal protections associated with potential harm to their populations and habitats. The Forest Service was not responsive to these concerns. The agency's response merely restates how the agency constructed the ESE process; it did not change or justify the decision to treat acres within ecozones as fungible. See App. A at 61. The agency also noted that it had developed fine filter plan components for some species, but this response merely begged the question, because the coarse filter analysis was inadequate to determine which location-restricted species would need fine filter components. Id.

Objectors also showed that that the ESE tool does not support the agency's NEPA analysis because it does not provide an adequate basis to meaningfully differentiate between alternatives at the Draft Plan phase. We highlighted the inability of the tool to distinguish between outcomes dependent on management area allocations. The Forest Service replied that "large differences between alternatives were not anticipated" because the alternatives were not "largely different at the landscape scale." DEIS App. A at 43. In other words, the agency was well aware that it was failing to consider the impacts of its Plan decisions on areas of confirmed biodiversity. Instead, the Forest Service stated, "[s]patial differences are considered during smaller scale, project-level assessments during plan implementation." Id. While many site- specific considerations are appropriately deferred to the project level, this is not a site-specific issue. It is an issue of how the Forests' mapping choices in the Plan will cumulatively affect species[mdash]particularly those found in NHNAs. The Forest Service failed to address that issue as required by the planning rule and NEPA. Furthermore, this rationale is inconsistent with the decision to identify highly localized "rare communities" for special management in the Plan. If these rare communities can

be considered at the plan level, so can NHNAs. The refusal to do so rings false, and it is arbitrary and capricious.

By failing to consider any spatially-related issues at the plan level, the Forest Service has deferred analysis of all spatial considerations to the project level. This includes impacts to dispersal-limited species, and/or those associated with unique habitat characteristics. The agency states that projects will "ensure[] that [such species] are not impacted." Id. But the Plan contains no binding components to make good on that assurance. See section IV.B., infra. As discussed extensively throughout our objection and in previous comments, relying on project-level analysis for the welfare of sensitive species is a guaranteed source of project conflict. It is also practically impossible for cumulative impacts[mdash]where the question is whether habitats are being impacted too much over the course of multiple projects[mdash]to be determined in a single project's analysis.

More to the point here, however, it is also a direct violation of the Planning Rule, 36 C.F.R. [sect] 219.9(a)(2)(ii), which requires that the Plan itself do this work.

iv. Unique ecosystems and geographic areas on the Forests underscore that acres of similar vegetation age are simply not fungible.

Acres within the Forests are not ecologically interchangeable, especially when it comes to the needs of species which are less resilient to change, dispersal-limited, or both. Reallocation of biodiversity hotspots such as NHNAs and unique habitats like existing old growth patches currently in Matrix and Interface into SIA, EIA, and the old growth network is the only way the Plan currently provides to ensure that rare and exemplary biological values are not sacrificed to meet landscape-level young forest targets.

a. NHNAs

As a specific and very important example of the "fungibility" problem, Objectors highlighted in their DEIS comments that the agency had provided no analysis on the impacts of management area allocations on NHNAs, which are areas of confirmed biodiversity. Objectors stressed the importance of utilizing NHNAs in the coarse filter to ensure protection of NHNAs and the many species within those areas. Instead of incorporating NHNAs into the filter, the Forest Service stated that individual resources represented by NHNAs, such as "forest communities, unique habitats and rare species that NHNAs contain" are analyzed as component parts in the FEIS. FEIS App. A at 42. The Forest Service also admitted that a comparison of NHNA allocations by alternative (which the Forest Service had in its possession) was left out of the FEIS because of the analysis of component ecosystem parts, as well as that "this information [about NHNAs] was not used in the ESE" but instead was considered generally in EIS analysis. Id.

After Objectors gave input on the importance of focusing on NHNAs and their values in conservation analyses, the Forest Service actually went backwards. It removed the only substantive requirement related to NHNAs that happen to be mapped into timber-suitable MAs. Draft PAD-DC-04 provided that "[u]nique ecological characteristics are maintained or enhanced within [NHNAs]." The final version provides only that NHNAs generally "contribute" to biodiversity[mdash]a desired condition which provides absolutely no guidance for a project level decision affecting a specific NHNA and, if taken seriously, would require a sprawling cumulative impacts analysis every time action in an NHNA was proposed to determine whether the desired condition would continue to be met. See 36 C.F.R. [sect] 219.15(d). After this change, the sole plan component left for NHNAs that are mapped into timber-suitable MAs is a nebulous guideline to "coordinate" with NHP during project development. PAD-G-02. As the Forest Service surely is aware, this is merely the status quo. Agency staff already "coordinate" with NHP regarding proposed timber management in NHNAs, but that has not prevented the regeneration of NHNAs for creation of ESH and timber production. The Forest Service could easily have predicted the effects of continuing along with a non-substantive coordination process: rates of regeneration

harvest degrading NHNAs will increase with the increased rates of logging. The FEIS does not disclose this fact.

The coordination requirement, too, was weakened. In the Draft, coordination was required annually, which would have helped to ensure that NHP could weigh in before the Forest Service invested sunk costs in prescribing stands in NHNAs for incompatible management. See generally Draft Plan at 87. We are now left with a nonbinding "intent . . . to complete the review prior to initiating projects." Id.

NHNAs Should be Included in the Coarse Filter

Objectors have detailed why the coarse filter analysis should include NHNAs. See DEIS Comments 13 -33. The Forest Service justifies its refusal to do so by noting that "NC NHNAs are not a Forest Service designation" and that individual resources represented by NHNAs, such as "forest communities, unique habitats and rare species that NHNAs contain" are analyzed as component parts in the FEIS. FEIS App. A at 42. But these "individual resources" do not capture the spatially specific biological values in NHNAs. The FEIS's analysis of impacts to rare species, for example, is inadequate precisely because it does not consider where rare species are most likely to be found. It is circular reasoning to say that there is no need to consider where rare species are because that analysis says rare species will be fine.

Put simply, the FEIS fails to account for the reality that acres of forest with similar seral classes are not fungible and are not equivalent in terms of ability to support biodiversity.

By failing to analyze the comparative effects of Plan alternatives that would impact NHNAs differently, the Forest Service is making a claim that those differences do not matter for maintaining and restoring biological diversity. To the contrary, NHNAs are critical reservoirs of biodiversity. Seventy percent of known rare species occurrences on the forest are contained within NHNAs. 33 That is no surprise, because these areas were delineated by NHP precisely because they are the most important areas of confirmed biodiversity and exemplary communities in the state. 34 The FEIS acknowledges that NHNAs are areas which "contain special biodiversity significance," but it completely ignores that significance when comparing alternatives. FEIS at 3- 106.

Under NEPA, Forest Service cannot both acknowledge that NHNAs are places of "special biodiversity significance" that require protection and also fail to disclose the environmental impacts of regeneration harvest in these areas. First, the ESE tool analysis is based primarily on the Spectrum model's predictions of how management regimes would affect young and old age classes, with an additional nod to a few habitat elements like snags. To be sure, rare species are often associated with specific ecozones or age classes or habitat elements, but they are more strongly associated with NHNAs. In other words, knowing that you are standing in a mesic oak ecozone is less likely to tell you whether there are rare species nearby than knowing you are standing in a NHNA. By choosing more weakly correlated indicators while neglecting to consider available and more strongly correlated indicators, the analysis does not constitute a "hard look" under NEPA, ignores the best available scientific information from NHP about where rare species are located, and is arbitrary and capricious.

Second, even if the ESE tool analysis were adequate to compare impacts to rare species, this would not excuse the failure to separately analyze differences for NHNAs. Some NHNAs are recognized by the NCNHP as exemplary natural communities even where they are not known to contain rare species. These communities are in characteristic condition and uniformly do not need regeneration harvest for any site-specific purpose. They provide the best opportunities for restoring old growth and the species associated with old growth. The Forest Service has completely ignored the tradeoffs that come with opening the best examples of natural communities to incompatible forms of management.

Ideally, the Forest Service would have included spatial information about NHNAs in its models analyzing impacts to species groups. At the very least, the agency must now provide supplemental analysis comparing the alternatives' relative ability to protect biological diversity in the long-term. Such an analysis would have to

recognize the acreage of NHNAs that would be available for timber production over multiple planning cycles and, for each alternative, analyze the effects of losing those rare and exemplary habitats on the Forests' ability to maintain and restore biological diversity. It is absolutely inadequate, however, to design an analysis that assumes that acres within ecozones and age classes are fungible, then rely on it for a conclusion that different MA allocations won't make any difference.

The Forest Service must also re-allocate NHNAs into more protective management areas in order to comply with the planning rule's requirement to protect rare habitats as part of the coarse filter. As discussed above, this would be a remarkably effective coarse filter[mdash]ensuring that for roughly 70% of the known occurrences of rare species, any management would be intended to protect or enhance their habitats. Protecting that habitat is essential to rare species persistence and recovery, as required for Species of Conservation Concern and Federally Listed Endangered and Threatened status.

Protection of NHNAs should be the cornerstone of the Plan's strategy to protect rare species.

Throughout the planning process, NHNAs have been front and center, in part because the Forest Service's repeated attempts to log them in successive projects, including in projects during the planning process, have been so controversial. The Forest Service had ample notice and ample time to ensure that its analysis was sensitive to this issue and could inform the public of the tradeoffs and to inform a responsible decision that can comply with the planning rule. The agency did not take that opportunity. Instead, it was clear from the beginning that the agency had chosen a solution based on political considerations (i.e., protecting "most" exceptional NHNAs, with important exceptions on the Nantahala District) and spent the rest of its time trying to justify that outcome.

The closest the Forest Service came to taking an objective look at the problem is in the ESE tool assessment for the "species persistence and recovery" group. The "[a]mount of NHNA (top 3 ranks) in MA Group 1 (or density estimate)" was used as an indicator. FEIS App. C at C- 126; see Figure below.

FIGURE

Yet all alternatives, regardless of whether they include more or less NHNA acreage in timber-suitable MAs, were considered to rank "very good" for this indicator. Id. The operative threshold for the indicator (greater than 75%) 35 was unfortunately not calibrated to show any difference between alternatives. It also expressed a judgment that up to 25% of NHNAs may be sacrificed without any appreciable loss of rare habitat values. Nowhere does the Forest Service justify this extraordinary claim.

There are 209,651 acres of NHNAs rated "High," "Very High," or "Exceptional." In Alternative E, 44,888 of those acres are allocated to Interface and Matrix outside of old growth designations, which is within the Forest Service's 75% threshold for a "very good" ranking in FEIS predicted outcomes. Alternatives B and D, in contrast, would schedule harvest in approximately 68,000 acres of NHNAs, while Alternative C would schedule harvest in 34,000 acres. Thus, it is clear that Alternative C is the most protective of NHNAs; Alternative E is less protective; and Alternatives B and D are the least protective by a long shot. Indeed, Alternatives B and D would leave a third of these top-tier areas unprotected. Even by the Forest Service's crude threshold, these alternatives should rank as "good" at best. Again, however, all alternatives are ranked as "very good." If the Forest Service's model is incapable of showing the differences between the alternatives on this issue, it does not mean that the issue is unimportant; it means the tool is badly designed.

NEPA requires the differences between alternatives to be analyzed and disclosed, not miscalculated and obfuscated. Since analysis into the real impacts of NHNA allocation has not been done, the only solution to ensure protection of rare species persistence without changing the Plan's components would be reallocation into more protective management areas. Alternatively, to meet the obligations of the Planning Rule to "maintain[] the

diversity of plant and animal communities and the persistence of native species in the plan areas" without reallocating these areas, the Forest Service would be obligated to add new standards or guidelines with substantive direction that NHNAs must be managed to maintain or enhance their local rare and exemplary values, and that coordination with NHP is intended to determine whether management is needed to accomplish that end. 36 C.F.R. [sect] 219.9.

The coarse filter is inadequate because the Plan aims to manipulate age class distribution without attention to the reference conditions for key ecosystem characteristics.

As a separate and distinct legal violation, the Plan's documentation utterly fails to show how rote balancing of age classes can achieve 1) the requirements of the Planning Rule to "include plan components to maintain or restore key characteristics associated with terrestrial and aquatic ecosystem types," 36 C.F.R. [sect] 219.9(a)(2), and 2) the desired conditions for each ecozone set by the Forests. The Plan uses balancing crude age class distribution as a proxy for ecological integrity, despite the Forest Service's own analysis in the FEIS showing complex fine-scale structural, compositional, and functional needs that go far beyond a histogram of seral classes. See Plan at 54-64. The Plan contains no explanation demonstrating how this oversimplified focus on age class can adequately meet the complex needs described in the reference model for the key ecosystem characteristics. Indeed, the Plan acknowledges that restoring the reference conditions for key ecosystem characteristics is the only credible coarse filter: "Most of these habitats are supported through restoration of ecozone composition or structural classes [contained in the reference model for key ecosystem characteristics by ecozone]." Id. Yet despite the Plan's own admission, the analysis considers only landscape-scale levels of young forest without considering which ecozones and what patch sizes and distributions are created. This may create habitat for some species, but alone it is insufficient to support needed conditions for all rare species.

Because the FEIS analysis does not provide the information that the Plan itself says is essential to determine whether species needs are being met, the Forest Service has violated the APA, 5 U.S.C. [sect] 706(2)(A), by failing to show a "rational connection between facts and judgment" and has constructing this Plan in a manner that "runs counter to the evidence before the agency." State Farm, 463 U.S. 29, at 56, 43.

The difference between restoring key ecosystem characteristics and balancing age classes at the landscape level matters for the rare species found in the NHNAs that the Plan leaves vulnerable to timber production and "structural restoration." Our analysis reveals considerable overlap between NHNA's and allocations of Matrix/Interface. We identified nearly 200 NHNA's totaling 54,295 acres that overlap with Matrix/Interface in Alternative E after excluding those contained within the proposed old growth network. Of these 197 NHNAs, 139 of them or 71% and 44,888 acres, are rated as "Exceptional," "Very High," or "High," meaning that they contain some of the best examples of rare habitats and greatest species richness. These areas objectively qualify for allocation to SIA or EIA as defined by the Forest Plan.

Failing to incorporate these biologically diverse and ecological important areas puts species at risk. For example, a spatial analysis comparing layers in matrix and interface outside of old growth networks and element occurrences of protected species shows that nearly 90 occurrences of ten federally listed species are within these vulnerable NHNA's.35F Additionally, these areas include occurrences of 28 wildlife SCC, of which 21 are dispersal-limited. They represent seven different taxa and on average are associated with 12 different ecosystems or species groups. Most of the terrestrial species are associated with Northern Hardwoods (100%) Closed Canopy (100%), Rich Cove (92%) and Old Growth (84%) forests. Whereas there is zero association with Young Forests, the principal driver of management planned within Matrix.

Additionally, 100% of the aquatic species are sensitive to sedimentation and point source pollution, which are associated with ground disturbing activities, pesticide use and road construction and maintenance. Based on this data it appears that there is no logical argument that these animals benefit from management unless it protects closed canopy and old growth conditions while also mitigating sedimentation and pollution of waterways.

Therefore, these habitats and associated species must be managed within an SIA or EIA allocation to maintain ecological integrity and provide for persistence.

Old growth and closed canopy associates

As the largest units of public land in the Southern Blue Ridge, a bioregion with some of the highest rates of endemism of native plants in the United States, Nantahala and Pisgah National Forests have a crucial role in providing habitat for native species. Acres within these Forests do not provide for biodiversity in equal measure - many sensitive species depend on the interactions between ecosystem flora, soil type, age, and connectivity to survive.

The Forest Plan does identify some rare communities as part of its coarse filter. To the extent that SCCs are strongly associated with these highly localized rare communities, the appraoch is uncontroversial, because the Forest Plan has Standards and Guidelines for the limited acreage considered to be rare habitats.36F A handful of other species, including federally listed species also have standards and guidelines to protect them. However, many species listed in Appendix C which are dependent on old growth and closed canopy conditions are not adequately protected by the coarse filter approach. These species are vulnerable because of the Forest Plan strategy of targeting closed canopy forests for conversion to young and open canopy forests[mdash] and targeting cove forests for a large proportion of timber production. These species are also absent from current fine filter components meant to fill in coarse filter gaps.

The Forest Service is required to include plan components which "maintain or restore the diversity of ecosystems and habitat types" alongside "rare aquatic terrestrial plant and animal communities." 36 C.F.R. [sect] 219.9(a)(2). As the Forest Service understands, this requirement means that diversity must be maintained where it exists and restored where it does not. The planning rule does not authorize the agency to degrade existing rare habitats and hope to restore them elsewhere, especially for dispersal-limited species. Yet that is exactly what the Plan proposes. See section II.B., supra. As written, the Plan does not account for many sensitive and specialized old growth associate species, because it allows logging in existing old growth (and in exemplary forests that are regaining old growth characteristics) while attempting to offset the loss by claiming that other portions of the forest will continue aging. No effort is made to show that these "new" old forest stands will provide the same quality of habitat or, more important, actually be occupied by these often highly dispersal limited species. Consequently, the Plan does not provide for the maintenance and restoration of old growth and closed canopy associates.

Table C-3 (FEIS App. C at C-74) lists the species analyzed by the ESE tool and includes a long list of habitats and conditions associated with each species. As stated above, we believe the species associated with already-named rare habitats and habitats not expected to produce timber are fairly well protected by the coarse filter approach. However, plant and lichen species associated with mesic ecozones (Northern Hardwoods, Acidic Cove, Rich Cove, Mesic Oak, High Elevation Red Oak) that will be targeted for timber production in the Revised Plan, along with species associated with old-growth forest, closed canopy, coarse woody debris, and especially species that are bark epiphytes, are highly vulnerable to declining habitat conditions because of the Plan.

In Table C-5, FEIS App. C at C-122, the Forest Service makes a number of assumptions about ecosystem characteristics, and for every ecozone, increasing young forest habitat is rated as a positive indicator of ecosystem health. While increasing the proportion of young forest might be beneficial for balancing age classes and for some species, species associated with old growth, closed canopy conditions, and those that depend on bark habitat of large trees and coarse woody debris would be negatively impacted if their habitat is selected for conversion to young forest. Therefore, identifying and protecting known habitats for disturbance sensitive species is needed, and currently lacking, in the Plan. These species occur in very specific and limited portions of the forest and are not only susceptible to direct impacts from harvesting, but also edge effects such as increased light, temperature, drought stress, and competition from non- native invasive species following timber harvest.

So, while Appendix C assumes that more logging in these ecosystems will improve ecosystem health, logging would negatively impact a huge suite of plant species listed in Table C-3 that are disturbance sensitive. Further, the Record of Decision explicitly leaves the decision to harvest existing old growth up to the District Ranger, with no guidance for the decision and only conflict as a sideboard. Draft ROD at 44-45. Furthermore, the ESE analysis does not use late-closed forest as an indicator for ecosystem trends, which is highly troubling given that the Plan would entirely liquidate late-closed forests over multiple planning cycles. See section III.D., supra.

Many of the vascular plant SCC that are associated with closed canopy forest, including Carex hitcockiana, Carex purperifera, and Trillium simile among several others, have a strong affinity for the highest cation soils in the region, which are associated with mafic and calcareous rock. These rocks, high in base-nutrients, nurture subtypes of plant communities such as the Rich Subtype of Rich Cove Forest (Rich Cove Ecozone), the Basic Subtype of Montane Oak-Hickory Forest (Mesic Oak Ecozone), and the Rich Subtype of Northern Hardwoods Forest. It is in these unusual subtypes that the majority of rare vascular plants associated with closed canopy conditions can be found, yet there is no plan direction in managing these rare species hotspots.

They are treated the same as the more common vegetation associations found within their respective ecozones. Many of these sites are captured by Natural Heritage Natural Areas, but unfortunately many of those NHNAs, such as Moore Knob (Nantahala), Corbin Knob (Nantahala), and Foster Knob (Nantahala), are allocated to Matrix. This again highlights the need to protect NHNAs as part of the coarse filter. Regardless, to properly protect vascular plant SCC associated with closed canopy, old growth conditions, the Rich Subtype of Rich Cove Forest, the Rich Subtype of Northern Hardwoods Forest, and the Basic Subtype of Montane Oak Hickory Forest must be added to the list of rare habitats for Pisgah and Nantahala National Forests.

Similarly, to properly provide for bark epiphytes, the Forest Plan would need standards and guidelines about the identification and protection of suitable habitat for those species, including standards and guidelines on buffers to prevent edge effects such as desiccation from increased light and temperature. These plan components would be particularly important for cove and northern hardwood ecozones. Several lichen species designated as SCC are both old growth associates and single host obligates. For example, Arthopyrenia betulicola is only found on the bark of mature yellow birch trees, and Graphis sterlingiana can only grow above elevations of 4,000 feet on the exposed roots of large and mature yellow birch. These highly specific needs are not accounted for by the coarse filter indicators associated with these species and their species groups. It is not consistent with best available science to assume that these species' needs will be met, even if their current habitats are degraded, simply because other forests will continue aging.

g. WIAs

The Wilderness Inventory Areas are also important elements of a coarse filter approach to maintain and restore ecological integrity. North Carolina's Mountain Treasures (which overlap almost perfectly with the NPNF's Wilderness Inventory Areas) "represent some of the most important lands in the U.S. to establish a protected areas system that is intact, connected, representative of ecological diversity and hotspots of range-limited species."37F When ranked among inventoried roadless areas (IRAs) nationwide, more than half of these areas rank in the top 95th percentile; all but seven rank in the top 90th percentile.

Driving these ecological integrity rankings is the biodiversity present in North Carolina's Mountain Treasures areas. On average, these areas scored "73% higher than other IRAs" on the biodiversity priority index.38F The biodiversity priority index was developed "by overlaying maps of mammal, bird, reptile, amphibian, freshwater fish, and tree species distributions and weighting the rarity of species (calculated based on the size of each species' geographic distribution) and the proportion of its distribution that is protected based on the International Union for Conservation of Nature (IUCN) protected area categories I to VI."39F The index also takes into account "[a]reas rich in endemic species with limited geographic distributions." 41 In short, North Carolina's Mountain Treasures are almost unparalleled hotspots for rare and limited-range endemic species and "represent some of

the most important lands in the U.S. to establish a protected areas system that is intact, connected, and representative of ecological diversity."41F

The biological value of North Carolina's Mountain Treasures corresponds to their relatively low level of historical timber harvest. For the same reasons, they are largely unroaded, with low road density. The allocations we've recommended in previous DEIS comments, which are consistent with the Partnership Recommendations, ask the Forest Service to preserve the unique and biologically important characteristics of WIAs, classifying these areas into a mix of recommended wilderness, backcountry, SIA, and EIA. More protective designations for WIAs would protect many imperiled species within the Forests and would help justify the Forest Service's conclusions that this Plan protects all species (not merely young forest associates).

Moreover, the Forest Service's failure to consider the best available science on North Carolina's Mountain Treasures constitutes a failure on the part of the agency to take a "hard look" at the impacts of the allocation decisions in the Plan. NEPA cannot support such an approach.

h. Salamander habitat

The Southern Blue Ridge, with the Nantahala National Forest at its heart, is the global capital for salamander biodiversity. The Forests have a special responsibility to safeguard this wealth of biological diversity. Positive outcomes after ten or fifty years for a particular coarse filter element at the forest-wide scale (for example, coarse woody debris in recently harvested stands, see FEIS at 3-359) make little difference to species that stay within one relatively small area for generations, are scattered in small pockets across the forest, or have other habitat needs unaddressed by the model. But the ESE model provides no way to account for that type of species-specific need.

It makes little sense to worry about habitat for particular kinds of salamanders forest- wide, when we know they are more limited in range. Conversely, within that limited range, we should worry much more about the impacts of incompatible management. For example, terrestrial salamanders (as defined by the Plan's "terrestrial salamanders" species group, which includes rare salamander species) occur within areas of the forest that are smaller than the landscape-scale but larger than a typical project analysis area. Where sensitive species are known to be abundant, and where there are bottlenecks for metapopulation success, lands must be instead be protected through reallocation into more protective management areas.

Modeling by Apodaca (2019) 42F is the best available science for salamander habitat and connectivity needs. Analysis of the salamander habitat likely to be impacted by sedimentation due to nearby logging and associated roadbuilding was calculated by comparing modeled core salamander habitat areas that intersected with matrix and interface outside of old growth designations. This analysis found that Alternative E impacted 15,500 more acres than Alternative C, which as a percentage of total salamander habitat, means that Alternative E impacts 20% versus the 15% impacted for Alternative C.

TABLE

FIGURE Salamander Habit Impacted by Alternatives

NEPA requires the Forest Service to consider and disclose the effects of meaningful alternatives on the human environment. An alternatives analysis which is not sensitive enough to detect any notable differences between options with measurably different consequences for salamanders fails to fulfill the agency's requirements under NEPA. Where Plan analysis proposes alternatives with different management allocations for salamander habitat and the EIS fails to discern the "probable" impacts of each choice, it is inadequate. See WildEarth Guardians v. Mont. Snowmobile Ass'n, 790 F.3d 920, 924 (9th Cir. 2015)).

Moreover, the Forest Service presents the differences between alternatives in a highly misleading way. The clearest example of this is the following statement, which nonsensically indicates that Alternative C would be worse for salamanders because it would provide fewer opportunities for habitat mitigation techniques: "In general, because it places fewer acres in MA Group 1, Alternative C would probably result in the least frequency to apply project specific standards to support salamander habitat than the other alternatives." FEIS at 3-359.

Objectors fail to see how having fewer opportunities for salamander habitat mitigation because there is less destruction of salamander habitat in the first place would be a problem for these species. The Forest Service's comparison between the impacts of alternatives on salamanders 1) fails to detect differences Objectors have shown to be present 2) fails to disclose effects to the public, and 3) misunderstands or obscures differences between potential impacts of agency actions on salamander populations. It unequivocally fails under NEPA.

The Forest Service also ignores salamander habitat requirements in discussing coarse- filter elements. The Forest Service concludes that salamander outcomes are positive because of mitigation for unique habitats, the retention of coarse woody debris, and canopy cover. FEIS at 3-359. However, the Plan components for these features are too limited to realistically benefit salamanders. For example, the Desired Condition at WLF-DC-06 provides a goal that "[c]oarse wood on the forest floor, in a variety of sizes and shapes" be "retained during young forest restoration." Plan at 67. Similarly, the primary standard addressing necessary salamander conditions is WLF-S-01, which indicates that projects should "[e]mphasize retention of downed woody debris of various sizes, where available, and include pieces that are at least 10" DBH and 10' long" as well as "[c]onsider leaving new logging slash." Id. (emphasis added).

Best available science indicates that coarse woody debris alone is not sufficient to maintain healthy salamander populations; instead, the species require complex interactions between canopy cover, a proper moisture regime, and corridors between cut and intact habitat areas.43F This sentiment could not be truer than in the case of coarse woody debris left in the form of logging slash - such a standard will only serve to preserve portions of salamander habitats in areas where the rest of their necessary habitat conditions, and the individuals themselves, have already been eliminated. These standards are not sufficient to provide the ecological conditions to maintain the viability of terrestrial salamanders, especially SCC salamanders, and they do not meet the Forest Service's obligations under Section 219.9(b)(1) of the Planning Rule.

Road density analysis at the coarse filter

The road density analysis suffers from the same problems discussed above: it is analytically incomplete and assumes that all acres of the forest are equally impacted by road density, which is a fundamental flaw. The proper coarse filter analysis must be re-done with the appropriate number of road miles and a logical threshold for road density impacts on a more relevant smaller scale.

The road density analysis is an important underlying factor in the ESE analysis, explained in more detail in FEIS Appendix C. However, this road density analysis only evaluated open roads, and apparently omitted unauthorized or private roads.44F This means that the road density analysis used a total of 2,096.02 total miles instead of the 5,736 total mileage cited elsewhere in the Plan. FEIS at 3-491. The omission of the many miles of closed roads in the road density analysis creates a vast underestimation of total road impacts.

As the FEIS recognizes:

There are many miles of old "legacy" roads on the Forest, and system road [sic] closed to use, kept in storage for future management. These features often vegetate where their surfaces are stable, however soil impacts continue long into the future as altered soil structure lingers for many decades. Thus, soil recovery to a semblance of pre disturbance condition and function is unlikely without active restoration.

FEIS at 3-51 (emphasis in original). These impacts, however, are left out of the road density analysis and therefore the Ecological Sustainability Analysis. FEIS App. C To illustrate what a vast difference is involved, the "Open Road and Trail Density" metric has been summarized as follows: "Poor: >2 miles/square mile; Fair: 1.5-2 miles/square mile; Good: 1.0-1.5 miles/square mile; and Very Good: <1.0 mile/square mile."45F By the Forest Service's own measure, changing the number from open roads (2,096.2) to all roads (5,736) brings the road mileage per square mile on the entire forest (1,625.61 miles) 47 from approximately 1.3 (good) to over 3 (poor).

The omission of unauthorized and private roads indicates that the impacts of roads

were further underestimated by approximately 37 miles, see FEIS at 3-491. This may be a small percentage of the 5,736 total miles on the Forests, see id., but it represents a significant impact on resources. Moreover, because the Ecological Sustainability Evaluations were applied by ecozone, the impact of unauthorized and private roads in that analysis may be larger in certain ecozones depending on where they are concentrated.

The difference in these calculations has direct impacts on species health and viability, especially those sensitive to closed-road impacts such as disturbance and sedimentation (see section IV.B.2, supra; IV.B.6, infra,). Further compounding the failure to incorporate closed roads, the road density analysis simply does not discuss sedimentation impacts, even from open roads. Instead, road density is only considered "as a measure of forest fragmentation and connectedness." E.g., FEIS at 3-136. This is a grave omission considering that the EIS itself recognizes that roads are the most significant contributor to water quality problems on the Forests, and as discussed in this Objection, sedimentation is an existential threat for several federally listed and SCC species on the Forests. NEPA demands that the Forest Service consider the impacts of all-road density on sedimentation and sensitive species for each alternative.

In addition to omitting the impacts of closed and unauthorized roads, road density was only analyzed by ecozone at the landscape scale, obscuring the full impact of roads on water quality as well as on specific places and species.47F Of course, waterbodies and sensitive species do not experience road-related impacts such as sedimentation on the landscape scale but rather locally, making this level of analysis almost meaningless. To illustrate how irrelevant this data is using the Forest Service's own open road density analysis: in order to reach the "poor" level of greater than two miles of open road per square mile across the entire Forest, the existing open road system would have to expand by over 1,000 miles.48F

This does not reflect the needs of road-density sensitive species. "For species sensitive to disturbance, minimizing road density is vital to reducing disruption of basic life history," and "[e]ven open unpaved forest roads can be barriers to movement for species such salamanders." FEIS at 3-180.49F Similarly, road-density limits around open-road sensitive species like black bear have traditionally been set at ".8 miles or less per square mile" 51[mdash] less than the ESE's 1.0-1.5 range for "good" outcomes on road-density sensitive species. For the Forest Service to meet the needs of these species at the landscape level, the agency would need to guarantee low enough road density for these sensitive species to persist across the Forests[mdash]even in habitat where they would never be found. The Revised Plan does not achieve this highly protective standard, and Objectors believe that the Forest Service's limited budget is best spent elsewhere.

Instead, the Forest Service should make road density projections at smaller scales to determine if there will be enough low-density areas in the right places. For example, if one alternative placed low-road-density areas in Matrix, and another alternative placed those areas in Backcountry, a comparison could be made based on the different impacts of road construction in different Management Areas. This medium-scale analysis is also a crucial piece missing from the current Plan and required by NEPA. Logic and best available scientific information dictate that roadbuilding in different Management Areas, which have varying levels of existing human disturbance and active management, will have different impacts on local ecology. Yet nowhere in the Plan does the Forest Service engage in this discussion. Instead, it defers the analysis to the project level.51F

Critically, a project-level analysis of optimal open-road density cannot, as a practical matter, consider the total open-road density at the relevant scales. Those scales will almost always be outside the geographic scope of the project. Does a roads decision impact black bear too much? How could a project-level analysis ever answer that question without programmatic analysis to tier to? For that reason, we know that projects will consider only the individual effects of the particular project, and the important question, deferred from the Plan level, will never be answered at the project level either. NEPA does not allow this kind of shell game.

In summary, the Forest Service's failure to analyze the effect on rare species of rotational harvest and associated road construction in biodiversity hotspots and unroaded areas violates the agency's duty under NEPA to take a "hard look" at the Plan's impacts to species. See W. Watersheds Project v. Abbey, 719 F.3d 1035, 1047 (9th Cir. 2013) (citing Or. Natural Desert Ass'n v. Bureau of Land Mgmt., 625 F.3d 1092, 1099 (9th Cir. 2008)). Here, the Forest Service failed to take any look at the impacts of harvest in unique and high-biodiversity areas like NHNAs, old growth, rich and basic forest communities, and WIAs. Currently, the Plan provides no direction to treat these areas any differently than any other acres when they are in suitable MAs. The Forest Service must either start its analysis over from scratch, or it must add protections (both allocation changes and plan components) to ensure that its analytical conclusions are justifiable.

The Plan Does Not Provide Necessary Fine-Filter Plan Components to Meet Planning Rule Requirement 219.9(b)(1) for Several At-Risk Species.

Objectors also noted inadequacies and omissions for numerous fine filter components related to specific species in decline, discussed in full in the DEIS comments previously submitted. The obligation for fine filter components looks different for ESA-listed species and SCC. For the former, the Forest Service has an affirmative obligation during planning to adopt components that will contribute to their recovery. For SCC, at the very least, the Forest Service must maintain their viability.

As Objectors pointed out in comments on the DEIS, the Plan must contribute to the recovery of federally listed species as required by 36 C.F.R. [sect]219.9(b)(1). The Forest Service responded that the ESA "requires project-level consultation on federally listed Species" which will ensure that incidental take is minimized or eliminated for every Project." FEIS App. A at 43. This response does not address the Forest Service's responsibility to account for listed species at the plan level. Moreover, the statement is simply not responsive to the concern. Project-level mitigation will not ensure that the Forest Service fulfils its obligation to contribute to the recovery of species. To argue otherwise would be tantamount to an admission that the only thing holding the species back from recovery is the Forest Service's bad management practices.

Clearly the agency has an affirmative obligation under the law to assist these species recovery by removing stressors or restoring connectivity, as relevant to the particular species. 36 C.F.R. [sect] 219.9(b)(1).

In fact, instead of strengthening listed species protections in the Revised Plan, the Forest Service actually removed a protective standard about preserving imperiled species' habitat. PAD- S-03, which contains standards about project-level surveys for listed species, once also directed that "[i]n areas occupied by federally listed species and species of conservation concern, management shall maintain characteristics required by these species." Compare Draft Plan at 88, Revised Plan at 80. As their stated rationale, the Forest Service said, "we do not currently always do this." 53 Whether or not the Forest Service currently complies with the law is irrelevant to the agency's obligations under the statute. The Forest Service is legally obligated to contribute to the recovery of listed species and maintain the viability of SCC. Maintaining key habitat characteristics necessary for species persistence in known areas of species occupation seems an essential part of that duty.

At times, the agency seems to agree. In fact, the Forest Service stated in its Response to Comments that "[i]n accordance with the Endangered Species Act, in areas occupied by federally listed species and/or identified as designated critical habitat, management will maintain characteristics required by these species." FEIS App. A at

61. Yet when push comes to shove, the Forests were unwilling to commit to do the very thing they say they will do, and removed the standard. The assertion is at best hollow, and at worst deceptive.

The Forest Service must reinstate PAD-S-03 in full.

2. Carolina Northern Flying Squirrel

While Carolina Northern Flying Squirrel (CNFS) primarily occupies spruce fir forest, which is mostly not suitable for logging in the plan, it is also highly dependent on adjacent northern hardwood forests. FEIS at 3-139. CNFS needs a diversity of adjacent undisturbed habitat types53F and is particularly sensitive to fragmentation issues.54F Because of this, islands of regenerative management in northern hardwood habitat near squirrel occurrences could isolate populations, interrupting gene flow and reducing resilience in a species already struggling as a result of "isolated gene pools and limited dispersal ability, analogous to populations of mammals on islands in marine environments." FEIS at 3-259. Objectors reiterate necessary solutions to this threat to the CNFS which were previously submitted as DEIS comments; the Plan must incorporate standards for buffers prohibiting active management around known CNFS occurrences and avoiding road construction through CNFS habitat. The Forest Service's own analysis acknowledges the importance of connectivity for the persistence of this species[mdash]BASI which should translate to Plan components. FEIS at 3-259. The Forest Service has an obligation to contribute to the recovery of the CNFS under the ESA, but only commits to "[m]aintain species presence within currently occupied habitat." Plan at 75. It is unclear that the Forest Service can accomplish either without standards aimed at protecting habitat connectivity and preventing the NFS from being stranded.

Bats

Objectors are pleased to see Plan components which will benefit listed forest-dwelling bat species, such as the commitment to retaining snags across all ecozones, WLF-DC-06, and to provide for exfoliating bark through snags [ge] 3 DBH in young forest "known to be or potentially occupied by federally listed bats." Plan at 67. However, the Forest Service has not met its obligation under the ESA to provide for the recovery of the Indiana bat and the Northern long- eared bat. This is especially disappointing considering the declining populations of these species. Currently classified as threatened, the Northern long-eared bat has showed consistent population loss and is in the process of being re-classified from threatened to endangered.55F The Indiana bat was listed as endangered in 1973. FEIS at 3-278. Both species will need every federal agency to fulfill their legal obligation to "carry out programs for the conservation of endangered species and threatened species" if they are to survive. 16 U.S.C. [sect] 1536(a)(1). In addition to the fine filter components discussed below, Objectors assert that the Forest Service must update its consultation with the FWS for the Northern long-eared bat, which should lead to additional protective measures in the Plan.56F

Additionally, the Forest Service must amend TIM-S-14 to limit gap size to 10 acres in hardwood-dominated forests within .5 miles of known populations of Indiana bats, Virginia big- eared bats, and Northern long-eared bats. The FEIS acknowledges that "[o]penings and edges are more important to gray bat and Indiana bat compared to Virginia big-eared bat and long-eared bat; however, both species tend to avoid larger openings (greater than 10 and 20 acres, respectively)." FEIS at 3-270 (emphasis added). Inexplicably, however, the Forest Service points to TIM-S-14, a standard which "limits the size of harvest areas to not greater than 40 acres in hardwood-dominated forest types and 80 acres in pine-dominated forest type" as a protective measure for these bat species. This is illogical and against the weight of the FEIS' own assertion of best available scientific information. The Forest Service has failed to provide a satisfactory explanation under NEPA as to why these measures would help minimize the impacts of regeneration harvests on federally listed bat species where its own documents assert otherwise, nor how they would comport with the requirements of the NFMA.

3. Cerulean Warbler

Cerulean warblers have substantially different needs than other species discussed in the Plan, namely, golden-winged warblers. Cerulean warblers breed in large tracts of older deciduous forests with tall trees.57F They require complex, heterogenous stand structure including large trees, canopy gaps, and understory vegetation. Their population has been decimated declining by 72% between 1970 and 2014. 59 It is suspected that this decrease is due, at least in part, to the loss of large unfragmented forest blocks across the landscape. FEIS at 3-176.

Researchers have found that in mature forest stands with high cerulean densities and high nest success, the no-harvest option is most favorable for sustaining cerulean populations.59F Where there is active management, best practices require retaining a basal area of between 40 and 90 feet per acre. 61 By contrast, golden-winged warblers in part "require open grassy and herbaceous areas with shrubby inclusions adjacent to mature forest." Plan at 67.

As Objectors insisted at the DEIS stage, the Forest Service must adopt a standard making clear that young forest creation management targets will primarily be met in the focal areas for the 5 species that require early seral habitat, while any management in the cerulean warbler focal area would focus not on young forest creation but instead on enhancement of habitat conditions suitable for cerulean warbler. While management approaches in the plan describe using best practices, they erroneously group cerulean and golden-winged warblers together without discussing their different needs. See Plan at 72 ("When prescribing management within WHAMAs for golden-winged warbler and cerulean warbler, follow recommended best management practices for these species."). It is contrary to the best available science to group these birds together for management purposes, as their habitat needs are ecologically divergent. Instead, the Forest Service must adopt clear standards which proscribe retention of mature forest with small patches for heterogeneity in cerulean warbler habitat.

4. Rusty-patched Bumble Bee

The Rusty-patched Bumble Bee (RPBB) is "usually associated with forest openings and woodlands" and is "threatened by disease (from the pathogen Nosema bombi), pesticide use, and habitat loss and fragmentation, each of which could cause extirpation because of perilously low estimated population levels." FEIS at 3-294.

Objectors note that while the RPBB has not been detected on the Forests at this time, it is highly plausible that they will travel onto the forest openings created by the Forest Service within the life of this Plan. Objectors ask that in accordance with the Forest Service's obligation to operate its programs in a manner which promotes species recovery, ESA [sect] 7(a)(1), the Plan incorporate a standard for surveying for the RPBB in potential habitat. At minimum, Objectors ask for pre-project monitoring to establish baseline data in suitable habitat where up-to-date surveys have not been completed.

Objectors asked at the DEIS stage and reiterate here that the Plan incorporate clearer spatial and temporal limits on pesticide and herbicide usage, one of the sources of population decline acknowledged in the FEIS. The Forest Service should adopt an accompanying standard requiring extra caution in the use of herbicides in areas that provide suitable or historical RPBB habitat but have not been surveyed. Applying herbicides without caution on potential RPBB habitat could violate the agency's obligation to ensure that federally funded agency actions don't jeopardize listed species. ESA [sect] 7(a)(2).

Again, if the Forest Service creates ideal habitat for the RPBB, it must act under the expectation that the species will occupy that habitat during the life of the Plan. In fact, the Forest Service seems to anticipate that the species will make its way onto the Forests[mdash]as part of explaining the need for more ESH, the FEIS references the RPBB as one of young forest associates in "pronounced population declines as quality young forest habitat is lost on the Forests." FEIS at 3-120. If the Forest Service is using the potential future presence of RPBB to explain the Plan's conclusions about young forest restoration needs, the Forest Service must also take steps to protect RPBB that may soon occupy that habitat. If the Forest Service does not expect the RPBB to occupy the habitat it

is creating, it must otherwise justify the need for young forest habitat.61F Neither NEPA nor the ESA allow the agency to have it both ways.

Noonday Globe

The noonday globe is a terrestrial snail found in only about two miles of high cliffs within the Nantahala Gorge in Western North Carolina.62F The lower gorge supports the only known population. Plan at 189. The Spectrum model seems to support a limitation against burning in the Nantahala gorge, as almost no burning is present within that area, but this expectation was not made explicit in any of the plan documents. As Objectors asked in DEIS comments, Objectors recommend that the Plan specify that prescribed burning will not take place in the Noonday Globe's limited habitat range to avoid risk of impacts to the species, especially in the Cove ecozones where they are most often found, and that any prescribed burning plans in the area will contain measures to ensure Noonday Globe habitat is not put at risk.

Sediment- Sensitive Aquatic Species: Appalachian Elktoe, Littlewing Pearlymussel, Spotfin Chub, and Eastern Hellbender

The Appalachian elktoe, littlewing pearly mussel, and spotfin chub are federally listed aquatic species which are entirely omitted from fine-filter plan components despite being highly sensitive to specialized threats not addressed at the coarse filter analysis. The Eastern hellbender is an imperiled SCC salamander species equally abandoned by the coarse filter analysis.

One of the most critical threats to the persistence of these species is sedimentation and siltation. FEIS at 3-311; Id. at 3-320; App. C at 74, 82. Discussions of sedimentation-reducing BMP strategies are inadequate to assure protection of these species, and road-density estimates omit sedimentation from their analysis entirely see section IX.A, infra. Yet, the FEIS concludes (with little analysis) that all these species will persist, and their populations may potentially increase under the proposed planning framework. See FEIS at 3-311 - 3-324. This conclusion is arbitrary and capricious as a matter of law without a rational explanation from the Forest Service.

The FEIS entirely relies on BMPs to protect sediment-sensitive species from the impacts of active management and harvest, constantly toting a success rate of 94.8%, and consistently assuming that there will be no increased risk associated with the new Plan because all activities will follow BMPs. FEIS at 3-60, 3-67. This is both illogical and inaccurate. See, IX.A,B, infra. Furthermore, even if the Forests could make the case that BMPs are adequate for some species, they have not made that showing for endangered, threatened, and other sediment-sensitive species which are "very threated by siltation" are not resilient enough to withstand BMP failures. FEIS at 3-320.

In short, the Forest Service provides zero fine-filter components specific to these federally listed aquatic species nor for the SCC designated Eastern hellbender, despite best available science showing that 1) these species are imperiled by sedimentation and 2) evidence from scientific literature and nearby Forests that BMPs are not enough to protect water quality and aquatic species' wellbeing. Instead, the Plan only nods to maintaining the continued presence of these imperiled aquatic species (Plan at 75), which is insufficient to satisfy the Forest Service's obligation to contribute to the recovery of these species under the ESA, to maintain populations under NFMA, and to make decisions that are supported by the evidence under the APA. The Final Plan must include standards which require more than higher streamside buffers and safety measures beyond BMPs in known habitat of imperiled aquatic species.

V. The Agency Has Not Complied with Its Requirements Under NEPA or NFMA Related to Non-native Invasive Species

We commend the agency for adding FHL-S-05 which requires the agency to "[s]urvey for and treat NNIS before

and after vegetation management and other ground disturbing activities." Plan at 88. But the agency's analysis and plan components continue to fall short for primarily the same reason we named in our DEIS comments: the agency does not link Tier 2 increases in vegetation management and associated roadbuilding with Tier 2 increases in non- native invasive species (NNIS) management. See DEIS Comments 202-03. To remedy this error, the agency should[mdash]at minimum[mdash]adopt the recommendation of the Pisgah-Nantahala Forest Partnership, which calls for a minimum level of monitoring demonstrating no net spread of priority NNIS on the forest before operating within Tier 2 vegetation management.

Factual and Legal Background.

Nonnative invasive species have been recognized as one of the four critical threats to the National Forest System since 2006, FEIS at 3-445, and the Plan notes that "introduced organisms are capable of creating drastic change in the composition and structure of native forest communities," Plan at 87. The FEIS discloses a "list of priority non-native invasive plants that pose threats to native ecosystems and rare habitats on the Forests," categorizing each as high, medium, or low priority for treatment. Id. at 3-445 - 3-446. These categories are defined by relative risk of spread and risk to rare native species. Id.

The FEIS recognizes that increased vegetation management objectives will increase the spread of invasive species under the preferred alternative, especially if Tier 2 levels are reached. FEIS at 3-448. It assumes however that "desired conditions, objectives, and guidelines that address the treatment of non-native invasive species [will] lessen the impacts from invasive species on native species and ecosystems." Id. at 3-448. Under Alternative E, this includes a Tier 1 objective to "[a]nnually, treat, control, or eradicate NNIS plant species on 1,500 to 3,000 acres" and a Tier 2 objective to do the same on 3,000 to 5,000 acres. Plan at 88; FEIS at 3-448. The agency is candid that with "the increased potential for more invasive species under Tier 2 vegetation management objectives, the Tier 2 objectives for invasive species treatment should be implemented in order to reduce the potential impacts of new invasive species infestations" but never incorporates that requirement into its Plan. FEIS at 3-448 (emphasis added).The Planning Rule requires the agency to include plan components to "maintain or restore the ecological integrity of terrestrial and aquatic ecosystems . . . including plan components to maintain or restore structure, function, composition, and connectivity, taking into account . . . [s]ystem drivers . . . such as . . . invasive species." 36 C.F.R. [sect] 219.8(1)(iv).

The Forest Service additionally has a responsibility to refrain from authorizing, funding, or implementing actions that are likely to cause or promote the introduction, establishment, or spread of invasive species in the United States unless, pursuant to guidelines that it has prescribed, the agency has determined and made public its determination that the benefits of such actions clearly outweigh the potential harm caused by invasive species; and that all feasible and prudent measures to minimize risk of harm will be taken in conjunction with the actions.

Exec. Order No. 13,751, Safeguarding the Nation from the Impacts of Invasive Species, 81 Fed. Reg. 88,609 (Dec. 8, 2016).

The Forest Service Manual likewise establishes a strategic objective to "[t]ake proactive approaches to manage all aquatic and terrestrial areas of the National Forest System in a manner to protect native species and ecosystems from the introduction, establishment, and spread of invasive species." FSM 2902. It directs National Forests to "[i]nventory and survey susceptible aquatic and terrestrial areas of the National Forest System so as to quickly detect invasive species infestations, and subsequently implement immediate and specific actions to eradicate those infestations before they become established and/or spread." Id. The Forest Service has also established a policy to "[e]nsure that all Forest Service management activities are designed to minimize or eliminate the possibility of establishment or spread of invasive species on the National Forest System, or to adjacent areas" and to "[m]onitor all management activities for potential spread or establishment of invasive species in aquatic and terrestrial areas of the National Forest System." FSM 2903.

The Agency Has Not Complied with Its Requirements Under NEPA or NFMA.

The agency's analysis does not meet NEPA's "hard look" requirement because it assumes that NNIS spread will be controlled though implementation of nonbinding plan objectives and desired conditions. An agency may not rely on mitigation[mdash]here, in the form of desired conditions and objectives[mdash]to inform its impact analysis if that mitigation is not a required component of the Plan. See Colorado Envtl. Coal. v. Dombeck, 185 F.3d 1162, 1173 (10th Cir. 1999) ("merely list[ing] possible mitigation measures" is insufficient). To meet NEPA's hard look requirement, the agency must disclose the likely effect of plan implementation assuming those nonbinding mitigation measures will not be implemented. This means the FEIS must analyze the full range of impacts associated with Tier 2 vegetation management in the absence of Tier 2 NNIS control. Its refusal to do so here causes its "hard look" to come up short.

The lack of a "hard look," in turn, forecloses the agency's ability to "to maintain or restore structure, function, composition, and connectivity, taking into account . . . [s]ystem drivers . . . such as . . . invasive species" under NFMA. 36 C.F.R. [sect] 219.8(1)(iv). Without an accurate assessment of the threat of NNIS, the agency cannot maintain or restore ecological integrity. In fact, the limited analysis in the FEIS discloses that NNIS will become more widespread under both Tier 1 and 2 vegetation management objectives. FEIS at 3-449. The Planning Rule requires the opposite[mdash]that management activities improve NNIS infestations or, at minimum, not exacerbate them. As we have noted before, the solution to this problem is to require a minimum level of monitoring demonstrating no net spread of priority NNIS on the forest before operating within Tier 2 vegetation management objectives. This will ensure current levels of NNIS infestation are at least "maintained"[mdash]i.e., not made worse.

The agency's failure to forthrightly comply with the Planning Rule's requirement to "develop a monitoring program for the plan area and include it in the plan" further complicates its NNIS analysis. 36 C.F.R. [sect] 219.12(a)(1). NNIS infestations are not static and require monitoring to track to ensure the agency is not causing effects outside the bounds of its NEPA analysis or exacerbating current NNIS problems in violation of NFMA. The Plan sidesteps this requirement by attempting to move the "[d]etails of the plan monitoring program[mdash]including monitoring and analysis protocols, data collection schedules, responsible parties, and data management" outside of the Plan itself. Draft ROD at 29. Instead, this critical information will be developed as a "monitoring guide" outside of the planning context. The agency even attempts to retain discretion to "update" the limited monitoring questions included in the plan leaving no guarantee that NNIS will be sufficiently monitored. See Plan at 290. This independently violates the planning rule and makes it highly likely the agency will fail to grasp the degree that its activities cause NNIS spread.

Adequate post-project monitoring would also satisfy the guidance in FSM 2903, which directs that National Forests "[m]onitor all management activities for potential spread or establishment of invasive species." It would similarly satisfy the guidance of FSM 2902 to survey "susceptible" areas for NNIS, allowing for quick detection of invasive species infestations and subsequent implementation of immediate and specific actions to eradicate those infestations.

VI. Old Growth

The Nantahala-Pisgah's old growth forests must be managed with special care. Once lost, they cannot be easily on a human time scale. These forests provide structurally complex habitat that will not be easily restored, and which the Spectrum model does not even attempt to predict. The Forests have designated an old growth network, but it consists mostly of forests that are not in old growth condition. Meanwhile, many thousands of acres of known old growth (and forests

previously designated as old growth because they represent the best examples of old forest in their compartments) have been left out of the designated network and lumped into the suitable base where there are

no requirements or limits on logging. The Forests are setting themselves up for difficult project implementation. We discussed the need to protect old growth at length in prior comments. DEIS Comments at 52-53.

The Final Plan indicates a "need" for between 430,000 and 560,000 acres of "old growth" to meet the Plan's terrestrial habitat goals "over many planning cycles." Plan at 66, tbl.3. While the Spectrum model shows increasing levels of old forest, it does not account for realistic levels of natural disturbance in old forests. Indeed, as discussed above, the FEIS admits that aging forests will trend toward NRV[mdash]meaning that roughly half of those old acres won't actually be in old growth conditions in the long term. Spectrum makes no provision to model the levels of forest with old growth characteristics; it is at best an approximation of stand age.

1. Patches designated under Amendment 5 must be carried forward in the patch network.

Under the old plan, the Forest Service is required to analyze and inventory for old growth characteristics. See Region 8 guidance, Amendment 5 to the 1994 Plan. Having reviewed a significant number of these project-level designations, as well as the 1994 network, it is clear that the Old Growth Network proposed in Alternative E does not account for many thousands of acres previously identified as old growth. An amendment to the 1994 Plan set criteria for when newly surveyed small patches must be added to the network. 1994 Plan Amendment 5 at 32, Table 3-1.63F The patches we have identified meet these criteria but have been left out of the network in Alternative E.

The Revised Plan brought forward the large and medium patches from Amendment 5. Some of the small patches were also carried into the new plan, such as from Macedonia and Horse Bridge Projects, but others, such as from the Shope Creek, Stateline, Shinwhite, Fatback, Thunderstruck, and Upper Santeetlah Projects were not. There is no explanation for this discrepancy in the FEIS.

During the Objection Period, we reviewed 33 timber projects from Nantahala and Pisgah National Forest and found precise references, including stand numbers and acreages, to 2,390 acres of small patch old-growth designations that were made in NEPA decisions since 2007 but not carried into the Revised Plan. Attachment 19. Some of those old-growth designations are of exceptional quality, such as Stand 51-6 from the Upper Santeetlah Project. In addition to these 33 NEPA projects, we analyzed which compartments had a deficit of small patch old growth using the criteria established in Amendment 5. This analysis reveals that there is a 25,128-acre deficit of small patches in Alternative E relative to what is required by the current Forest Plan.

Because old growth restoration requires consistency of management for longer than a single planning cycle, and because the patch network designation is the mechanism for that continuity, it is arbitrary and capricious to move old growth designations around during planning without explanations for the cuts. There are no explanations here, because there was no rational decisionmaking. The Forests simply didn't do the work to gather up the patches from prior projects.

Prescribed fire will turn old growth into young forest

In the old growth network, prescribed fire is permitted only "with project specific analysis" and for the purposes of enhancing old growth characteristics. FEIS at 3-262 - 3-263; OGN-S-01. Prescribed fire is permitted[mdash]and modeled[mdash]in "old forest" at high rates: In closed- canopy forests, Spectrum models about 7800 acres of burning treatments per year in old forests over the first decade of the Plan and 11,500 acres per year during the second decade. By Period 14, burning in old forests has reached 35,350 acres per year.

Because the Forests' accounting for old growth under the revised Plan is incomplete, and because the Forests have said they will not add new old growth acres to the Old Growth Network, OG-S-02, it is certain the Forests' ambitious fire prescriptions in old forests will be applied to genuine old growth forest outside the network. Some amount of old growth will be among the acres the forests plan to "burn for young forest creation"[mdash]between

890 and 2,980 acres of closed-canopy old forest per year. But as we have demonstrated above, young forest will also come from unidentified (or previously identified) old growth that is part of the remaining 32,000 or so acres per year treated with less intense fire prescriptions will nevertheless transition to young forest.

In other words, the Plan will permit old growth acres to be transitioned into young forest.

The FEIS does not acknowledge this certainty or discuss its environmental consequences. But the Spectrum model shows that there will not be any late-aged forest to replace it. Failing to acknowledge that old growth will be a source of young forest precludes the Forests from being "fully informed" of the environmental consequences of the Plan's prescribed management levels.

3. Cap & Trade

At the draft stage, we urged the Forest Service not to limit its ability to update the old growth network. DEIS Comments at 52. Despite enlarging the network in Alternative E, the Forests continue to insist that the network remain fixed through the life of the Plan. Draft ROD at 44.

This constraint is inconsistent with how the Forests have approached old growth in the recent past. And it is not sound policy. When project-level surveys reveal high quality, unaccounted-for old growth, the Forests should not be helpless to act. As we argued in our comments at the draft sage, the most sensible compromise between protecting the landscape's most important resources and certainty with respect to other management objectives is a "cap and trade" system, where the size of the old growth network is set and newly inventoried, higher- quality acres can be exchanged for lower-quality acres elsewhere.

In its response to comments released alongside the Final Plan and the FEIS, the Forests stated this suggestion "was not considered in detail because there is strong disagreement regarding the starting point acreage for the network, and disagreement on the criteria for adding or removing patches from the network." Further, they argued, "[a] cap-and-trade style method is untested, would require [an] additional level of project surveys for old growth characteristics, and would likely be regularly challenged." Response to Comments at 47; FEIS 3-391, -92. None of these reasons explains their choice.

First, we fail to see how the task of choosing a starting size for a cap-and-trade network is any different from or more contentious than selecting a static size for the old growth network in Alternative E. The latter figure is not just a starting point[mdash]it is the final word on the size of the old growth network throughout the life of the Plan. Profound disagreement among stakeholders as to its size did not prevent the Forests from making that choice. Disagreement, on its own, should not be (and clearly is not) an obstacle to making choices.

Furthermore, punting to District Ranger discretion is not likely to avoid conflict. During these project-level conflicts, project level analysis will be forced to answer impossible questions without the benefit of Plan-level guidance. Because the Forests have been unwilling to take the heat to say that they will cut old growth when they find it outside the patch network, and because they have been unwilling to limit themselves not to cut old growth, and because they haven't even set an analytical cap on how much they'll cut, there is no cumulative impacts analysis in the FEIS to which a project may tier. Objectors intend to ensure that such an analysis is properly performed in each project where old growth is at issue.

Second, the Forests state that cap-and-trade is untested. This is not true. In negotiating with stakeholders over the scope and nature of management projects, the Forests often agree to add or subtract acres of old growth. This happened recently in the Camp Branch project. The Forests are familiar with and practiced in this sort of negotiation. That aside, lack of precedent is not alone a sufficient reason to forgo an otherwise sensible policy.

Third, the Forests state that a cap-and-trade system would require an additional level of project surveys for old

growth characteristics. But Region 8 guidance already requires that the Forests determine old growth status at the project level. Region 8 Old Growth Guidance (1997) at 23. This reservation is entirely unfounded. If the Forests intend to cease inventorying old growth, they should disclose that fact clearly and explain how it is consistent with agency policy.

Fourth and last, the Forests argue that decisions exchanging old growth acres would likely be regularly challenged. Perhaps. But we anticipate that failing to make a proper accounting of old growth on the forest would invite project-level conflict of a different and more serious nature. The Forests are likely aware that the status quo for conflict around old growth is high. Declining to add newly surveyed, high-quality acres to the old growth network would certainly not lower the temperature on those conflicts. And we fail to see how adopting a cap- and-trade approach could make them worse.

For all these reasons, we strongly advise that the Forests consider in detail the benefit of adopting a cap-and-trade approach to the old growth network.

To summarize, we request the following remedies to ensure the Plan lives up to the Forests' obligations toward old growth forests:

* Survey previously identified old growth and ensure it is carried forward into the Plan's Old Growth Network.
* Adopt cap-and-trade to effectively balance the need for certainty required by other objectives against clear opportunities to improve the quality and habitat values of the Old Growth Network
* Restore the old plan's sensitivity toward old growth by including a guideline that prohibits roads from crossing Special Interest Areas or designated old growth unless there is no physically practicable alternative.

VII. Monitoring

The Planning Rule requires forest plans to include monitoring programs that look for key ecosystem characteristics. 36 C.F.R. [sect] 219.12(a)(1) ("The responsible official shall develop a monitoring program for the plan area and include it in the plan") (emphasis added); Id. At 219.12(5)(ii) (monitoring plans must address the "status of select ecological conditions including key characteristics of terrestrial and aquatic ecosystems"). During plan implementation, key ecosystem characteristics that can "be monitored in a direct and efficient way" must be monitored to measure the effectiveness of plan components at restoring ecological integrity and addressing the needs of at-risk species. FSH 1909.12, Ch. 32.13b. Monitoring should occur at the ecosystem scale, not merely the forestwide scale. Id. Similarly, indicators in the monitoring plan "should measure the effectiveness of [forest] plan components (both ecosystem and species- specific components) designed to maintain or restore the ecological conditions and key ecosystem characteristics necessary to provide for diversity of plant and animal communities and contribute to the recovery of, conserve, or maintain the viability of at-risk species within the plan area." Id. In short, the monitoring plan must be designed to accurately inform the Forests about ecosystem health, species viability, and Plan success.

The revised Plan, by contrast, only commits to measure seral classes at the crude landscape level. Plan at 291-92. As Objectors discuss extensively in this objection, age class alone does not equate to "key ecosystem characteristics" according to the best available scientific information.

How, where, and in what context the Forest Service will monitor for Plan objectives is crucial for achieving the goals of NFMA and the Forest Plan. Yet the Forest Service has obscured this information from public comment and review at the DEIS stage, and from input by Objectors now. "Details of the plan monitoring program[mdash]including monitoring and analysis protocols, data collection schedules, responsible parties, and data management[mdash]will be part of a separate monitoring guide" outside of the Plan. FEIS App. A at 29-30.

This information is vitally important to the public, and it is a crucial part of the Nantahala-Pisgah Forest Plan.

Delaying release of select Plan elements required by NFMA until after Plan publication to avoid public input is impermissible under NEPA.

The Forest Service's obligation to disclose the monitoring guide and make it available for public notice and comment arises from NEPA requirements that "provide for broad dissemination of relevant environmental information." Robertson v. Methow Valley Citizens Council, 490 U.S. 332, 350 (1989). One of NEPA's "twin aims" is to ensure that "the relevant environmental information will be made available to the larger audience that may also play a role in both the decision-making process and the implementation of that decision." Baltimore Gas. & Elec. Co. v. NRDC, 462 U.S. 87, 97 (1983); see also Citizens for Better Forestry v. U.S. Dep't of Agric., 341 F.3d 961, 970-71 (9th Cir. 2003) ("[T]he very purpose of NEPA . . . is to 'ensure that federal agencies are informed of environmental consequences before making decisions and that the information is available to the public.'") (quoting Okanogan Highlands All. v. Williams, 236 F.3d 468, 473 (9th Cir. 2000)). In short, "public disclosure is a central purpose of NEPA" that the Forest Service must fulfill here. Sierra Club v. Marsh, 976 F.2d 763, 770 (1st Cir. 1992).

But the Forest Service nevertheless asserts that the monitoring guide can be both separate from the Plan and exempt from the requirements that pertain to Plan-level analysis altogether.

Plan at 286 ("A change to a monitoring guide or annual monitoring work plan is not a change to the plan monitoring program nor other administrative change of the plan and does not require public notification.") (citing FSH 1909.12, Ch. 32.4). This assertion is irrelevant[mdash]the Forest Service is not making a change to an existing monitoring guide. The agency is instead publishing for the first time details and procedures explaining how NFMA's goals will be met on two National Forests for a 20-year period[mdash]a monitoring plan that is expressly required as a plan constituent under NFMA. This is exactly the kind of information for which NEPA requires public disclosure. The Forest Service's plan to create the monitoring guide after the Plan is finalized and without public notice and comment procedures under NEPA would run counter to both NFMA and one of NEPA's core commands.

VIII. The Agency Has Not Met Its Obligations Under NEPA or NFMA Related to Wilderness Inventory Areas.

The Forest Service must balance multiple uses under NFMA, including wilderness. 16 U.S.C. [sect] 1604(e)(1); 36 C.F.R. [sect] 219.10(a)(1). Wilderness consideration during plan revision involves identifying and evaluating lands that may be suitable for inclusion in the National Wilderness Preservation System, 36 C.F.R. [sect] 219.7(c)(2), as well as including plan components that are designed to protect Congressionally designated wilderness and recommended wilderness, id. at [sect] 219.10(b)(1)(iv). The process for identifying and evaluating lands that may be suitable for inclusion in the National Wilderness Preservation System is set forth in the Forest Service Handbook. FSH 1909.12 Ch. 70. "The process occurs in four primary steps: inventory, evaluation, analysis, and recommendation." FSH 1901.12, Ch. 70.6.

The primary function of this analysis is to consider areas' suitability for Congressionally designated wilderness, but it is not the only function. The evaluation step, in particular, requires the agency to "evaluate, pursuant to criteria set forth in the Wilderness Act of 1964, the wilderness characteristics of the lands included in the inventory." Id. at Ch. 72. Some inventory areas will move forward for analysis under NEPA in forest plan alternatives as recommended wilderness and others will not. Id. at Ch. 73. But all inventoried areas possess unique roadless and wilderness characteristics[mdash]values that are front and center during landscape-scale planning. These place-based values must be considered under NEPA, both individually and in the broader landscape context, even for specific areas that are not recommended for wilderness.

Flaws in the evaluation are most obvious for areas that are carried forward as recommended wilderness under

one or more plan alternatives but are rejected for inappropriate reasons, but the agency's obligations under NEPA extend further. Having recognized the unique, place-based characteristics of these areas through the inventory and evaluation process, the agency must consider how different MA allocations affect those characteristics. The FEIS implicitly recognizes that inventoried areas are affected differently under each alternative when it notes that alternatives can "relate" differently "to the wilderness resource." FEIS App. E at E-302; see also Smith v. U.S. Forest Serv., 33 F.3d 1072, 1076 (9th Cir. 1994) (noting that designations during forest plan revision can "at the least, mak[e] logging more likely.") Those differences matter to the agency's "hard look" and alternatives consideration under NEPA and must be publicly vetted, not dismissed behind closed doors. See, e,g., Lands Council v. Martin, 529 F.3d 1219, 1230 (9th Cir. 2008) (noting importance of assessing roadless values under NEPA).

Objectors noted extensive errors in our DEIS comments regarding the agency's consideration of Wilderness Inventory Areas (WIAs) that the Forest Service has not resolved. See DEIS Comments at 16-20, 255-319. We reiterate several of those errors here with detailed explanation, but we do not abandon our catalogue of errors from those prior comments.

First, the agency has failed to analyze thousands of acres of WIA for MA allocations other than Matrix or Interface. Timber production is incompatible with the unique values of these areas, and it was necessary under NEPA for the agency to consider a reasonable plan alternative that would have ensured all WIAs were allocated to MAs outside of Matrix and Interface, and it was arbitrary and capricious to have omitted that alternative. Second, for WIAs or portions that were not considered as recommended wilderness under any plan alternative, the agency has not evaluated the special characteristics of these areas and assessed how MA allocations will affect those values. This is also true for areas that were advanced as recommended wilderness but allocated to a different MA[mdash]the agency has not disclosed how that allocation will affect those wilderness characteristics. Third, for several areas that were considered in a plan alternative for wilderness recommendation, the agency has fundamentally misapplied its wilderness criteria and reached an unsupported decision.

To resolve these shortcomings, we recommend that the agency: (1) reallocate WIAs to MA designations consistent with our DEIS Comments, (2) consider and disclose how management activities will affect wilderness characteristics or commit to doing so at the project- level and (3) complete a more forthright wilderness evaluation for the Tusquitee Bald and Black Mountains WIAs.

The Agency Has Not Assessed a Reasonable Range of Alternatives.

1. Areas not considered for unsuitable management in any alternative.

For the same reasons we explained in our DEIS comments (at 16-20) the agency's refusal to consider an alternative allocating all WIAs to MAs where timber production is unsuitable violates NEPA's requirement to consider a reasonable range of alternatives. We have been unable to rerun the same analysis we completed at the DEIS stage but based on similarities between Alternative D and E, it appears likely that significant portions (100+ acres) of at least 14 WIAs have been considered only for Matrix or Interface. See DEIS Comments at 19. NEPA requires the agency to prepare a comparative analysis disclosing how different MAs affect the unique values in these areas. Instead, the public is left with just one possible future[mdash] management of these areas consistent with timber production. This takes a valuable resource for eastern forests[mdash]undeveloped and unroaded areas[mdash]and fails to consider the effects of suitable management and road construction on that resource.

The agency's refusal to consider different MA allocations for these areas under different alternatives matters. For example, Alternatives B-E appear to place more than 1,500 acres of the Joyce Kilmer-Slickrock Extension 1 WIA into Matrix. See Draft ROD at 34 (noting placement of this area in Matrix under Alternative E). Just one of the unique attributes of this area is that its "high ridges, knobs, heath balds, and dense hardwood forests are scenic,

and serve as the backdrop for visitors along the Cherohala Skyway, a National Scenic Byway." FEIS App. E at E-70. An allocation of this pristine area to Matrix would obviously affect these characteristics one way, and another MA designation would affect them differently[mdash]but the agency never considers, analyzes, or discloses how or how much, because the Forest Service allocates the bulk of this area to Matrix in every alternative.

2. Craggy Mountain National Scenic Area

Objectors join the chorus and object to the Forest Service's inexplicable refusal to consider the proposed Craggy Mountain National Scenic Area. We will not belabor the issue, but we hope the Forest Service will reconsider its ill-advised decision and take this opportunity to build trust and goodwill, which is now at a low ebb.

The Agency Has Not Evaluated the Unique, Place-based Values of WIAs That Were Not Considered for Wilderness Under Any Alternative.

As noted above, NEPA requires consideration of how activities affect the unique values provided by WIAs. The agency failed to do so here for areas that were not carried forward for wilderness recommendation under any plan alternative. Examples help illustrate this point.

1. Daniel Ridge

Daniel Ridge has significant wilderness characteristics but was not carried forward for wilderness consideration in any alternative. FEIS App. E at E-400. Nevertheless, these characteristics need to be accurately documented and considered in the management allocation of the area. The areas wilderness characteristics include:

Apparent Naturalness: Daniel Ridge is largely dominated by natural characteristics. Devil's Courthouse, in particular, is an extremely significant and unique geologic, scenic, and cultural feature that is visible from surrounding areas. Even when the rock outcrops are not visible, the forested slopes containing old growth are a dramatic natural vista. As noted in our DEIS comments, Pinkshell azalea is present in this area. In the spring, Pinkshell azalea (Rhododendron vaseyi) form impressive displays of blooms within Daniel Ridge. This species is endemic and has a very narrow range. Daniel Ridge is one of the few areas where this species occurs, and trails within Daniel Ridge offer some of the best opportunities to view this species in bloom in a natural setting. The values in this area are particularly relevant under the Eastern Wilderness Act.

Opportunities for Solitude and Primitive Recreation: As pointed out in our comments to the DEIS, Daniel Ridge has abundant opportunities for solitude. The ruggedness of the area lends itself to purposeful isolation. The area has numerous out-of-the-way locations that also offer opportunities for solitude. The Art Loeb Trail, Mountain to Sea Trail, and numerous other trails offer both opportunities for solitude and primitive and unconfined recreation. Opportunities for off-trail solitude also abound in this area. Vegetation screening minimizes the effects of surrounding sights and sounds, giving the area similar values to those provided by the Shining Rock Wilderness despite proximity of both areas to the Blue Ridge Parkway.

Other Values: As noted above, Devil's Courthouse is geologically and culturally unique; it is also extremely significant in Cherokee spirituality.

NEPA requires the agency to consider how these characteristics should be managed[mdash]and how management activities will affect these characteristics[mdash]regardless of whether the area is recommended for wilderness.

2. Dobson Knob

The same problem plagues the agency's assessment of the Dobson Knob area. Dobson Knob has significant

wilderness characteristics with a sizable inventoried roadless core. This area was also not considered for Wilderness in any plan alternative. FEIS, App. E at E-401. Its wilderness characteristics include:

Apparent Naturalness: The Dobson Knob area is largely dominated by natural characteristics, many of which are acknowledged in the wilderness evaluation. Much of the area has never been logged, containing at least 5,002 acres of existing old growth. The rugged outcrops are covered with some of the best remaining stands of Carolina Hemlock. Table Mountain Pine, a Southern Appalachian endemic species is found throughout the area. Dobson Knob is a massif with a double top at 3680 feet, from which ridges and valleys fall off in all directions. It is a key connector between Woods Mountain and the Linville Gorge Wilderness. Because of dense undergrowth, most of this area is in old growth forest.

Opportunities for Solitude and Primitive Recreation: As pointed out in our comments to the DEIS, Dobson Knob has abundant opportunities for solitude and primitive recreation. The Dobson Knob Area is extremely rugged, and its interior is a very difficult place to navigate to[mdash]a feature which secures ample solitude. Most this area is inaccessible and will likely remain so.

The hollows drained by Black Fork and Yellow Fork, and below their confluence, Paddy Creek, are laurel and rhododendron "hells." Similar to Daniel Ridge, vegetation screening minimizes the effects of sights and sounds within the area.

Other Values: The high and rugged terrain of this area provides views East into the Linville Gorge, where unique habitats and rare plants can be seen. Fire has played a part in in the area's history and provides a unique perspective into forest regeneration following disturbance events. The Over Mountain Victory Trail, a National Historic Trail, transverses the area.

Carolina hemlocks at Dobson Knob remain some of the healthiest in the region and are prime candidates for preservation.

3. Steels Creek

Steels Creek likewise has significant wilderness characteristics that need to be accurately documented and considered in management allocation. Like Daniel Ridge and Dobson Knob, this area was not considered for wilderness in any plan alternative. FEIS App. E at E-405. Its wilderness characteristics include:

Apparent Naturalness: The majority of the Steels Creek area is dominated by natural characteristics; 88% of the area has not been managed for timber or wildlife openings in the last 40 years. Several notable waterfalls are found along Steels Creek and its tributaries, including Steels Creek Falls. The Mountain to Sea Trail travels across the area entering along Buck Creek and provides access to much of Steels Creek and the impressive Steels Creek Gorge. The topography of the gorge contains tiered shelves of rock that contribute to the falls in the area, as well as create swimming holes and potholes where erosion has worn circular pools in the rock. Teacup Falls has a number of these pothole pools.

Opportunities for Solitude and Primitive Recreation: This area's primary opportunity for recreation is the bisecting Mountains to the Sea Trail along Steels Creek. However, the more adventuresome can explore off-trail and take advantage of the area's topography for a more primitive experience. As the agency explains: "The trail along Steels Creek, though popular, is rugged in places and provides a serene and unique hiking experience. Steels Creek offers many cascades, swimming holes, and waterfalls in the area. Along some of the more remote sections of the creek (i.e., not along the trail) waterfalls have formed with features such as . . . a slide waterfall that takes a 90 degree turn through a narrow rock channel at the base." FEIS, App. E at E-151.

Other Values: This area contains an old-growth patch of 604 acres, with 1,440 additional documented old-growth

acres.

We offer these areas as examples, but it appears many other locations suffer from similar problems. Under Alternative E, significant portions of the following WIAs are allocated to Matrix or Interface: Bald Mountain, Boteler Peak, Cantrell Top, Cedar Rock Mountain, Fishhawk Mountain, Laurel Mountain, Middle Prong Extension, Piercy Mountain Ridge, Pigeon River, Siler Bald, Tellico Bald, and Yellow Creek Mountains.

Ultimately, NEPA does not allow the Forest Service to avoid considering and disclosing the effect of management activities on the unique characteristics provide by WIAs. If it refuses to do so here, it will be forced to complete that analysis when it proposes project-level management activities in these areas. Given the unique characteristics of WIAs, and significant public interest in protecting those characteristics, project-level analysis of those effects is likely to generate high levels of conflict. The better approach is to consider those effects now.

The Agency Misapplied Its Wilderness Evaluation Criteria for Several Area

For several areas that were considered in a plan alternative for wilderness recommendation, the agency has fundamentally misapplied its wilderness criteria resulting in an arbitrary decision. Again, this problem is best illustrated through examples. We recommended that portions of the areas discussed below be recommended for Wilderness and explained why they met the agency's wilderness criteria. See DEIS Comments at 294-296, 280-281. Here, we show how the agency misapplied its criteria.

1. Tusquitee Bald

Tusquitee Bald has abundant wilderness characteristics. It contains almost an entire watershed in relatively natural conditions, which is highly unique. It is also unusual in its size. At 29,156 acres it is among the largest inventoried areas in the Southern Appalachians; within that, slightly over 13,000 acres is inventoried roadless, and the entire 29,156 acres was included in the wilderness inventory process. Unfortunately, the wilderness evaluation in Appendix E minimizes and downplays these characteristics, leading to an inaccurate evaluation.

Apparent Naturalness: The Tusquitee Bald area is largely dominated by natural characteristics. Some of these natural characteristics are acknowledged in the wilderness evaluation, but many are not. The evaluation was not altered after the DEIS stage, despite Objectors' and other members of the public submitting extensive comments showing why this area qualified for wilderness consideration. In declining to issue that recommendation, the agency failed to acknowledge that the watershed is one of the largest unprotected primitive areas on Nantahala National Forest. Also absent from the evaluation is the fact that the area is a bear sanctuary and that the area includes two North Carolina State Natural Heritage Areas. The evaluation acknowledges the presence of old growth but seeming only as a foil for a purported absence of natural characteristics in much of the area. See FEIS, App. E at E-292.

These observations are true, but they ignore the special consideration afforded areas in the east in the Wilderness Act, the Eastern Wilderness Areas Act, the Planning Rule, and Directives for the Planning Rule. See DEIS Comments at 255-257 (expounding upon these requirements). Apparent Naturalness is especially a case where realistic and practical standards were intended. The intent to protect areas with past management, low level roads, and remnants of historical structures is apparent in both the history of the Wilderness Act as well as the fact that the Wilderness Act and the Eastern Wilderness Areas Act designated areas containing these features. The presence of these features should not have been disqualifying given the other extraordinary characteristics of this area. Many Eastern wilderness areas have been, at the time of their designation, in similar or less natural condition than Tusquitee Bald, as explained in early comments we submitted on the wilderness inventory.

Opportunities for Solitude and Primitive Recreation: Tusquitee Bald has abundant opportunities for solitude. The

extreme ruggedness of the area lends itself to many opportunities to solitude. Numerous trails give access to the area, and the Rim Trail provides the unique experience of taking the horseshoe ridge around the watershed. The Rim Trail can supportmultiday hikes deep within the area, and it's possible to take the Southern Nantahala Wilderness on the Chunky Gal Trail to join the Rim Trail for a truly long-distance experience. A number of other trails provide access to the Rim Trail[mdash]there are a multitude of options for recreation within the area. The large size of the area, the very good network of trails in the area, and the rugged terrain provide a wealth of opportunities for primitive recreation.

The evaluation dismisses these features and focusses on "sights and sounds" outside the area, stressing that the towns of Hayesville, Andrews, and Tusquitee, and other communities lie outside the area. These communities roughly lie around the Tusquitee Bald Area but are often many miles distant[mdash]which is typical in the east. Ultimately, the evaluation concludes the obvious: roadless and primitive areas are surrounded by areas that are not roadless and primitive. More to the point, Objectors have pointed out that "sights and sounds" from these areas do not affect wilderness characteristics. See DEIS Comments at 295.

The agency also points to disqualifying "sights and sounds" along the "Fires Creek corridor, where there are Forest Service] developed recreation sites, mowed wildlife fields, and open NFS roads." FEIS App. E at E-292. This corridor provides the infrastructure so that people can access it for solitude and recreation. It is part of the history of the area and part of its richness. The simple availability of low-elevation access does not detract from the fact that the entire area has abundant opportunity for solitude and primitive recreation. As with all primitive areas, including designated wilderness areas, there is a gradual transition from more developed areas to less developed areas with increasing opportunities for solitude and primitive recreation. This should not be viewed as a detriment to the area's wilderness characteristics.

Other Values: The agency acknowledges the uniqueness of the Rim Trail and the fact that the Fires Creek watershed is a North Carolina Outstanding Resource Water. It also notes that Fires Creek is a popular trout fishery and that nearby Andrews and Tusquitee are significant because the Trail of Tears is nearby.

It fails to acknowledge however that Fires Creek is home to several rare aquatic species including Hiwassee Headwaters Crayfish and Hellbender. The rare southern water shrew inhabits the streamside zone as does one of the largest and most robust populations of the rare mountain camellia. The area has at least 4,007 acres of old growth. Opportunities to increase the ecological representation of ecological types that are currently under-represented in the Wilderness Preservation System include a variety of ecological types, especially Appalachian Montane Oak, Appalachian Cove Hardwood, Appalachian Hemlock-Hardwood; Appalachian Oak, Appalachian Oak -xeric; and Small Stream and Riparian. Two State Natural Heritage Areas are located wholly or partly within the area: Fires Creek Rim /Fires Creek Gorge and Western Valley River Mountains. With an elevation gradient extending from 1,600 feet to 5,200 feet in one of the most southern natural areas and intact watersheds in Western North Carolina, it offers excellent opportunity for climate adaptation through species adapting through movement along this gradient. The area also ties in with the greater network of natural areas in the Nantahala Mountains connecting from the east with Boteler Peak, Chunky Gal and Southern Nantahala Wilderness and to the north with other areas of the Nantahala Mountains and the Unicoi Mountains. The agency's analysis misses all these extraordinary values.

Ultimately, the Tusquitee Bald area was not recommended for wilderness recommendation based on the agency's misapplication of its wilderness evaluation criteria.

2. Black Mountains

The Black Mountain WIA was not recommended because of similar problems. This area also has abundant wilderness characteristics, forming a contiguous ridge containing some of the highest peaks in eastern America. Its unique topography and adjacency to both state owned lands and private lands in conservation easement

make it one of the top wilderness candidates on the Forests. Within the WIA there is an inventoried roadless area of 10,599 acres. Unfortunately, the wilderness evaluation minimizes and downplays these rich wilderness characteristics, leading to an inaccurate evaluation.

Apparent Naturalness: The Black Mountains area is largely dominated by natural characteristics. Some of these natural characteristics are acknowledged in the evaluation, but the evaluation mostly stresses remnants of past activity, including mining, roadbeds, railroad logging and an old helicopter pad. Significantly, the evaluation hasn't changed since the DEIS, and comments submitted by objectors relating to apparent naturalness were not incorporated or addressed in response to comments. See DEIS Comments at 280-281. Objectors informed the agency of significant old growth in this area but the evaluation describes only "scattered large trees" with some old-growth characteristics. While the evaluation highlights past disturbances, there is little mention of the landscape context of the Black Mountain area with adjacent and nearby lands (including Big Ivy, the Big Tom Wilson Preserve, the Blue Ridge Parkway, Mt Mitchell State Park, and the Asheville Watershed) which place the Black Mountains WIA in one of the most remote areas in the Southern Appalachians, with the natural character that accompanies such a remote setting.

Like Tusquitee Bald, the evaluation's observations about past activities in the area are accurate, but they ignore the special consideration afforded areas in the east under relevant legal authority. See DEIS Comments at 255-257.

Opportunities for Solitude and Primitive Recreation: The evaluation stresses recreation being confined to the Crest Trail and does not incorporate or expand on our descriptions of challenging side trails which make numerous circuit hikes possible. Both the Woody Ridge Trail (Tr #177) and the Colbert Ridge Trail (Tr #178) offer exceptional challenging hiking for those seeking solitude. There are also exceptional opportunities for off- trail experiences. The evaluation describes "sights and sounds" from the east and north, but admits they are "not pervasive across the entire area." FEIS App. E at E-26. At their closest, they are miles away. The evaluation confirms there are no highly developed trails, motorized trails, or mountain bike trails but this description does not capture the depth and breadth of the opportunities we described in comments. The primitive recreation experience available in the Blacks is unmatched in the East. The elevation and ruggedness force visitors to rely on their own skills in inclement and fast-changing weather. Hikers are treated to iconic views of the East's greatest peaks. The Blacks provide an unforgettable and authentic wilderness recreation experience. Seven main peaks (16 if you count subpeaks) are over 6,000 feet in elevation along the Black Mountain Ridge, and the ridge drops below 5,800 feet only once along its 12-mile length.

Other Values: Our comments discuss the 3,064 acres of old growth in this area which the evaluation ignores. DEIS Comments at 281. The evaluation does recognize several other unique values in this area. See FEIS App. E at E-292.

As far as we can tell, this area must have been excluded from wilderness recommendation in the final alternative based on application of "sights and sounds" criteria. If the Black Mountains area cannot meet that standard, almost no place in the East can[mdash]a clear indicator that the agency is misapplying its criteria.

IX. Transportation, Water, & Soil

Water Quality

Water resources play a critical role in forest and aquatic ecosystem integrity, both in the forests and within the broader landscape of our region. Streams and rivers, some designated as outstanding resource waters (ORW) by the state, support a remarkable array of biodiversity, help sustain recreational fishing and outdoor economies, as well as supply drinking water for downstream communities. Sediment-free streams are vital to protecting aquatic biodiversity.

Headwaters to multiple major Southeastern river systems originate in the Pisgah and Nantahala national forests, having a profound influence on downstream water quality, and many people and municipalities draw their drinking water directly from the Forests.

The line between managing terrestrial and water resources on these forests is blurry. They receive up to 80 inches per year of precipitation, and soils (where healthy) serve as a sponge.

Plan at 39. There are very few places on the ground that are not within a few hundred yards of a stream, spring, or shallow groundwater. Protecting water therefore requires protecting watersheds. That these watersheds are in public ownership is a tremendous asset, but it is also a tremendous responsibility. Unfortunately, the Plan does not bear that responsibility. While the Plan improves on the Draft in limited respects, it does not meet regulatory requirements, and it lacks an analytical justification for some key choices (and omissions).

Under the Planning Rule, the Forests must assure the maintenance and restoration of water resources in the Plan itself. The Rule requires standards or guidelines[mdash]binding requirements[mdash]adequate to ensure maintenance and restoration of aquatic ecosystem integrity. 36 C.F.R. [sect] 219.8. These terms require "plan components be designed to maintain resources that have ecological integrity and to restore conditions where they are degraded, damaged, or destroyed." FSH 1909.12, Ch. 23. The Forest Service is therefore required to build a Plan that is capable of either (a) ensuring that baseline protections applicable everywhere are sufficiently stringent to protect even the highest quality and most sensitive aquatic systems, or (b) differentiating between when routine, baseline protections are enough and when sensitive resources require additional protections. The Plan does neither. It assumes that routine BMPs will be good enough, even when there are high risk factors. The FEIS analysis does not support this approach.

Forest plans must not only include binding requirements to protect water quality; they must also be fiscally realistic. 36 C.F.R. [sect] 219.1(g) ("plan components," including objectives, must be "within [hellip] the fiscal capability of the unit"). The Plan does require (and its analysis assumes) that short-term impacts to aquatic systems be offset by a greater long-term improvement of watershed condition and water quality. WTR-DC-02; WTR-G-04. However, the Forests provide no justification to assume that watershed improvements will actually be completed. Watershed improvements contained in project decisions under the old Plan have often been neglected and not implemented due to funding limitations, and there is no analysis to show that this will change. In fact, the FEIS admits that watershed improvements related to roads management are dependent on future funding increases. FEIS at 3-73.

Finally, Plan components to maintain and restore aquatic ecosystem integrity must be based on the best available science under both the planning rule and NEPA. 36 C.F.R. [sect] 219.3; see 40 C.F.R. [sect] 1500.1(b) (accurate scientific analysis based on high-quality environmental information is essential to implementing NEPA). The BMP monitoring and its use in the EIS are not science, much less the best available science, and reliance on them is contrary to specific counterexamples showing that they are not adequately protective. The Forest Service must provide a justification for its assumptions of no impact, or it must adopt plan components that will assure impacts are avoided even in high-risk circumstances.

In prior comments, Objectors explained shortcomings with streamside zone ("SMZ") management[mdash]both width of SMZs and treatment of ephemeral streams[mdash]along with other related problems discussed in the soils and transportation sections of this Objection. DEIS Comments at 178-82. Since the Draft, the Plan has improved by restoring the 50-foot buffer around intermittent streams and adding some language regarding ephemeral streams. Plan at 48. SMZ-S-02 was also helpfully improved for clarity. But SMZ protections are still inadequate, and the requirements around ephemeral streams are unclear at best. In the analysis, the agency now acknowledges that it doesn't have a scientific basis for assuming its BMPs are virtually always effective, but it continues to make that assumption anyway, and it fails to reckon with specific evidence that they are not.

These analytical failures undermine not only the conclusions regarding water quality, but also the transportation and soils analyses discussed in later sections.

1. The Plan's Streamside Zones Are Inadequate.

While some important improvements have been made to Plan components regarding streamside zones, they remain insufficiently protective. The Plan has increased the width of the SMZ for intermittent streams from 15 to 50 feet, returning to the status quo from the old plan.

Plan at 48. However, a 50-foot SMZ will be inadequate in many cases, such as where the terrain is steep or filtering capacity is reduced for some other reason.

Scientific literature as well as practices on nearby National Forests support increasing riparian buffers as slope increases. For comparison, the GWNF starts with the same core streamside zones of 100 feet for perennial waterbodies and 50 feet for intermittent streams.64F65 As slopes increase, however, an "extended area" ranging from 25 feet (slopes >10 percent) to 50 feet (slopes > 45 percent) is added to core areas. 66 The Cherokee National Forest similarly provides riparian corridors that expand with slope, for example from 75 feet (10 percent) to 183 feet (40 percent).66F67 Within the filter zone, significant ground disturbance is restricted. CNF Plan, FW-3. The Chattahoochee-Oconee National Forest Plan also has larger buffers for streams depending on slope.67F68 Scientific literature also points to the need for more protective buffers on slopes.68F69 The Forest Service was obligated to consider the best available science and its own practices in surrounding forests with more modern plans, and it was obligated to consider the reasonable and highly intuitive alternative of extending SMZ widths where slopes are steepest.

In its Response to Comments, the Forest Service dismissed its neighbors' examples with the conclusory statement that "neighboring forest language will not meet the needs on the Nantahala and Pisgah NFs." FEIS App. A at 23, 33. The FEIS does not show any analysis to support this conclusion. This does not meet the "hard look" requirement.

The FEIS's brief discussion of SMZs does not explain why the buffer widths for perennial and intermittent streams were chosen in the Final Plan. FEIS at 3-74 - 3-75. Reference is made generally to expected improvements as compared to the current plan due to the embrace of an "ecosystem-based approach," but this is not defined and its relevance to the water quality impacts associated with ground disturbance is not explained. Id. Does the Forest Service intend to argue that, for example, a clearcut for one purpose has different physical impacts to water and soil from a commercial harvest intended for another purpose? If so, this proposition has no support in the scientific literature and must be justified in the FEIS.

The Forests must supplement their analysis and adopt a slope-dependent SMZ width or another standard that is equally protective.

The Plan's Management of Ephemeral Streams Is Inadequate

The Plan now includes a non-binding and unclear management approach to "minimiz[e] soil disturbance" and "retain[] vegetation for slope stability" along ephemeral streams. The intent (again, non-binding) is that "[e]phemeral water bodies are managed to retain their ability to filter sediment from upslope soil disturbances." Plan at 47. However, ephemeral streams are excluded from SMZ protections and are subject only to this vague management approach. The FEIS does not explain this decision at all. FEIS at 3-74 - 3-75.

To begin with, the Forest Service has not demarcated the transition from intermittent streams (where there is a buffer) to ephemeral streams (where there is not). However, the Plan does base its different treatment of these two types of streams on three physical differences.

First, according to the Plan, ephemeral streams are always below the water table. Plan at 47. Second, the Plan explains that ephemeral streams "do not have enough energy to remove leaf litter, organic matter, and soil down to mineral soil." Id. And, finally, "they do not contain riparian vegetation, fish, or aquatic insects with multiple-year larval life cycle phases." Id.

The Forests must clarify that if any of these factors are present[mdash]i.e., if a stream is below a spring or seep, if it is channelized, or if it has riparian vegetation or benthic macroinvertebrates[mdash]then the stream is not ephemeral and is subject to the 50-foot SMZ requirement.

Second, the current plan language is unclear to the point of uselessness. Requiring "minimization" of disturbance and "retention" of vegetation in a management approach will create confusion about whether these can be ignored in any particular project. Furthermore, even if they are applied consistently, these requirements do not provide clear direction for project development. No guidance is given for the width of the zone in which restrictions should apply, or what "minimization" and "retention" requirements mean. Stakeholder reactions highlight the ambiguity of the language: some have interpreted it to effectively prohibit timber harvest, while others have seen it as too lenient in allowing ground disturbance.

The ambiguity in drafting reflects a lack of analytical clarity. The addition of language in the Plan for ephemeral streams was not accompanied by any additional analysis in the FEIS. In other words, the Forest Service acknowledged that protection of ephemeral streams is necessary, but did not develop and analyze the effects of Plan components. Without such analysis, it lacked an analytical basis to articulate a clear standard for how much disturbance is too much, or how much retention is enough.

The Forests must set a clear rule that prevents the need to argue, in project after project, the extent to which disturbance can be allowed and how much vegetation can be removed. We believe our prior comments still provide the best solution, but we could also support the addition of a guideline that prohibits the operation of equipment within 25 feet of an ephemeral stream (subject to the exceptions provided in SMZ-S-02), but allows the removal of vegetation otherwise consistent with the prescription.

The FEIS Fails to Analyze Important Water Quality Impacts, In Large Part Due to Inaccurate Assumptions Regarding Mitigation Efficacy

As compared to the current plan's baseline, the Plan would increase active management levels by roughly 500%. Regeneration harvest would increase from 650 acres per year to as much as 3,200 acres per year. Prescribed fire, with associated ground disturbance for firelines, would increase from 8,500 acres per year to 45,000 acres per year. Levels of road construction would increase commensurately. Despite this tremendous increase in active management levels, the agency concludes that there will not be "a measurable change in surface or ground water quality as a result of any alternative."

Come again? This incredible conclusion assumes that the risk coefficient associated with ground disturbing activities is zero. To explain: if one stream per year is seriously impacted by timber harvest activities at 650 acres per year, then five streams per year would be impacted with levels of 3,200 acres per year. The only way to conclude that there will be no change is to assume that there is no risk. That is simply counterfactual, and it is not supported by best available science. It also shows a failure to take a hard look at evidence provided during the planning process.

i. The FEIS assumptions regarding BMP effectiveness is a fundamental flaw that undermines the entire analysis of impacts to water.

Instead of discussing the impacts of its decisions regarding Streamside Management Zones, the EIS trots out the same flawed discussion of past BMP monitoring that Objectors addressed in comments on the DEIS:

With continued implementation of planning and operational BMPs, these activities would not adversely impact water quality, and other improvements associated with the timber project would result in overall beneficial impacts to water quality by reducing erosion and sedimentation.

FEIS at 3-75.

The EIS excessively relies on BMPs to minimize the impact of management activities on water quality. Even where the EIS recognizes risks in the abstract, it assumes those risks away rather than analyzing them or committing to a framework to avoid them. For example, the FEIS recognizes that "recently harvested areas" pose "an elevated risk to stream channels," FEIS at 3- 59, but it then pivots to its BMP monitoring data and claims that BMPs were implemented 94.8% of the time, id. at 60. The FEIS then makes a counterfactual leap, assuming that there will be no increased risk associated with the new Plan because all activities will follow BMPs. FEIS at 3-67. Based on these assumptions, the EIS makes no further attempt to analyze how site-specific factors influence soil erosion and sedimentation risks, like slope, soil erosion rating, or logging in erosion-prone soils near ORWs.

As Objectors detailed in our comments on the DEIS, this past monitoring paints only a partial picture of experience gained on the forest - and in some instances obscures chronic problems. Because the Final EIS repeats this fundamental error and does not change the underlying analysis, we incorporate our prior submissions by reference. 70 To summarize here:

The BMP scoring system inflates the effectiveness of BMPs by treating each BMP separately instead of considering the success rate for a project. The Forest Service uses a flawed scoring system to inflate the success of monitored BMPs by scoring each individual BMP separately. In other words, while a single BMP failure can result in sediment release impacting a water body, the success of other BMPs in the same project will result in a high score for the whole project. Thus, projects with negative water quality impacts still receive high scores. Even projects with adverse stream impacts still have high success rates by the Forest Service's accounting.

Monitoring does not even purport to capture all impacts. The monitoring is not comprehensive. For example, only 3% of road stream crossings on the Forests were examined. FEIS at 3-58. No justification for the statistical reliability of the sample set is provided in the FEIS. Second, the monitoring does not include impacts during implementation and prior to closure. The units that were selected for inspection were generally examined after closure, not when they are least stable. The timing is nearly always too late to evaluate the short-term effects. Third, monitoring generally occurs only once after closure, and therefore does not consider the long-term effects of a failure to maintain BMPs (especially on closed roads). Finally, the monitoring excludes whole categories of impact, like firelines.

Underneath this misleading summary, the data show a much greater risk:

In the 63 timber sales surveyed between 2009 to 2018, sediment was reaching streams on 70 separate occasions. Nowhere is this disclosed in the FEIS; instead, this failure rate (more than one unlawful sediment impact per timber sale) is obscured as a 97.4% success rate, per the agency's accounting. In reality, if BMPs are allowing 7 violations of law every year under current harvest levels, then they are likely to allow 35 violations of law every year under the new Plan.

Similarly, the FEIS does reveal that one project per year has caused critical visible sediment to enter streams (i.e., long-term, high-volume levels of sediment), FEIS at 3-60 - 3-61. But it does not acknowledge that

quintupling the levels of timber harvest would likely result in 5 such instances per year, instead concluding (without support) that there would be no "measurable change." FEIS at 3-67.

To its credit, the Forest Service for the first time acknowledges that its BMP monitoring reports are unscientific, noting that they have "not been peer reviewed." The agency has further offered to submit its analysis to "our FS research branch" to "consider the need for changes to future BMP monitoring documents" FEIS App. A at 29. However, the Forest Service has not attempted to develop Plan standards that would improve BMPs and monitoring in the future, nor has it offered any explanation for why continuing with the same approach would lead to different, more protective results in the future.

Other data available to the agency also show that the risk to waters from the ground disturbance associated with logging and road construction cannot be dismissed as zero. On-the- ground survey data documents chronic erosion and sedimentation impacts associated with closed and long-unmaintained roads. A survey in 2015 investigated the success rate of BMPs on closed NPNF system roads. Of 322 stream crossings and other BMPs affecting intermittent or perennial streams, 127 (40%) violated NC FPG Performance Standards, with accelerated erosion in a stream crossing or visible sediment directly entering the stream.70F71 Additionally, the FEIS fails to disclose major BMP failures, such as in the Panther Branch project, which resulted in 200 linear feet of stream being impacted by 2-3 inches of sediment and further affected impacted the North Fork of the French Broad River. 72,73

i. The FEIS includes no analysis of impacts of management other than sedimentation, and no analysis of firelines.

The FEIS also overlooks risks to water quality other than sedimentation. Lacking is a candid analysis of other impacts to hydrology and water quality caused by loss of ground cover, skid trails, log landings, soil disturbance, temperature, and channel erosion. The EIS does not acknowledge the extent of potential hydrologic modifications (including to groundwater) related to timber harvest and associated roads, and fails to analyze the direct and indirect impacts alteration of hydrologic flow paths and soil loss.

Finally, the FEIS discloses that the Plan calls for 11,000 acres of new burn blocks. FEIS at 3-429. There is no concomitant disclosure of how many miles of fire line excavation would take place and in which watersheds, not to mention cumulative impacts to water resources in those areas. For reference, the Plan only requires that fireline construction be "minimized" by using natural and existing fuel breaks, and that "[f]irelines which expose mineral soil should not be located in streamside zones unless tying into waterbodies as firebreaks at designated points with minimal soil disturbance." Plan at 100. Direction to "minimize" impacts, even if faithfully followed, does not equate to a meaningful limit, but it does confirm that there will be impact to water resources. Those impacts must be disclosed and analyzed as cumulative with other active management.

i. The FEIS must be supplemented and additional plan components must be added to protect water resources.

Like the DEIS, the FEIS is fundamentally unsupported and the agency's conclusions are arbitrary and capricious. The Forest Service must supplement its FEIS to reckon with the serious risks that it has so far dismissed. If the Forest Service intends to increase management levels by 500%, it must disclose the likely impacts to water quality or it must adopt protective standards to avoid them. Ignoring the risks is not an option.

"The hallmarks of a 'hard look' are thorough investigation into environmental impacts and forthright acknowledgment of potential environmental harms." Nat'l Audubon Soc'y v. Dep't of Navy, 422 F.3d 174, 187

(4th Cir. 2005). The BMP monitoring and its use in the EIS are not rigorous enough to support relying on BMPs to entirely dismiss categories of impacts from analysis in the EIS.

As the Fourth Circuit recently held in a similar context, reliance on an "overly high efficiency rate of erosion control devices" (in that case, a claimed success rate of 96 percent) was a violation of NEPA. "The problem[hellip] was assuming that these devices would function nearly perfectly to reduce erosion and sediment, despite a wealth of evidence to the contrary." Cowpasture River Pres. Ass'n v. Forest Serv., 911 F.3d 150, 177 (emphasis added); see also Sierra Club, Inc. v. Forest Serv., 897 F.3d 582, 590 (4th Cir. 2018) (finding the Forest Service failed to take a hard look at sedimentation concerns).

Because the agency failed to take a thorough look at the risk, it failed to see the need for additional plan components in order to meet its obligations under the planning rule. This "undermined the 'action-forcing' function of NEPA," because "neither the agency nor other interested groups and individuals can properly evaluate the severity of the adverse effects." Robertson, 490 U.S. at 352 (citations omitted). Again, as noted above, the Forest Service must repair its analysis or add plan content to avoid the risks it has so far ignored. Increasing SMZ widths on steep slopes and clarifying ephemeral stream protections would be the absolute minimum.

The Forest Service offers one further answer to our prior comments that is so insulting that we must mention it before closing here. After a perfunctory statement reasserting that BMPs have a "high success rate," the Forest Service states, "At the programmatic analysis level of the forest plan, the alternatives have comparable effects and risks to water quality at an 18-county scale are not greater in one alternative than another." Response to Comments at 25. If you zoom out far enough, no impact is significant. That does not relieve the Forest Service from protecting the resources that it is charged by law with maintaining and restoring.

4. Solutions

As noted above, the Forest Service must supplement its analysis, and it must adopt better and clearer protections for SMZs and ephemeral stream corridors. Specifically, SMZs must increase in width as slopes increase, and enforceable standards and guidelines must be developed so that projects will not be subject to conflict over which activities are allowed and prohibited in SMZs and ephemeral streambeds. These Plan components must be explained with reference to the best available science, and the impacts of those choices must be analyzed in the FEIS.In addition, the agency must adopt a standard requiring a finding at the project level that short-term adverse impacts to water quality will be offset by long-term improvements, and an adaptive management "trigger" to show that it is accomplishing the watershed improvements promised by project decisions. As noted above, the Plan states that short-term impacts to aquatic systems will be offset by a greater long-term improvement of watershed condition and water quality. WTR-DC-02. There is no corresponding standard to implement this desired condition. The analysis makes the same assumption: timber projects will include "other improvements" that will actually benefit water resources "by reducing erosion and sedimentation." Id. If this is the basis for the agency's happy conclusions, then it must be made binding. Furthermore, it is not enough to merely include watershed improvements in project decisions. Too often, they simply don't get implemented because of funding limitations or, more troublingly, reallocation of allocated funds to other priorities. The agency must commit to demonstrating that it has accomplished (or is on track to accomplish) all of the watershed improvements it promised at Tier 1 before it stretches into Tier 2.

Finally, monitoring must do a better job of accounting for and reporting negative impacts. Specifically, monitoring should occur during or immediately after rain events for all projects, but it must occur during or after rain events for projects with high risk factors. Further, monitoring should assess the status of disturbed areas periodically after closure for soil stability, hydrology, NNIS, and species composition.

Soil/Slope

For many of the same reasons discussed in the preceding section, we object to the Plan's lack of adequate protection for soil resources. The Plan backslides from the old plan's generally successful standard requiring skyline logging on steep slopes. There is still no science or data offered to support the 85/15 soil impairment standard. There are no requirements preventing the degradation of soils vulnerable to base cation depletion. And plan components that do address important risk factors are drafted so vaguely that they cannot be considered "standards" at all.

1. Relevant Legal Requirements

Timber can be harvested from National Forest System lands "only where . . . soil, slope, or other watershed conditions will not be irreversibly damaged." 16 U.S.C. [sect] 1604(g)(3)(E)(i); 36 C.F.R. [sect] 219.11(d). In addition to prohibiting impairment, the planning rule contains an affirmative obligation to maintain soil productivity and restore it where it has been degraded. 36 C.F.R. [sect] 219.8(a)(2). The rule's requirements are clear and specific: Plans must include binding components (standards or guidelines) to maintain or restore soils and soil productivity, plus additional guidance to reduce erosion. Id.

Standards and guidelines for soil protection should include direction, among other things,

for: "Maintaining [hellip] organic matter inputs and avoiding losses, to help maintain or increase net soil carbon";

* "Limiting potential impacts on soil physical properties, for example, compaction, rutting, puddling, displacement of the soil surface, and erosion"; and
* "Limiting potential effects on soil chemical properties, such as potential for nutrient depletion, acidification, or both."

FSH 1909.12, Ch. 23.12b.

Plans must also be based on the best available science. 36 C.F.R. 219.3. Data and methodology used in environmental analysis must be accurate, reliable, and relevant. FSH 1909.12, Ch. 7.12. "Reliability reflects how appropriately the scientific methods have been applied and how consistent the resulting information is with established scientific principles." Id. Similarly, NEPA requires that agencies disclose likely impacts and consider reasonable alternatives that may avoid harmful impacts. The impact analysis must "have some reliable methodology for estimating" impacts to soil. Rocky Mountain Wild v. Vilsack, 843 F. Supp. 2d 1188, 1198 (D. Colo. 2012).

The Plan falls short of these requirements, particularly in light of the Plan's dramatic increases in objectives for timber harvest and road construction[mdash]activities which have harmed soils under the current plan.

1. The Plan Does Not Prevent Harmful Logging Methods on Steep Slopes

Under the old plan, skyline logging was the default for timber projects on slopes above 40%, unless it could be shown that another logging method would be similarly protective. That standard has generally been successful. However, even as previously drafted, project-level compliance was imperfect. In the Buck (recent) and Crossover (current) project proposals, for example, units were proposed on slopes requiring cable logging, but they were anticipated to be logged with ground-based methods. Objectors have repeatedly had to remind the agency of the need to ensure access is feasible for cable yarding.

The consequences of using ground-based methods on steep slopes rather than skylining can be dramatic. For example, in the Thunderstruck project, at least two steep units were logged using inappropriate ground-based methods. Monitoring reports explained:

The choice to tractor log the unit over skyline was not the best practice. As a result, there are multiple skid roads and excessive ground disturbance. Therefore, recommend obliterating a majority of the skid roads to restore site production and slope stability.73F

In the Big Cove project, monitoring revealed similar impacts:

Unit slope is very steep and unit should have been skylined. Skid roads are present across the slope, stacked up the hill ~225' apart. We feel that the unit is set up for mass wasting due to stacked roads.74F

Rather than retaining or, better yet, strengthening the standard to prevent these kinds of harm, the Plan simply tosses the language and leaves it entirely to project-level discretion to determine the "appropriate" method. Plan at 92; Responses to Comments at 28. In full, the standard provides: "Conduct a site-specific review to determine the appropriate logging systems for management on sustained slopes (>200ft) over 40% slope." TIM-S-06. A separate standard calls for "avoiding" stacked skid roads on slopes rather than prohibiting them. Plan at 93. This backsliding leaves soils at risk and falls short of the planning rule's requirement to maintain and restore soils and soil productivity. 36 C.F.R. [sect] 219.8.

The Forest Service defends this change with three separate arguments: first, that it is not really a change; second, that new technologies (other than skyline logging) could emerge during the Plan's life; and third, that the new standard is based on monitoring.

First, the Forest Service attempts to gaslight the public into believing that it is not weakening the old standard. By the agency's reckoning, the standards are equivalent because both "not[e] that a site-specific review is needed to determine the appropriate logging systems for management on [steep slopes]." FEIS at 3-49. However, that simply is not true. Under the old plan, site-specific review was not "needed" unless there was a proposal to deviate from the default rule. Under the new Plan, site-specific review would be needed every time a steep slope is at issue.

Furthermore, site-specific review under the new Plan would be made without Plan-level guidance. Under the old plan, what factors should be considered in this site-specific review? By waffling in this standard, the Forests are suggesting that slope alone isn't a good enough basis to decide whether to use ground-based logging systems. But if the Forests have data to show that ground-based logging on steep slopes is safe in some circumstances, it has not seen fit to share that data with the public or to explain what those circumstances are.

Second, the Forests argue that "[d]etermining appropriate logging systems at the project level enables future practitioners to make the best decision for the site conditions as well as account for future advances in logging technology." FEIS at 3-49. Of course, if the standards really were equivalent in the amount of flexibility they afford, then changing the standard would not have been necessary to allow for selection of different systems. In fact, the current Plan recognizes that these two standards are substantively different: it requires default cable logging on sustained slopes over 40%, but separately requires "[d]etermin[ing] appropriate logging systems for intermediate (thinning), selection, or shelterwood cuts on sustained slopes over 40%." Old Plan at III - 34. Moreover, if new technologies emerge and the Forest Service has data to show they are sufficiently protective of steep slopes, amending the Plan to accommodate those technologies would be trivially easy.

Third, the Forest Service answered Objectors' concerns about ground-based logging and stacked skid trails on steep slopes by stating that Plan standards were "designed based on decades of monitoring," Response to Comments at 78, but that reasoning is irrational. To the extent that monitoring shows limited impacts from logging

on steeper slopes, it is because the agency had in place a more protective default standard. Tossing out protections because they are working is the very definition of irrational decisionmaking. Further, if the agency means to rely on monitoring data, it should provide or at least summarize the relevant monitoring data. As shown by the illustrative examples above, the agency's own data clearly shows the damage that can result when ground-based logging is used on steep slopes.

The Plan should reinstate the default rule requiring cable logging on steep slopes, with an option to use other methods only with a finding that they would be as effective at protecting soils. This should not be a difficult request if, as the agency asserts, the standards were meant to be equivalent. If the agency is unwilling to make this change, then it must supplement its analysis to show that the old default standard is no longer necessary.

1. The 85/15 Rule Is Not Based on Science or Current Agency Policy

The Plan's only specific, quantitative standard to protect soils is based on rescinded agency policy, discredited science, and an utter lack of effective monitoring or validation. That standard provides as follows: "On all soils dedicated to growing vegetation, at least 85% of the activity area will be able to grow vegetation without Substantial Soil Impairment. Reforestation shall be accomplished within five years." SLS-S-02.

We note here that the standard contains two footnote signals, but the corresponding footnotes are not provided. They appear to indicate definitions for the terms "activity area" and "Substantial Soil Impairment," which are not defined in the glossary.

The 85/15 standard was at one time assumed to reflect the best available science for preventing cumulative soil impairment. At that time, it was an explicit requirement from Region 8, and something that Forests could rely on without independent, original analysis. That Regional requirement has now been withdrawn, because the literature now suggests that the simple 85/15 rule is not reflective of best available science. In fact, the Forest Service's own scientific research now recognizes that, contrary to previous guidance using the 15% disturbance threshold, "there is little or no documented evidence of any connection between disturbance thresholds and [soil] productivity. When critical data are lacking, it is prudent to err on the conservative side to ensure that productivity is not impaired." 76 Instead, more recent research suggests that site-specific expertise and data should be used "[f]or making judgments on impaired productivity." 77

Now, if the Forests intend to continue using the standard, they bear the burden to show a reasoned basis to conclude that it will allow them to meet not only the legal requirement that existed at the time it was adopted (namely, to prevent "irreversible damage"), but also the new planning rule's requirement to maintain and restore soils and soil productivity. The Forests have not shown a rational basis to rely on this standard. According to the FEIS, in fact, using the standard allows up to 15 percent of the activity area and the harvest unit to "lose potential long- term soil productivity." On its face, this would threaten to violate the relevant planning rule requirement.

The remainder of the relevant section of the FEIS attempts to show that the 85/15 rule has been followed in the vast majority of projects (i.e., that only a few units have exceeded 15% detrimental disturbance), but it does not provide any data or reasoning to show that applying the rule has been effective and has maintained or restored soils and soil productivity.

In the Response to Comments, the Forest Service makes a claim about effectiveness: "monitoring indicates that the standard has been adequate to maintain an acceptable level of soil productivity while facilitating logging operations to meet project objectives." Response to Comments at 27. However, the FEIS provides no data whatsoever to support the claim. It is hollow reasoning to say that the standard has been effective, but for support only to say that the Forests have been following the standard. To be clear, the Forests are applying a

rule that they have never validated.

A brief foray into the cited monitoring data confirms that the Forest Service is using circular reasoning. The EIS explains:

Soil Quality Monitoring (SQM) was conducted on the Nantahala and Pisgah NFs using the Forest Soil Disturbance Monitoring Protocol (Page-Dumroese et al. 2009). The monitoring was done to determine if there was significant change in land productivity due to timber harvest activities. "Significant change" is defined as detrimental soil disturbance exceeding 15 percent of each individual harvest unit.

FEIS at 3-45. Of course, no negative impacts will be found for soil disturbance under 15 percent in a study that defines negative impacts solely as soil disturbance over 15 percent. As the Forest Service's own published research on soil quality standards recognizes, "Perhaps the most serious monitoring pitfall is using indicators with no cause-and-effect relationship with the soil service (e.g., soil productivity)." 78

Furthermore, even if the Forests did have data to show that past levels of soil disturbance are not, in fact, causing soil impairment, they still could not support a conclusion that up to 15% substantial soil impairment will meet regulatory requirements, because levels of disturbance in practice have been much lower. The average soil disturbance from timber harvest on the NPNF is 6.9%. Response to Comments at 27. Fewer than 20% of the units surveyed have had soil disturbance greater than 10%. FEIS at 3-46 - 3-47. The Forests could not show that their timber sale program supports a 15% threshold even if they had bothered to determine whether their timber sale program had in fact been protecting soil quantity and productivity.

Had the Forests taken this issue seriously, there would have been no shortage of scientific literature and policy guidance to assist them. As noted above, Forest Service policy provides that soils analysis during planning should include consideration of inputs and outputs. FSH 1909.12, 23.12b. The best available science for determining soil loss is the USLE (universal soil loss equation and subsequent revisions, RUSLE and RUSLE2), which was developed by USDA, is based on experimental data, and has been used for peer reviewed analyses of forest management in the Appalachians.78F The USLE allows predictions of soil loss based on rainfall levels, soil erodibility, slope, and amount of disturbance. Combined with estimates of soil formation rates, the Forests could have predicted whether various disturbance rates on various slopes would result in soil loss rates in excess of soil formation rates, based on assumed rotation length.

The Forests did not attempt that analysis. Nor did they provide any other quantitative or qualitative substitute. Instead, they concluded without disclosing the factual basis that the 85/15 rule will "maintain an acceptable level of soil productivity." FEIS App. A at 27. There is no definition of what "an acceptable level of soil productivity" means, or how it relates to the requirement to maintain or restore soil productivity.

At this late hour, it is difficult to remedy the problem. The Forests must (a) identify and adopt a protective standard that has been validated as maintaining or restoring soils and soil productivity; (b) supplement the FEIS with a serious analysis that fixes such a standard for our forests; or (c) commit to performing a quantitative (USLE) analysis at the project level to inform layout limitations.

1.
Base Cation Depletion

As we commented previously, timber harvest on soils vulnerable to base cation depletion is an important risk factor in our forests. The FEIS acknowledges that "timber harvests would remove nutrient base cations." FEIS at 3-8. Nevertheless, even though vulnerable areas are already known and mapped, the Plan does not require any

additional protection or mitigation for these areas. Instead, the plan sets two objectives:

* "WSD-O-02 Tier 1: Assess acid neutralizing capacity in one priority watershed annually and utilize the information to inform watershed management and restoration." Plan at 37.

"WSD-O-03 Tier 1: Annually, conduct a site-specific analysis of base cations in 1 to 2 project locations where there is a concern for base cation depletion. Develop mitigation or restoration strategies when these strategies are necessary to restore or protect at-risk water, soils, flora, and fauna." Id.

As noted above, plans must include components where necessary to "limit[] potential effects on soil chemical properties, such as potential for nutrient depletion, acidification, or both." FSH 1909.12, 23.12b. This limited monitoring requirement would, at best, signal when soil has already been impaired. It would not limit the effects in the first place.

The Response to Comments points to the above-quoted Plan components and argues that "timber harvesting in catchments with a low acid neutralizing capacity can be designed with acidification risks in mind, including adding lime to soils or streams, increasing the pH of aggregate material in the catchment, or increasing monitoring." FEIS App. A at 73. However, these mitigation strategies are not actually required by the Plan. Instead, the cited objectives require assessment of ANC in one priority watershed and one to two project areas per year. Similarly, the monitoring question only requires ANC to be assessed in the watershed undergoing study. None of these plan components require avoidance of depleted soils, monitoring, or mitigation for every project.

Even if required, these mitigation strategies would be wholly inadequate. First, "increasing monitoring" is not a mitigation strategy. Second, adding lime to soils is unrealistic. The Forest Service fails to disclose the high cost of remediating soils across a large project area. Because the Plan must be fiscally realistic, this is simply not a strategy the Forests can afford to rely on. That leaves liming streams or graveling roads with basic aggregate material. These strategies may help to protect the pH of waters, but they would do nothing to repair the damage to soils. Further, these strategies would cause the precipitation of metals in waters that may themselves harm aquatic life.

Despite the Plan's refusal to protect depleted soils with enforceable limits on management activities, the EIS never evaluates the cumulative effects of such activities on base cation depletion. "The Nantahala and Pisgah's ANC [acid neutralizing capacity] threshold categories were calculated, assuming no anthropogenic removal of base cations by acid deposition or timber harvesting in any catchment." FEIS at 3-7. Baseline calculations are important as the first step of an impact analysis, but these calculations are never actually used to analyze effects of the Plan, which is the purpose of NEPA review.

The right solution would have been to recognize that these areas are not suitable for timber production because the technology does not exist that would allow them to be harvested without irreversible damage. See FSH 1909.12, Ch. 61.12 (requiring the suitability determination to take into account "soil vulnerability to physical, chemical, and biological damage) (emphasis added). The Forests must either re-do their suitability analysis or commit that, at the project level, they will assess vulnerability to base cation depletion for all areas where buffering capacity is "uncertain or unlikely to be attained" before proposing any timber harvest activities. See FEIS at 3-7. If timber harvest would reduce buffering capacity below safe levels, the area would not be harvested. The current Plan objectives are not adequate, however. Irreversibly damaging soils and then "monitoring" the damage does not meet the planning rule's requirements.

1. Plan Components Listed As "Standards" Are Not Actually Standards

Forest plan "standards" are "mandatory constraint[s] on project activity and decisionmaking, established to help

achieve or maintain the desired condition or conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements." 36 C.F.R. [sect]

219.7. Two so-called standards related to soil protection and landslides do not comport with this definition.

First, GEO-S-02 provides that areas proposed for roads and timber harvest, among other activities, "shall be screened for the presence of geological hazards," and if they are present, "location and design measures shall be provided."

Similarly, SLS-S-01 provides that these same activities "shall be screened for the presence of highly erodible soils," which, if present, will also require "location and design measures."

We agree that the Plan must have standards to avoid landslides and erosion of highly erodible soils. While we support the intent behind these standards, however, they are far from "mandatory constraints" on project activities. The Forests must either clarify the screening criteria and mitigation measures in the Plan itself or commit to a post-plan process to develop those criteria and measures in coordination with NCGS and/or NRCS, with opportunity for public comment.

1. Solutions

As described in more detail above, the Plan must:

Revise TIM-S-06 to require skyline logging systems on sustained slopes over 40% unless another logging method is found, based on site-specific factors, to be equally protective of soil and water resources.

Replace or justify the 85/15 rule for ground disturbance. Specifically, (a) identify and adopt a protective standard that has been validated as maintaining or restoring soils and soil productivity; (b) supplement the FEIS with a serious analysis that fixes such a standard for our forests; or (c) commit to performing a quantitative (USLE) analysis at the project level to inform layout limitations.

Supplement the FEIS with a determination of suitability that excludes areas vulnerable to base cation depletion or commit to assess vulnerability to base cation depletion for all areas where buffering capacity is "uncertain or unlikely to be attained" before proposing any timber harvest activities, and commit to avoiding areas where timber harvest would reduce buffering capacity below safe levels.

Clarify the screening criteria and mitigation measures for landslide and highly erodible soil risks, either in the Plan itself or in a post-plan guidance document developed with expert and public input.

Roads

1. Background

The FEIS acknowledges that the road system is the greatest threat to water quality on the Forests. FEIS at 3-57 ("Roads generally pose the greatest risk to streams, both stream channels and water quality."); id. at 3-73 ("[W]ater quality could decline in some watersheds and improve in others largely depending on presence or absence of new roads and their relationship to streams."). Those risks increase when maintenance is lacking, and budgets to maintain the road system are chronically inadequate. As the Forests' draft TARs show, the

Pisgah and Nantahala have profound road funding deficits[mdash]they have approximately 12.5% and 14% of the funding needed to maintain their road systems to standard, respectively[mdash]and a backlog that is extraordinarily high even compared to other national forests. 80

The maintenance backlog is a proxy for risk to waters. The longer roads go unmaintained, the more likely they are to have failing BMPs that affect waters. The planning record shows unmistakably that sediment impacts in violation of mandatory state BMP performance standards are ubiquitous on the Forests' most neglected roads (namely, the low-service, usually dead-end roads in wilderness inventory areas). As noted above, a 2015 survey of roads in wilderness inventory areas showed that 40% of stream crossings and other BMPs directly affecting intermittent or perennial streams violated the prohibitions on accelerated erosion in a stream crossing or visible sediment directly entering the stream.80F81 Barriers to aquatic organism passage were also ubiquitous. Of the pipe-culverted streams with summer flow depth of 4 inches or greater, none were passable for small fish (and therefore were also barriers to mussels). Only 14% of crossings were passable for salamanders.

In addition, chronic lack of maintenance leads to acute failures during storm events. 82 The location of those failures is unpredictable, which means that chronic lack of maintenance must be remedied systematically, not merely in priority watersheds or with post-failure mitigation. In other words, the Forest Service must reduce its maintenance backlog.

The size of the backlog is a function of the agency's budget, which local line officers have no little control over, and the mileage and service level of the road system, which they do have control over. As discussed below, the Forests' legal obligations with respect to the road system are clear and unequivocal. The Plan must ensure that future projects do not degrade aquatic ecosystems. We understand, of course, that meeting this obligation is a monumental task,
and one which cannot be met overnight. But kicking the can down the road for another planning cycle is simply not an option.

That is, unfortunately, what the Plan would do. It expands the footprint of scheduled, rotational timber management dramatically, including in approximately 100,000 acres that currently lack well developed infrastructure and were, in fact, inventoried as potentially eligible for inclusion in the NWPS for that reason. It quintuples levels of timber harvest and prescribed fire, both of which require additional access. It places no limit on road construction mileage or density. And yet, it somehow concludes that road-related impacts will be no worse than the status quo.

That conclusion is indefensible. Other national forests, when faced with similar realities, have adopted self-imposed density limits on management areas, which must be met through project level decisions. One could argue that such a limitation is absolutely required here, too.

Objectors have not sought to compel such a limitation thus far only because we have developed more flexible strategies in a collaborative setting.

Specifically, as members of the Partnership, we recommended a holistic approach that (a) would allow for maintenance and expansion of access in "suitable" MAs, but on a footprint that would be more sustainable, (b) would prioritize road decommissioning in backcountry areas, and (c) would include a requirement that the road maintenance backlog be reduced system-wide. We described this last requirement as an adaptive management trigger: in order to move to Tier 2 levels of management, which the Forests admit will expand the extent of the road system, the Forests must show substantial and continued reduction of the maintenance backlog.

To be clear, like the other collaborative solutions advanced by Objectors, these approaches were not the environmental groups' preferred solutions. We would have much preferred black-and-white limitations that would guarantee progress toward the mandatory obligations that have gone unmet for decades. Yet the Forest Service

has so far declined to accept even this flexible approach. This may be the Forests' last chance to show that it can solve the problem voluntarily.

1. Legal Framework

The planning rule requires that infrastructure must be managed sustainably. 36 C.F.R. [sect] 219.10; see also id. [sect] 219.8 (obligation to maintain or restore soils and water). As spelled out in the directives, "[t]he central consideration in land management planning for infrastructure is that the integrated desired conditions and other plan components set a framework for the sustainable management of the plan area's infrastructure and mitigation of adverse impacts." FSH 1909.12, Ch. 23.12l.

The directives first explain what isn't at issue during planning: "design related to infrastructure" is a project-level decision, and "determin[ing] which roads are to be maintained" is a question for travel management analysis. Id. (emphases added). Then the directives explain what is at issue for planning. Planners are directed to:Develop plan components to reflect the extent of infrastructure that is needed to achieve the desired conditions and objectives of the plan. The plan should provide for a realistic desired infrastructure that is sustainable and can be managed in accord with other plan components including those for ecological sustainability.

Id. (emphasis added). And they must include:

A. desired condition for the road system based on the desired uses for a plan area and management or geographic areas. [hellip] The plan's desired condition should describe a basic framework for an appropriately sized and sustainable transportation system that can meet [recreation and resource management] needs. The desired condition may also describe the desired road density for different management areas, geographic areas, or other areas in the plan.

Id. (emphases added). As needed to achieve the desired conditions, components may also include objectives for decommissioning or improvements like culvert replacement, and standards or guidelines to restrict road management activities to protect resources.

A. As with all components, the plan components for infrastructure must be integrated[mdash] meaning that achieving them must not undermine the ability to meet other desired conditions, objectives, standards, or guidelines. FSH 1909.12 Ch. 22 (one plan component must not prevent another's accomplishment). They must also be "within the fiscal capability of the planning unit and its partners"[mdash]that is, "attainable [based on] recent past budget obligations for the unit (3 to 5 years)." Id. Ch. 23.23l; 22.12.

The Clean Water Act also sets a mandatory floor for road impacts where they cross streams. Section 404 of the CWA requires a permit for the discharge of "fill material," which includes stream crossings by roads. National forests typically claim an exemption to that requirement for "construction or maintenance of . . . forest roads" used for timber management. 33 U.S.C. [sect] 1344(f)(1)(E). This exemption, however, is available only "in accordance with best management practices" intended to "assure that flow and circulation patterns and chemical and biological characteristics of waters of the United States are not impaired, that the reach of the waters of the United States is not reduced, and that any adverse effect on the aquatic environment will be otherwise minimized." Id.

By regulation, the minimum BMPs required to qualify for the exemption apply to permanent roads, temporary roads, and skid trails. 33 C.F.R. [sect] 323.4(a)(1)(iii)(A)(6). As particularly relevant here, those requirements include:

"The fill shall be properly stabilized and maintained during and following construction to prevent erosion."

"The road fill shall be bridged, culverted, or otherwise designed to prevent the restriction of expected flood flows." "The design, construction and maintenance of the road crossing shall not disrupt the migration or other movement of those species of aquatic life inhabiting the water body."

"All temporary fills shall be removed in their entirety and the [stream bottom] restored to its original elevation."

Id. Notably, these requirements apply both at the time of construction and thereafter, specifically requiring maintenance as needed to prevent erosion and maintain passage for aquatic species.

1. The Plan Will Increase the Extent and Impacts of the Road System.

To its credit, the Plan does adopt workable desired conditions: "A sustainable, well- maintained transportation system [hellip] reflects the expected levels of use and public desires while having minimal impacts on resources." TA-DC-01. The Plan also provides that "[t]he transportation system's size and type are able to be maintained to Forest Service standards using resources available to the Forests." TA-DC-05. And "roads are in full compliance with [applicable laws]." TA-DC-10. We are comfortable that these desired conditions provide the overall framework required by agency policy. See FSH 1909.12, Ch. 23.23l.

At the risk of understatement, however, these desired conditions are not currently being met. The FEIS discloses that the "current road system has a backlog of maintenance needs," FEIS at 3-490, and that "reduced mileage [hellip] would generally equate to [hellip] decreased [hellip] ecological impacts, [hellip] increased wildlife habitat connectivity, reduced sedimentation and impacts to plants," and other benefits, id. at 3-493. Astonishingly, however, the FEIS does not disclose the extent of the backlog or attempt to characterize the degree to which the current road system is negatively impacting environmental resources, despite that information being available to the agency in the planning record and highly relevant to the decision.

The Plan's objectives, standards, and guidelines would not make progress toward the stated desired conditions. Maintaining 280 miles of roads annually (TA-O-01) out of 2,320 total system roads is a drop in the bucket. The FEIS does not disclose the fact that these 280 miles per year will not be distributed across the road system evenly. They will instead primarily occur on the 868 miles of open roads, which require more frequent maintenance. As under the current plan, closed roads will be neglected for much longer periods of time[mdash]often until the area has another timber sale. See FEIS at 3-494. Additionally, requiring site-specific analysis for road location and design (TA-S-04) would not have any impact on the extent of the road system.

Without components to improve sustainability of the road system as a whole, the Plan's other components will certainly move the Forests in the wrong direction. In the Matrix and Interface MAs, which occupy 610,434 acres (58.8%) of the forests, the Plan forbids a net decrease in open road access and calls for a 10% increase in open roads at Tier 2. TA-O-06. To be sure, this does not compel a net increase in total road mileage, but because open roads are more expensive to maintain, it would increase the maintenance backlog unless offset by a greater number of closed roads to be miles downgraded or decommissioned. Such an offset will not occur because the Plan makes no provision for disinvesting in closed roads in the Matrix and Interface MAs. To the contrary, the Plan's resource management objectives will require significant additions to the road system. The FEIS admits that additional road construction will occur, although it does not explain or support its assumptions about how much.

The FEIS "assumes that current road building levels will continue under Tier 1 and that additional permanent and temporary road construction would be needed under Tier 2." FEIS at 3-542. Specifically, the FEIS discloses that under the current plan, annual road construction has totaled 6.0 miles[mdash]3.1 new system road miles and 2.6 new temporary road miles.82F83 FEIS at 3-495. This same level of road construction is assumed to continue at Tier 1 levels of management under the new Plan. Id. At Tier 2, road construction is assumed to require an additional 4.1 miles of road construction annually[mdash]2.1 new system road miles and 2 temporary road miles. Id.

To begin with, these numbers do not make sense when compared to the higher numbers for road construction assumed for Alternative C. Alternative C would provide the same amount of timber harvest as the other action alternatives, but on a smaller suitable base that would not include as many currently inaccessible acres. Yet the FEIS assumes Alternative C would involve more road construction than any other alternative. FEIS at 3-497. This cannot be right.

Regardless, the Alternative E road construction assumptions are much too low. They are nowhere explained in the FEIS, and they are contradicted by other Plan content. The current levels of road construction (3.1 miles/year of system roads) are "predominantly to meet the needs of vegetation management," and they correspond to 800 acres/year of total timber harvest (650 regeneration and 150 thinning). FEIS at xiv. The Plan, however, calls for 2,200 acres/year at Tier 1 (1,200 regeneration, 400 thinning, 600 thin and burn) and 4,700 acres/year at Tier 2 (3,200 regeneration, 600 thinning, and 900 thin and burn). Id.

If current trends continue, therefore, Tier 1 would require 8.5 miles of system road construction annually (3.1 * 2,200 / 800). Tier 2 would require an additional 9.7 miles, or 18.2 total miles of system road construction annually (3.1 * 4,700 / 800). Over the 20-year life of the Plan, these rates would require 364 miles of new system roads[mdash]a system-wide increase of 16%.

In addition, even these numbers are too low based on the Plan's assumption that Tier 2 harvest levels will require more road construction than under the current plan because they are scheduled for logging on currently inaccessible lands. FEIS at 3-542. Historical trends would therefore not hold at Tier 2 levels of harvest. More road construction would be required to develop inaccessible lands with infrastructure.

1. The FEIS does not support the agency's conclusions.

Thus, over the life of the Plan, the FEIS estimates 104 miles of total system road construction, even though its own assumptions show that that figure will be in excess of 364 miles. The objection here writes itself: Expanding and developing the suitable base by 100,000 acres, almost all in wilderness inventory areas, would require a significant expansion of the road network. It is implausible and internally inconsistent for the Forest Service to argue otherwise.

Yet that is precisely what the Forest Service argues in the FEIS. In particular, the FEIS assumes that there will be no "gain in overall road miles" simply because there is no road- building objective and, rather, road-building is incidental to other objectives. FEIS at 3-497; Responses to Comments at 94. Of course, the mere fact that road-building is not an independent objective of the Plan is completely irrelevant to whether or not it will occur because of the Plan. As shown above, those other objectives, if implemented, guarantee high rates of road construction.

The Forest Service also defends its "no net gain" conclusion by noting that there are two separate objectives for road decommissioning. FEIS at 3-497. Those objectives call for decommissioning unauthorized (non-system) roads in priority watersheds and inventoried roadless areas, TA-O-04, up to 20 miles over 20 years. Plan at 305. While appreciated, this figure is paltry compared to 104 to 364 miles of road construction. Further,

decommissioning unauthorized roads (TA-O-04) simply would not offset any of the impacts of building system roads. The problem, again, is that the Forest Service has a backlog of system road maintenance needs that are additional to the largely-unaccounted-for problems caused by unauthorized roads. There is a limited amount of funding for both system roads and unauthorized roads, and there is not enough to cover both needs. The Forest Service should not be making the problem worse.

At Tier 2, the objectives also call for decommissioning 10% of "unneeded" system roads in the Backcountry management area. TA-O-06. Neither the Plan nor the FEIS estimate how many such "unneeded" roads there are, but there are only 40 miles total in the Backcountry MA. FEIS at 3-495. Even if all of them were considered "unneeded," this objective would only call for 4 miles of system road decommissioning over the life of the Plan, or 0.2 miles per year. Such a paltry objective cannot offset the construction of 18.2 miles of system roads per year.

The FEIS Relies Upon Unprecedented Levels of Road Maintenance That Are Not Reflected in the Plan.

Budgets to maintain the road system are chronically inadequate, and the Plan includes no components that would change this. However, the impact analysis in the EIS seems predicated on an unprecedented level of maintenance being performed. The FEIS artfully obscures impacts by relying on desired conditions and theoretical improvements for the preferred alternative, in contrast to its pessimistic realism for the current plan. Compare FEIS at 3-73 (claiming the action alternatives would improve water quality because roads would be "a priority for reducing sedimentation") and 3-495 (promising a host of improvements from implementing a road maintenance plan) with 3-494 (stating that under Alternative A, "road maintenance issues would continue to persist on a transportation system that has a backlog of deferred maintenance").

All of the Plan's theoretical improvements, however, are dependent on funding. See EIS at 3-493 ("In order to provide a safe and efficient transportation system that minimizes environmental impacts, new sources of funding must be identified or required maintenance must be reduced, either by reducing mileage or reducing existing maintenance levels"). The FEIS acknowledges that "[f]unding for road maintenance is subject to budgets and is not determined by the forest plan." FEIS App. A at 91. As noted above, the Forests' funding deficits are profound, and the accumulated backlog results in many roads going totally unmaintained between timber sale entries. FEIS at 3-494. These system road impacts are cumulative with legacy road problems that have not been rectified during prior projects using those roads. See FEIS at 3-60 (noting that serious BMP failures during timber sales were often "related to legacy system road problems and fish passage obstructions" that "preceded the timber sale activities").

As the EIS cannot fail to acknowledge, over the years this has resulted in a road system with severe water quality impacts:

During the Watershed Condition Framework assessment, roads in general were identified as not maintained to standard across the Forest, therefore culverts are more prone to plugging and failure, road surfacing is not maintained and replenished and thus more prone to rutting, concentrating runoff and road failure.

FEIS at 3-59.

Despite these known budget shortfalls and their deleterious effects on water resources, and with no plans to ameliorate these problems, the FEIS paints an optimistic picture of a sustainable road system in the future. See FEIS at 3-494 - 3-497. This results in a dramatic failure to disclose the negative impacts of the road system, which the Plan guarantees will only worsen. The most glaring example is the commitment described above to maintain only 280 miles per year: the same level of maintenance that has led to the failing system described by the FEIS itself even without the additional maintenance needs created by high levels of new road construction

under the new Plan.

TAP is not a substitute for meeting planning rule requirements.

The Forests' only plan component related to the extent of the road system is TA-O-02, which requires the agency to undertake travel analysis within three years. Travel analysis should have been completed a decade ago, but the Forests deferred their responsibility until after planning.

Travel analysis reports are required to identify a minimum road system (MRS) that can be maintained to standard with expected budgets. As explained by Region 8, they must "balance the costs of maintaining the identified system such that the recommendation will not result in accrual of deferred maintenance on roads and bridges once the TAP is implemented (i.e. there should be a zero balance between anticipated maintenance revenue and anticipated maintenance cost on an annual basis)." 84 However, as the FEIS explains, the MRS must not only be maintainable so that it protects environmental resources; it must also meet "resource management objectives" adopted in the planning process. Plan at 107 n.18.

The Forests have given themselves an impossible task for TAP. There is no realistic possibility that the Forests will have sustainable levels of funding to maintain even the current road system, much less a road system that adds 364 miles during its lifetime. Thus, there is no minimum road system that can meet the requirements set by agency policy.

The Forest Service's assumptions about roads will limit its flexibility during implementation.

Despite Objectors' attempts to raise the need to right-size the road system throughout the planning process, the Forests' strategy has been simply to pretend that there is not a problem.

The agency assumes that it can simultaneously: (1) expand the footprint of its infrastructure investments into 100,000 acres of land that currently have few roads; (2) quintuple levels of timber harvest (and associated road construction); (3) achieve no net gain of road miles; and (4) identify a minimum road system that can both meet its resource management objectives and fully maintain the road system to protect environmental resources with budgets that are only a fraction of the need. This requires magical thinking.

In an effort to give themselves more "flexibility" in the future, the Forests have made promises they cannot keep. Ironically, the agency's attempt to pretend that it can have it all will limit its flexibility in the future. Specifically, the Forests' "no net gain" assumption will prevent it from adding any system road mileage. Projects will not be able to tier to the Plan if they are outside of its analytical bounds. To add net system miles, the Forests would be required either (a) to stay within the Plan's assumptions by removing other roads or (b) to supplement the Plan FEIS with a full cumulative impacts analysis of the implications for the road system's sustainability as a whole. Indeed, this would operate in practice as a more draconian limit than any Objectors have proposed: for every mile added, another would have to be removed.

Temporary Roads

If the Forests cannot add new system roads, whether because of analytical shortcomings in the Plan or any other reason, experience teaches that this will create pressure to use more temporary roads. As our prior comments

demonstrated, the agency uses and reuses temporary roads in an unlawful effort to avoid analyzing the effects of permanent road construction.

Temporary roads often have more serious impacts than system roads, because they are not subject to engineering oversight. In addition, they are often not returned to resource production as required by the National Core BMPs 85 because they are being reused in successive entries. As experience under the old plan demonstrates, temporary roads are anything but.

The 2017 LiDAR data (as interpreted in the hillshade model that the Forests are already using in the field) shows that road prisms stay on the landscape for much longer, with much greater cumulative effects, than ever before disclosed. These road prisms are areas of high compaction and may be acting as barriers to dispersal-limited species' movement. The FEIS does not disclose this information, even though it uses the 2017 LiDAR for other purposes in its analysis. Moreover, as the FEIS itself admits, "[s]uccess of restoring soil productivity on temporary roads is often marginal and adverse impacts frequently remain." FEIS at 3-51.

Despite the facts before the agency, the FEIS makes an unsupported assumption that temporary roads only have short-term impacts because of decommissioning. FEIS at 3-73. To be sure, the Plan includes components requiring that any new temporary roads be decommissioned. See Plan at 93, 109. But the Plan lacks specific standards and objectives to ensure that decommissioning is effective at preventing long-term and cumulative impacts. See Plan at 93, TIM-S-07(k) (temporary road decommissioning may use "techniques such as, but not limited to, removing drainage structures, re-contouring, and stabilizing the final slope"). Current experience shows that full decommissioning is the exception, not the rule. No monitoring (under the old or new Plan) is required to ensure that temporary and decommissioned roads are not causing resource damage and are on track to resume contributing to relevant forestwide, MA, and ecozone desired conditions.

The Plan must contain binding standards or guidelines to ensure that temporary roads are not causing long-term, cumulative resource impacts. As a first step, the Plan must ensure that temporary roads are not being used as "shadow" system roads[mdash]reused again and again for multiple entries. Such roads are not temporary, and there is no argument that their impacts are only short term.

4. The Above Deficiencies Violate the Planning Rule, NEPA, and the Clean Water Act.

Under the Plan, the Forest Service would accelerate the expansion of the road system and the backlog would grow at even faster rates. The Plan therefore violates the planning rule and NEPA, and it perpetuates ongoing violations of the Clean Water Act.

The Plan is not integrated and fiscally realistic.

The current road system is not economically or ecologically sustainable, and the Plan does nothing to change that. As the EIS readily acknowledges, the current road system accounts for the largest impact to water quality on the Forests, particularly in light of the failure to adequately maintain it. The Plan thus fails to meet the requirement to "maintain or restore" aquatic ecosystems: at best, it is more of the same, and at worst, it would expand the damaging road system with no proportional commitment to mitigate its impacts.

The Plan's goal of a sustainable road system is directly undermined by the Plan's contemplated increase in timber harvest levels, particularly without enforceable commitments to reducing the maintenance backlog. Moreover, the Forest Service's analysis of its road impacts reveals fundamental contradictions between major, cross-cutting Plan objectives. The Forests simply cannot achieve its resource management objectives on a footprint that requires extensive road construction while also achieving "no net gain" of roads, much less

achieving the desired condition that the transportation system be fully maintainable within the agency's expected budgets.

In other words, the Forests have built goal interference into the Plan and have not developed any mechanism to avoid it. The Forests cannot rely on the Tier 2 objective of backlog reduction because the Plan does not require it to be met[mdash]not before expanding the road system; not ever.

In order to remedy these legal errors, the Forest Service should adopt the MA allocations recommended by the Partnership, which for present purposes are very similar to Alternative C. Development of permanent infrastructure on Alternative E's suitable land base, which contains 100,000 acres of largely unroaded WIAs, cannot be accomplished without a commensurate expansion of the road system, which is not within the Forests' fiscal capability. In addition, the Forest Service should commit that it will reduce the maintenance backlog before expanding the road network.

The FEIS fails to disclose the true impacts of the road system, fails to consider reasonable alternatives, and fails to consider best available science, violating the planning rule, NEPA, and the Administrative Procedure Act.

The Forest Service has not taken a "hard look" at the problems posed by its overextended and undermaintained road network, particularly in light of objectives that would require expanding that road network. See Robertson v. Methow Valley Citizens Council, 490 U.S. 332, 350 (1989). As described above, the FEIS:

1. Drastically underestimates the likely expansion of the road system;
2. Assumes that the road system will not increase, despite admitted significant levels of road construction that are not offset by proportional commitments to decommissioning;
3. Overestimates the implementation and efficacy of road maintenance;
4. Relies on TAP to identify a road system capable of protecting environmental resources while making that task impossible with expected budgets; and

5. Ignores the long-term and cumulative effects of temporary roads without requiring that they be returned to resource production, which will allow them to be used to bypass travel analysis requirements.

The analytical failures here are not only a matter of failure to disclose impacts under NEPA. The agency has also violated the closely related requirement to consider the best available science. On-the-ground data in the planning record shows that roads are having profound and systematic impacts, even at current levels of road construction. In addition, the Forests have ignored the 2017 LiDAR data, which shows the long-term, cumulative impacts of roads of all varieties, including temporary roads. And, finally, the Forests' conclusions evince no "rational connection between facts and judgment" as required of agency actions by the Administrative Procedure Act. State Farm, 463 U.S. at 49. It is simply irrational to adopt plan objectives that cannot be achieved simultaneously.

The Plan perpetuates ongoing violations of the Clean Water Act.

The Forests' road system is full of stream crossings that are in ongoing violation of the Clean Water Act. As explained above, stream crossings are blocking aquatic organism passage and causing accelerated erosion and visible sediment, especially on the neglected roads in wilderness inventory areas. This violates the BMP requirements needed to establish and maintain eligibility for the forestry road permit exemption from Section 404 of the Clean Water Act. As explained above, the Forest Service must not only design its stream crossings

properly in the first place; it must also maintain them to prevent erosion and ensure aquatic organism passage.

The Forest Service has adopted a desired condition that roads comply with water quality laws, TA-DC-10, but the Plan does not acknowledge that many of its roads are currently in violation of the CWA. AQS-O-03 is a modest start to identify and remedy the worst of the aquatic organism passage barriers, but the Plan must do more. Specifically, the Plan must make progress toward removing stream crossings on roads that are long-neglected between uses and as a result are causing erosion in stream crossings in violation of the CWA. The agency can accomplish this by placing WIAs in MAs that do not prioritize retaining infrastructure, but instead allow for strategic disinvestment. It can also help accomplish this by committing to correct backlogged problems before further expanding the road system.

In addition, the Forests must prevent future violations of the CWA. We are glad to see AQS-S-01, but it lacks clarity. The Forests should commit to developing a guidance document, outside the planning process, that will help project designers understand the relevant species whose passage needs should be met and how to meet those needs.

5. Solutions

As discussed above, the two most important solutions to these legal violations are the adoption of land allocations on which the Forests can more realistically maintain timber harvesting infrastructure, and a "trigger" requiring reduction of the road maintenance backlog before expanding the road system. The Forests simply cannot justify a decision to develop 100,000 acres of WIAs with new road infrastructure to meet timber harvest objectives that they admit they can meet on a smaller suitable footprint. Further, even with appropriate land allocations, the Plan's ambitious objectives would require considerable roadbuilding. In order to justify that expansion, the Forests must be able to demonstrate that they are making commensurate progress toward remedying the serious and chronic impacts of the current road system.

In addition, the Forests must adopt binding standards or guidelines to ensure that temporary roads are not causing long-term, cumulative resource impacts. The Plan should clearly state that roads reused for multiple entries are not temporary roads. It should also clarify what will be required in decommissioning by incorporating the National Core BMPs by reference and explaining that a return to "resource production" for purposes of the Plan means that: soils are stable; groundwater hydrology, if disturbed, is restored; NNIS are absent; and characteristic plant species are able to be established.

Finally, the Forests should commit to develop a guidance document, in coordination with NC WRC and with an opportunity for public comment, to identify relevant aquatic species and their passage needs when designing stream crossings.

X. The Agency Has Not Satisfied Its Obligations Related to Carbon Storage and Emissions in the Revised Forest Plan.

Issue Description

The United States faces a "climate crisis that threatens our people and communities, public health and economy, and, starkly, our ability to live on planet Earth." Executive Order 14008 [sect] 201, 86 Fed. Reg. 7,619, 7,622 (Feb. 1, 2021). "We have a narrow moment to pursue action . . . to avoid the most catastrophic impacts of that crisis and to seize the opportunity that tackling climate change presents." Id. at 7,619. Accordingly, the Forest Service is part of a "Government-wide approach that reduces climate pollution in every sector of the economy." Id. at 7,622.

Unfortunately, the Forest Service is missing the mark here. The agency has a substantial opportunity to increase

carbon storage on the forest and decrease CO2 emissions by protecting carbon-dense portions of the landscape and focusing management activities in other areas. But the Forest Service assumes that each acre of the forest stores an equal amount of carbon, blinding itself to the carbon tradeoffs between different forest plan alternatives, harvesting locations, and harvest strategies. These and other errors doom its hard look required under NEPA. Just as problematically, while any single project has a small effect on carbon storage at the global scale, the sum of all projects on the National Forest System has a weighty effect on our ability to achieve net-zero emissions nationally. Yet the Forest Service has never assessed the cumulative effect of its timber program on carbon storage and emissions and refuses to do so here. Without it, the agency cannot understand the true effect of its actions on atmospheric CO2 levels and respond accordingly.

Remedies

To cure these deficiencies, the agency must complete additional analysis to satisfy its obligation to take a hard look at the direct, indirect, and cumulative effects of the plan on carbon storage and emissions[mdash]particularly, comparing the carbon costs of the plan's strategy to emphasize harvest in mesic ecozones with the "pacing," or "trigger" mechanism recommended by the Pisgah-Nantahala Forest Partnership to ensure that ecologically appropriate levels of work are happening in dry ecozones. The agency must also commit to project-level tracking of carbon storage effects in order to confirm the agency's plan-level assessment and ensure plan implementation is not having unexpected outcomes.

Background on Forests and Climate Change

The science behind anthropogenic climate change is well known. Increased greenhouse gasses[mdash]predominantly CO2[mdash]trap heat in the earth's atmosphere which leads to increases in global temperatures. The current rate of global warming is unprecedented in at least the last 2,000 years with temperatures approaching levels not seen in 125,000 years. 86 Global temperatures have increased approximately 1.09[deg]C over pre-industrial levels and it is likely that warming over 1.5[deg]C will be exceeded by 2040 even if countries take immediate and drastic action to reduce CO2 emissions.86F87

Global warming unleashes a litany of adverse consequences including but not limited to harmful changes in precipitation patterns, temperature increases, melting of artic sea ice, sea level rise, changes in growing seasons and climatic zones, and increases in extreme weather events.87F88 Warming to date "has caused substantial damages, and increasingly irreversible losses, in terrestrial, freshwater and coastal and open ocean marine ecosystems."88F89 Warming threatens biodiversity, food and water security, human health including increased mortality, economic damages, and contributes to humanitarian crises.

"Global warming, reaching 1.5[deg]C in the near-term, would cause unavoidable increases in multiple climate hazards and present multiple risks to ecosystems and humans." 91 Even before then, with "every additional increment of global warming, changes in extremes continue to become larger." 92 Consequently, there "is a narrowing window of opportunity to shift pathways towards more climate resilient development futures" with a focus on making that shift before 2030. 93 "Any further delay in concerted anticipatory global action . . . will miss a brief and rapidly closing window of opportunity to secure a livable and sustainable future for all." 94

This "rapidly closing window" is aimed at preventing further increases in atmospheric carbon levels. The global carbon cycle is closed loop[mdash]i.e., the total amount of carbon on earth and in its atmosphere does not change.94F95 Most carbon on earth is stored in rocks and sediment, with the bulk of the remainder stored in the ocean, atmosphere, and living organisms.

Carbon naturally passes through these various storage pools. For example, carbon stored deep in the earth's crust is sometimes released to the atmosphere through volcanic eruptions. Or, relevant here, carbon is removed from the atmosphere via photosynthesis and stored in trees.

This cycle has kept global temperatures relatively stable for thousands of years. Anthropogenic global warming is fueled by rapidly increasing atmospheric carbon levels by burning fossil fuels and by converting carbon stored in living organisms such as trees into atmospheric carbon through various processes.

Forests are the largest terrestrial carbon reservoir on earth and play a critical role in global carbon cycles.95F96 The U.S. Forest Service is the largest individual forest landowner in the United States, managing approximately 193 million acres of forests and grasslands. 97 Forests are important both because they remove carbon from the atmosphere and because they store substantial amounts of carbon. U.S. forests remove the "equivalent of about 12-19 percent of annual U.S. fossil fuel emissions" from the atmosphere each year;97F98 they store approximately 58.7 billion metric tons of carbon[mdash]multiple decades worth of U.S. greenhouse gas emissions. 99

Carbon is not stored equally on each acre of a forest. For example, older forests and trees generally store more carbon than younger forests and trees, in part because older forests have been sequestering carbon for decades or centuries longer than younger forests. 100 As explained more below, younger forests sometimes sequester carbon from the atmosphere at higher rates but old forests still store more overall carbon. See Disturbance Report, App. 4 at 16 (providing net primary production rates). Large, older trees can also remove more carbon from the atmosphere based on their sheer size and rate of absolute tree mass growth even if younger trees have a higher productivity per unit of mass rate. 101

Carbon stored in live forest biomass can transition to other carbon pools in three ways relevant here. First, when trees die carbon stored in below-ground biomass (e.g., roots) decomposes and often remains stored in soil carbon.101F102 In temperate forests, the above-ground biomass decomposes slowly, continuing to store carbon for decades or centuries. 103 Over time, a portion of this carbon is emitted to the atmosphere and a portion is stored for longer periods in soils. 104

Second, carbon stored in live biomass or deadwood can be emitted to the atmosphere due to combustion in wildfires or prescribed burns. Recent studies show that past models significantly overestimated the amount of carbon emitted to the atmosphere from fire. While wildfires can consume 100% of small branches[mdash]immediately emitting the carbon stored in those branches to the atmosphere[mdash]at the landscape level, severe fires consume less than 2% of the total above-ground woody biomass on average. 105 While a significantly higher proportion of a burned forest may be killed due to severe wildfire, the majority of the biomass is not combusted and can continue to store significant amounts of carbon for decades or centuries as it decomposes.105F106 Ultimately, wildfires and prescribed burns convert some carbon stored in live and dead woody biomass into atmospheric carbon but this is a relatively small amount of carbon per acre burned.

Third, timber harvest and associated processes convert carbon stored in live biomass to atmospheric carbon. Nationally, carbon losses from timber harvests are five times higher than those from all other forest disturbances combined, including wildfire. 107 Carbon is emitted through multiple pathways associated with the timber harvesting process. Only a fraction of harvested wood is converted into an end product, the remainder of which is often burned for energy use or left onsite.107F108 Wood left on site is frequently chipped or left in small fragments leading to faster decomposition rates and making it more likely to combust in prescribed burns. As a result, the carbon stored in harvested wood that is discarded before being converted to an end-product is often emitted to the atmosphere in the short term. Carbon is also emitted from in- use wood products as they are discarded and decompose. The amount of carbon stored in an in- use wood product over time is highly dependent on the end use. For example, carbon can remain stored in structural building materials for decades but is only stored in in-use paper products for a handful of years.108F109 Once these products are discarded to landfills, additional emissions occur as the wood product decomposes. Overall, about half of the carbon stored in harvested wood is emitted to the atmosphere soon after logging, and more carbon is emitted once the wood product is discarded and decomposes. 110

Procedural Background and Forest-specific Facts

1. The Assessment Phase of Forest Planning

The Forest Service identified climate change mitigation as an important issue early in the forest plan revision process. The Forest's March 2014 Assessment Report disclosed that "[e]xcess greenhouse gases (GHGs) in the atmosphere are a measurable and significant contributor to a changing climate" and that levels were higher than any time in the past 800,000 years. Assessment Report at 79. The agency explained that "[f]orests help to mitigate the climate effects of increasing atmospheric CO2 concentrations by removing carbon from the atmosphere through the process of vegetative growth and storing carbon as biomass." Assessment Report at 80, It recognized that "[f]orest management is important for protecting, maintaining, and improving the amount of carbon stored in forests" and that "[e]ffective climate change mitigation requires balancing carbon sequestration with other beneficial services." Id.

To facilitate this "balancing" act, the agency included an initial assessment of forest carbon stocks in its Assessment Report, concluding that the Forests stored approximately 72million metric tons of carbon. Id. at 81. 111 The agency estimated that approximately half of the total carbon was stored in above-ground live biomass. Id. It then allocated carbon storage by forest type. Id. at 82. The agency's analysis disclosed that almost 60% of the Forest's carbon was stored in just four of the 22 forest types analyzed: chestnut oak, white oak/red oak/hickory, yellow-poplar/white oak/northern red oak, mixed upland hardwoods. Id. The analysis did not include a spatial component but made clear that carbon stocks are not distributed evenly across the landscape.

The agency also disclosed the effects of timber harvesting on carbon stocks. According to the agency's analysis, 57% of the carbon in timber harvests is emitted to the atmosphere within a decade. Id. at 83. After 50 years, only 12% of the harvested carbon remains stored in in-use wood products with the remainder either emitted to the atmosphere or stored in landfills. Id. 112

The assessment phase analysis resulted in the Forest Service identifying "a need to include plan direction regarding potential climate change impacts" in the revised forest plan. 48 Fed. Reg. 13,984, 13,985 (March 12, 2014).

The Draft Environmental Impact Statement

The carbon analysis in the DEIS incorporated many of the findings from the assessment phase and drew heavily "from two recent U.S. Forest Service reports: the Baseline Report . . . and the Disturbance Report." DEIS at 64. The Baseline Report confirmed that the Forests store approximately 72 million metric tons of carbon. U.S. Forest Service, Baseline Estimates of Carbon Stocks in Forests and Harvested Wood Products for National Forest System Units; Southern Region at 14 (2015) ("Baseline Report"). And the DEIS disclosed that approximately 47% of this carbon is stored in above-ground live biomass. DEIS at 66. The Baseline Report underscored the importance of "[u]nderstanding the consequences of harvesting, thinning, and other vegetation management practices on forest carbon cycles" so the agency can assess "tradeoffs between carbon and other services." Baseline Report at 1-2.

The Disturbance Report disclosed net primary production rates. Net primary production measures the "uptake of carbon dioxide by plants through gross primary productivity in excess of losses from plant, or autotrophic, respiration"[mdash]in other words, net primary production measures the rate at which trees remove carbon from the atmosphere. Birdsey, Richard A., et al., Assessment of the influence of disturbance, management activities, and environmental factors on carbon stocks of U.S. national forests. Gen. Tech. Rep. RMRS-GTR-402 at 11

(2019) ("Disturbance Report"). According to the agency's analysis, most forest types in North Carolina increase their rate of carbon removal through 25-40 years of age at which point they hit their maximum net primary productivity rate[mdash]the point at which their rate of carbon removal peaks.

After reaching peak productivity, sequestration rates decline approximately 25% and then maintain the reduced rate for many decades. Disturbance Report, App. 4 at 67. The graph below is specific to the National Forests in North Carolina and is taken from Appendix 4 of the Disturbance Report:

FIGURE

The Disturbance Report also disclosed that timber harvest was responsible for 71% of the change in carbon stocks in national forests in North Carolina, with fire responsible for 27% of the change. Id.

Roughly consistent with those percentages, the DEIS found that on the Forests "carbon losses from harvests have been about 27,100 metric tonnes . . . of carbon annually from 1990 to 2011" and fire "resulted in the estimated loss of about 10,000 metric tonnes of carbon per year."

DEIS at 71. 114 While the DEIS acknowledged that "older forests store more carbon," it assumed that Alternatives B-D would each have the same effect on carbon storage even though harvest would occur at different locations on the landscape under each alternative. Id. at 67. Each alternative was assumed to increase carbon losses from timber harvesting by up to five-fold and carbon losses from fire by up to thirty-three-fold. Id. at 72. Combined, the DEIS concluded that fire and timber harvest could result in removal of up to 465,500 metric tons of carbon annually under each alternative. Id.

The DEIS dismissed the significance of those potential emissions as "negligible" leading it to conclude that "a quantitative analysis of carbon effects is not warranted and thus is not meaningful for a reasoned choice among plan alternatives." Id. at 68. Instead, "potential carbon impacts [were] discussed qualitatively." Id. The main takeaway being that the "initial small adverse effects on carbon by these proposed actions will likely be balanced, and possibly eliminated or reversed, in a relatively short time." Id. at 69.

The agency included just two paragraphs assessing the cumulative effects of the plan alternatives on carbon storage and emissions. It repeated its conclusion that carbon effects were "negligible" and therefore "the contribution of the plan's proposed actions to cumulative effects .. . would also be negligible." Id. at 73. It also stated that carbon "emitted during the initial implementation of the management actions (e.g., harvest, thinning, prescribed fire) would have only a temporary influence on atmospheric carbon concentrations, because carbon would be removed from the atmosphere over time following management as the forest regrows." Id.

Comments on the Draft Environmental Impact Statement

We pointed out numerous flaws in the agency's carbon analysis in our comments on the DEIS. First, we demonstrated that the agency's disclosure of the role of harvested wood products in storing carbon was incomplete which led the agency to miss tradeoffs between storing carbon in ecosystems and timber harvesting. See DEIS Comments at 231-35. The DEIS's finding that reductions in carbon stocks would be "offset . . . by facilitating carbon storage in [harvested wood products]" overstated the role that wood products play in storing carbon. Particularly problematic was omission of the agency's assessment-phase finding that 57% of the carbon stored in harvested wood is emitted to the atmosphere in the first decade following harvest.

Second, we demonstrated that by assuming each alternative would have the same effect on carbon storage and emissions, the agency masked differences between the alternatives thereby preventing meaningful comparison.

See DEIS Comments at 236-38. While each alternative called for similar levels of timber harvesting and prescribed burning (by acreage), the spatial distribution of these activities was different under each alternative. As a result, some alternatives disproportionally focused harvesting in carbon-dense older forests, making the agency's assumption that each alternative would have the same general impacts invalid and inadequate to compare alternatives.

Third, we explained that the agency's analysis failed to forthrightly inform the public about the carbon costs of increasing management activities. See DEIS Comments at 236-38. This error stemmed in part from using vague, undefined timeframes and from a refusal to use tools such as the social cost of carbon protocol to clearly explain tradeoffs. Particularly problematic was the agency's assertion that increased CO2 emissions from logging would be "eliminated or reversed, in a relatively short time." DEIS at 69. This "relatively short time" is decades or centuries; it is also the same window when it is most critical that we reduce atmospheric CO2 levels. The agency omitted that context which was necessary to its "hard look."

Fourth, we notified the agency that its carbon cumulative effects analysis fell short of NEPA's requirements. See DEIS Comments at 240-42. This shortcoming was particularly problematic because the agency has never assessed the cumulative effect of its timber program on carbon storage and emissions.

The Final Environmental Impact Statement

The FEIS fails to correct the errors we identified in our comments and leaves the analysis in the DEIS largely unchanged. At best, the agency attempts to defer required analyses, stating "[c]limate change impacts, tradeoffs, and cumulative effects would be considered in project-level environmental analyses." FEIS App. A at 15.

The most significant change in the FEIS is disclosure that Alternative E will result in the annual removal of up to 170,000 metric tons of carbon due to timber harvest and up to 750,000 metric tons of carbon from prescribed burning for a total of 920,000 metric tons. FEIS at 3-31. This is approximately double the carbon removal under Alternatives B-D and twenty-five times the carbon removal under the current plan as implemented. Like the DEIS, the agency characterizes these potential emissions as "negligible"[mdash]both individually and cumulatively[mdash] and asserts that they will be "eliminated or reversed, in a relatively short time." FEIS at 3-27, 31.

Legal Requirements

The Forest Service is charged with deploying its "full capacity . . . to combat the climate crisis [through] a Government-wide approach that reduces climate pollution in every sector of the economy." Executive Order 14008 [sect] 201, 86 Fed. Reg. 7,619, 7,622 (Feb. 1, 2021). This includes "aligning the management of Federal . . . public lands and waters . . . to support robust climate action." Id. [sect] 204. As part of this effort, it "is essential that agencies capture the full costs of greenhouse gas emissions as accurately as possible, including by taking global damages into account." Executive Order 13990 [sect] 5, 86 Fed. Reg. 7,037, 7,040 (Jan. 25, 2021). "Doing so facilitates sound decision-making, recognizes the breadth of climate impacts, and supports the international leadership of the United States on climate issues." Id. Accordingly, agencies are charged with using the social cost of carbon protocol "when monetizing the value of changes in greenhouse gas emissions resulting from . . . relevant agency actions" like the forest plan. Id. 115

These obligations dovetail with requirements under NEPA. NEPA has twin aims: "First, it places upon an agency the obligation to consider every significant aspect of the environmental impact of a proposed action. Second, it ensures that the agency will inform the public that it has indeed considered environmental concerns in its decisionmaking process." Baltimore Gas & Elec. Co. v. Nat. Res. Def. Council, Inc., 462 U.S. 87, 97 (1983)

(citations and quotations omitted). Consequently, NEPA requires the Forest Service to take a "hard look" at the direct, indirect, and cumulative effects of the Forest Plan revision and to disclose those effects to the public. See Robertson, 490 U.S. at 350.

"The hallmarks of a 'hard look' are thorough investigation into environmental impacts and forthright acknowledgment of potential environmental harms." Nat'l Audubon Soc'y, 422 F.3d at 187. To meet this standard, "it is essential that the EIS not be based on misleading . . . assumptions." Hughes River Watershed Conservancy v. Glickman, 81 F.3d 437, 446 (4th Cir. 1996) (referencing economic assumption specifically); see 40 C.F.R. [sect] 1502.1 (1978 and 2020) (EIS "shall provide full and fair discussion of significant environmental impacts"). Use of misleading assumptions, can "impair[] the agency's consideration of the adverse environmental effects of a proposed project" and "skew[] the public's evaluation of a project." Id.; see Animal Def. Council v. Hodel, 840 F.2d 1432, 1439 (9th Cir. 1988), amended, 867 F.2d 1244 (9th Cir. 1989) (finding revision of an EIS may be necessary where information was "so incomplete or misleading that the decisionmaker and the public could not make an informed comparison of the alternatives"); Nat. Res. Def. Council v. U.S. Forest Serv., 421 F.3d 797, 813 (9th Cir. 2005) (holding that the Forest Service's use of misleading economic assumptions "violated NEPA's procedural requirement to present complete and accurate information to decision makers and to the public to allow an informed comparison of the alternatives.").

The "hard look" also facilitates consideration of forest plan alternatives. See Lands Council v. Powell, 395 F.3d 1019, 1027 (9th Cir. 2005) ("The purpose of NEPA is to require disclosure of relevant environmental considerations that were given a 'hard look' by the agency, and thereby to permit informed public comment on proposed action and any choices or alternatives that might be pursued with less environmental harm.").

Regarding carbon specifically, courts have found that the "impact of greenhouse gas emissions on climate change is precisely the kind of cumulative impacts analysis that NEPA requires agencies to conduct." Ctr. for Biological Diversity v. Nat'l Highway Traffic Safety Admin., 538 F.3d 1172, 1217 (9th Cir. 2008); see Wildearth Guardians v. U.S. Bureau of Land Mgmt., 457 F. Supp. 3d 880, 894 (D. Mont. 2020) ("the large-scale nature of environmental issues like climate change show why cumulative impacts analysis proves vital to the overall NEPA analysis"). That is because "cumulative impacts analysis was designed precisely to determine whether 'a small amount here, a small amount there, and still more at another point could add up to something with a much greater impact.'" Wildearth Guardians, 457 F. Supp. 3d at 894 (citation omitted). If the Forest Service "ever hopes to determine the true impact of its projects on climate change, it can do so only by looking at projects in combination with each other, not simply in the context of . . . nation-wide emissions." Id.

In turn, forthright NEPA analysis helps the agency determine the appropriate balance of "ecosystem services"[mdash]such as carbon storage[mdash]to provide across the forest as required by NFMA. 36 C.F.R. [sect][sect] 219.8, 219.10, 219.19; see FEIS at 3-24 ("carbon uptake and storage and accompanying potential climate regulation are key ecosystem services provided by forests.").

Argument

The FEIS Failed to Take a Hard Look at the Direct and Indirect Effects of the Forest Plan on Carbon Storage and Emissions.

The Forest Service's "hard look" at the direct and indirect effects of the revised forest plan on carbon storage and emissions falls short for three reasons.

i. The agency masks tradeoffs by assuming carbon is stored equally across the forest.

First, the agency erred by assuming that each acre of the national forest stores similar amounts of carbon, therefore any alternative that "include[s] the same number of acres to be treated . . . [will] have similar effects on carbon." FEIS at 3-30. This is unsupported by best available science which shows that older forests store more carbon than younger forests.115F It also contradicts other portions of the FEIS which similarly confirm that "[o]lder forest stands . . . stor[e] more carbon than do younger stands." Id. at 3-28. The discussion of net primary production in the Disturbance Report (App. 4 at 67), which is incorporated into the FEIS (at 3- 22), likewise confirms that forests increase carbon storage as they age. And information provided during the assessment phase of forest planning[mdash]but omitted from the DEIS and FEIS[mdash]confirms that carbon is not stored equally across forest types. Instead, approximately 60% of the Forest's carbon is stored in just four forest types. Assessment Report at 82.

The FEIS also shows that plan alternatives focus harvesting to differing degrees in larger, more productive forests that store more carbon. For example, Alternative D is predicted to harvest approximately 1% more acreage annually than Alternative B at Tier 1 but will produce 23% more volume. FEIS at 3-544. Alternative E is predicted to harvest approximately 11% more acreage annually than Alternative B at Tier 1 but will produce 40% more volume. Id. These differences in volume[mdash]with corresponding effects on carbon[mdash]are attributable to the fact that the alternatives focus harvest in different forest types to varying degrees. The FEIS discloses, albeit opaquely, that Alternative E shifts harvest into coves, which have greater carbon storage potential than any other ecozone on the forest.

Each alternative also affects Wilderness Inventory Areas and existing old-growth forest in different ways. Older, intact forests like those common to many Wilderness Inventory Areas typically have above-average carbon densities. See DEIS Comments at 235-36. The differences in whether and how these areas are allocated to timber-emphasis management areas across alternatives makes a difference in how each alternative affects carbon storage and emissions. Put simply, alternatives with more carbon-dense forests in Matrix and Interface will have higher carbon footprints.

Quantitative analysis would aid the agency's consideration of carbon effects across alternatives. The agency cites 2009 Forest Service guidance to support its conclusion that "a quantitative analysis of carbon effects . . . is not meaningful for a reasoned choice among plan alternatives." FEIS at 3-26. This guidance does not comport with law, because it unlawfully purports to allow cumulative effects to go unanalyzed. However, even that guidance explains that "[q]uantifying greenhouse gases emitted and/or sequestered may help choose between alternatives based on relative direct effects trade-offs" and that "Forest Service decisions having the potential to emit or sequester more greenhouse gases . . . may be best informed by quantitative analyses." 117

At bare minimum, the Forest Service must provide a qualitative analysis of the different alternatives' effects on carbon storage and emissions. Such analysis must also include reasonable alternatives that the Forests have so far ignored[mdash]most importantly, the strategy of ensuring that a significant proportion of harvest activities are located in the drier systems most in need of restoration and least costly in terms of carbon. The agency cannot simply conclude that every alternative with similar harvesting levels will have the same effect or that increases in harvesting acreage will lead to proportional carbon effects. Those conclusions are not supported by best available science or other portions of the FEIS. They also stymie assessment of "tradeoffs between carbon and other services" and deny the public a meaningful opportunity to compare alternatives. See Baseline Report at 1-2.

The agency's assessment of the role of wood products in carbon storage is incomplete.

Second, the agency's hard look is plagued by vague and incomplete characterizations regarding the role of wood products in sequestering carbon. The FEIS promotes using "harvested wood . . . to store carbon over the long-

term" and suggests that as "more commodities are produced and remain in use, the amount of carbon stored in [wood] products increases, creating a cumulative benefit when considered with forest regrowth." FEIS at 3-27 - 3-28. The FEIS overwhelmingly presents wood products as having a carbon benefit without disclosing that harvesting live biomass and converting it to wood products emits significant amounts of carbon to the atmosphere.

Agency documents prepared at the assessment phase show that 57% of the carbon removed in timber harvests is emitted to the atmosphere within a decade and only 12% remains stored in in-use wood products after 50 years. Assessment Report at 83. These findings are supported by best available science. Yet the agency fails to take this into account in its DEIS and FEIS. We agree with the agency that carbon can be stored in wood products for varying periods of time "depending on the commodity produced and end use," but forthright analysis requires disclosure of the fact that conversion of trees to wood products results in emission of most of the carbon stored in the trees shortly after harvest. NEPA demands a credible accounting to support a comparative analysis between Alternative A and the different tiers of the action alternatives.

The agency has not forthrightly assessed and disclosed the effect of the plan on carbon storage and emissions.

Third, the agency's disclosure of the effects of the revised plan on carbon storage and emissions relies on misleading assumptions that "impair[] the agency's consideration of the adverse environmental effects of a proposed project" and "skew[] the public's evaluation of a project." Hughes River Watershed Conservancy, 81 F.3d at 446. For the same reason, the FEIS fails to "provide full and fair discussion of significant environmental impacts." 40 C.F.R. [sect] 1502.1 (1978 and 2020).

The root of this error is the agency's assumption that the carbon emissions resulting from implementation of the revised plan "will be very small and transitory . . . [and] will likely be balanced, and possibly eliminated or reversed, in a relatively short time frame." FEIS at 3-27.

To the contrary, maximum treatment levels under Alternative E will result in removal from the forest and/or loss 118 of up to 920,000 metric tons of carbon annually. FEIS at 3-31. Presumably, carbon removed from the forest through burning[mdash]up to 750,000 metric tons[mdash]will be immediately emitted to the atmosphere. Based on the agency's assessment that 57% of the carbon removed in timber sales is emitted to the atmosphere in the first decade, conservatively at least half of the carbon removed in timber sales annually[mdash]up to 170,000 metric tons[mdash]will be emitted to the atmosphere shortly after harvest. Thus, annual activities under Alternative E have the potential to emit approximately 835,000 metric tons of carbon in the short term. 119

A decade of these activities could result in short-term emissions of 8.35 million metric tons of carbon which is the equivalent of 30.64 tons of CO2.119F120 This is not "very small." According to EPA's Greenhouse Gas Equivalencies Calculator, this level of CO2 emissions is comparable to the annual emissions from over seven coal-fired power plants or from burning over 3.4 billion gallons of gasoline. 121 The max short-term emissions from annual activities under Alternative E (835,000 metric tons of carbon) are the rough equivalent to burning over 16,500 railroad cars worth of coal.121F122 Even assuming the Forest Service can only complete half of the max level of management under Alternative E, these emissions are still not "very small."

Other agency documents confirm the same. The Disturbance Report cautions that while carbon losses from management activities "may seem relatively small, . . . they often represent very large amounts of climate mitigation benefit." Disturbance Report, App. 4 at 18. The report indicates that preventing the emission of "half a million metric tonnes [of carbon]"[mdash] significantly less than the max short-terms emissions from annual activities under Alternative E[mdash]would be a significant climate mitigation benefit. Id.

The Disturbance Report also highlights the value of calculating the economic cost of carbon emissions. See id. That is particularly appropriate here where the agency calculated the economic value of timber harvesting (see FEIS at 3-589 - 3-592) and has tools available to calculate the economic cost of carbon emissions. See California v. Bernhardt, 472 F. Supp. 3d 573, 623 (N.D. Cal. 2020) ("It is arbitrary for an agency to quantify an action's benefits while ignoring its costs where tools exist to calculate those costs"); WildEarth Guardians v. Bernhardt, No. CV 17-80-BLG-SPW, 2021 WL 363955, at *9 (D. Mont. Feb. 3, 2021), appeal dismissed sub nom. Montana Env't Info. Ctr. v. Haaland, No. 21-35294, 2021 WL 3077586 (9th Cir. June 23, 2021) ("Although NEPA does not require federal agencies to engage in a cost-benefit analysis, when an agency chooses to quantify the socioeconomic benefits of a proposed action, it would be arbitrary and capricious for the agency to undervalue the socioeconomic costs of that plan by failing to include a balanced quantification of those costs."); Utah Physicians for a Healthy Env't v. U.S. Bureau of Land Mgmt., 528 F. Supp. 3d 1222, 1232 (D. Utah 2021), appeal dismissed, No. 21-4069, 2021 WL 5570560 (10th Cir. June 21, 2021) ("The socioeconomics section may not lay out the economic benefits from the proposal without analyzing the socioeconomic costs of GHGs together with climate change").

The Interagency Working Group on Social Cost of Greenhouse Gases (which includes USDA) has calculated an interim social cost of CO2 as $51/ton.122F123 Max short-term emissions from annual activities under Alternative E are over 3 million metric tons of CO2. Using the interim estimate, this would equal a cost of $153 million. For comparison, the non-carbon annual value of timber harvested from 2002-2012 only exceeded $2 million twice. Assessment Report at 105.

We recognize that the agency is not strictly required to complete a cost-benefit analysis to revise its forest plan, but it is required to forthrightly disclose the effects of its actions and it may not "quantify an action's benefits while ignoring its costs where tools exist to calculate those costs." California, 472 F. Supp. 3d at 623. At minimum, use of the social cost of carbon protocol underscores that carbon emissions under the revised plan are not "very small" or "negligible."

The emissions contemplated under the action alternatives also will not "be balanced, and possibly eliminated or reversed, in a relatively short time frame." FEIS at 3-27. According to the Disturbance Report, a pine/oak stand hits a max primary production rate of approximately 8 metric tons of carbon per hectare at around 35 years of age. Disturbance Report, App. 4 at 67.

Over the next 80 years, the stand declines to a rate of approximately 5 metric tons of carbon per hectare which it maintains for decades. Id. Applying rates from the Disturbance Report, a 100- year old oak/pine stand could easily store 500 metric tons of carbon.123F124 Applying the percentage from the agency's Assessment Report, 57% of this carbon[mdash]285 metric tons[mdash]would be emitted to the atmosphere in the first decade following harvest. Applying the same sequestration rates used to determine that the stand would hold at least 500 metric tons of carbon, it would take a new stand over forty years to re-sequester the carbon emitted in the first decade alone following harvest of the existing stand. And this does not account for the carbon that would have been sequestered in the 100-year old forest had it been allowed to continue growing. In other words, the forty-year estimate is conservative.

This is not a "relatively short time frame." The agency must also put this timeframe into context. Nat'l Audubon Soc'y, 422 F.3d at 186 ("A 'hard look' is necessarily contextual."). That requires explaining that forest plan implementation will result in an increase in atmospheric CO2 levels over the same period which the federal government and Intergovernmental Panel on Climate Change have identified as the most critical to reduce atmospheric CO2 levels in order to avoid the worst impacts of climate change. Appropriately contextualizing the forest plan's effects on carbon storage and emissions could lead the agency to choose a different alternative[mdash] for example, one that minimized carbon emissions by avoiding harvests in carbon-dense areas[mdash] and is necessary for the public to understand the agency's proposed action.

Related, the FEIS also suggests that climate change will increase fire risk in the Southeast and that more intense fires will "increase[e]carbon emissions and lower[] carbon stocks," thereby justifying management activities aimed at reducing fire risk as a way to maintain carbon stocks. FEIS at 3-28 - 3-29. First, as noted above, recent literature demonstrates that past models have significantly overestimated carbon loss from wildfire casting doubt on assertions that removing carbon from the forest now will save future carbon from wildfire combustion. One study shows severe fires combusted (resulting in carbon emissions) only 2% of above-ground biomass while, as noted above, the agency's analysis shows that approximately 57% of carbon in a timber sale is emitted within a decade. Second, the agency fails to disclose that its timber harvest program will disproportionately focus on mesic forest types that are not at high risk for wildfire, creating a significant additive loss of carbon. And third, the agency's timber models justify increases in timber harvest levels by assuming there will not be an increase in climate change-driven disturbances. The agency cannot have it both ways here[mdash]assuming there will be an increase in wildfires to justify management activities for purposes of carbon storage but assuming there will not be an increase in wildfires to justify the same management activities for purposes of achieving NRV.

Finally, the agency's assertion that carbon emissions from forest management activities will "be balanced, and possibly eliminated or reversed" is also misleading. FEIS at 3-27. Under the status quo, the forests will continue to store increasing amounts of carbon. As discussed above, when the agency engages in forest management activities it emits stored carbon into the atmosphere. This is lost potential carbon storage. In other words, the forests would store more carbon without those activities even if forest-wide carbon storage continues to increase with maximum treatment levels. As the Forest Service liquidates old-age and mid-age forests to create too-high levels of young forest, and as it ignores the natural disturbances occurring in old growth forests, the forests as a whole will skew younger than NRV[mdash]an imbalance that will be most pronounced in cove and other mesic forests. This is not just deviation from NRV; it is also lost potential carbon storage.

We have a "rapidly closing window of opportunity to secure a liveable and sustainable future for all" by reducing atmospheric CO2 levels to avoid the worst impacts of climate change. This makes sober assessment of the revised forest plan's effects on carbon storage and emissions of critical importance. Unfortunately, the agency has missed the mark in terms of assessing direct and indirect effects[mdash]a shortcoming which also spoils its assessment of cumulative effects.

2. The FEIS Failed to Take a Hard Look at the Cumulative Effects of the Forest Plan on Carbon Storage and Emissions.

The errors in the agency's cumulative effects analysis start by dismissing cumulative effects as "negligible" because "the potential direct and indirect effects of alternatives would be negligible." FEIS at 3-32. As explained above, the plan's direct and indirect effects on carbon storage and emissions are not "negligible." Even if this plan's effects were too small to count (which they are not), the cumulative effects of the agency's timber sale program across the national forest system is of course not negligible. As a result, this rationale is insufficient to comply with NEPA. As one court recently explained, the "global nature of climate change and greenhouse-gas emissions means that any single . . . project likely will make up a negligible percent of state and nation-wide greenhouse gas emissions." WildEarth Guardians, 457 F. Supp. 3d at 894 (emphasis added). But agencies still must "look at projects in combination with each other, not simply in the context of state and nation-wide emissions." Id. (citation omitted).

Otherwise, "the relevant 'decisionmaker' cannot determine 'whether, or how, to alter the program to lessen cumulative impacts' on climate change." Id. (citation omitted).

The agency sets itself up to make this error by asking the wrong question. The FEIS assesses cumulative impacts by inquiring: what is "the contribution of the plan's proposed actions to cumulative effects on global atmospheric GHG concentrations"? FEIS at 3-32 (emphasis added). But the point of cumulative effects analysis is not to assess the degree that a project contributes to a larger effect[mdash]it is to consider and disclose the

effect of the proposed action in combination with "past, present, and reasonably foreseeable future actions." 40 C.F.R. [sect] 1508.7 (1978). This error led the agency to conclude that the cumulative effect of increased carbon emissions from the plan and other "past, present, and reasonably foreseeable future actions" was "negligible." FEIS at 3-32. Not so. The cumulative effect of additional carbon emissions on climate change[mdash]particularly emissions over the life of the revised forest plan[mdash]is highly significant with numerous adverse consequences.

Practically, the approach taken by the agency[mdash]dismissing climate concerns based on the "contribution" of a project to global CO2 levels[mdash]will facilitate further increases in atmospheric CO2 because each siloed project, standing alone, will look insignificant when compared to overall CO2 levels. That is what makes global climate change so hard to address[mdash]there is no single fix and the problem only becomes apparent when looking at actions cumulatively.

One "past, present, and reasonably foreseeable future action[]" the agency must account for in its cumulative effects analysis is its overall timber program. To our knowledge, the agency has never assessed the collective effect of its timber program on carbon storage and emissions. Certainly the agency has not developed a strategy for carbon management with a programmatic analysis to which it can tier in NEPA documents and in fact asserts that "[n]o applicable regulatory of [sic] legal requirement exist[s] for management of forest carbon or greenhouse gas emissions" at all. FEIS App. A at 9.

Several courts have recognized the importance of cumulative effects analysis when agencies operate a nationwide program like the Forest Service's timber program. See WildEarth Guardians, 368 F. Supp. 3d at 77 ("Although BLM may determine that each lease sale individually has a de minimis impact on climate change, the agency must also consider the cumulative impact of GHG emissions generated by past, present, or reasonably foreseeable BLM lease sales in the region and nation.") (emphasis added); Sierra Club v. Bosworth, 510 F.3d 1016, 1028 (9th Cir. 2007) (finding cumulative effects analysis of new categorical exclusion "of critical importance in a situation . . . where the categorical exclusion is nationwide in scope and has the potential to impact a large number of acres"). Other courts have similarly confirmed that cumulative effects analysis must account for actions outside of a specific project area when those actions will affect a resource at issue. See Native Ecosystems Council v. Dombeck, 304 F.3d 886, 896 (9th Cir. 2002) (rejecting Forest Service attempt to limit cumulative effects analysis to area immediately surrounding timber sale); Salmon River Concerned Citizens v. Robertson, 798 F. Supp. 1434, 1440 (E.D. Cal. 1992), aff'd, 32 F.3d 1346 (9th Cir. 1994) (finding NEPA documents must "consider cumulative effects in light of other [actions] by the Forest Service or other entities and must consider any cumulative effects resulting from the site specific application, even those effects occurring beyond the site area").

For example, in Kern v. U.S. Bureau of Land Mgmt., 284 F.3d 1062 (9th Cir. 2002), the Ninth Circuit Court of Appeals rejected BLM's attempt to restrict its assessment of the cumulative effect of its action on a specific plant species to a limited area when the agency was aware of other actions outside of the limited area that would affect the plant. The court explained that adequate cumulative effects analysis would have to "include BLM timber sales . . .; timber sales by other federal agencies, or timber harvesting by private parties, outside the [limited analysis area] but within the range of the [plant]." Id. at 1079. Here, this requires consideration of the effect of the forest plan on carbon storage and emissions cumulatively with the rest of the agency's timber program.

Frequently, agencies can satisfy their obligation to consider the effect of broader, nationwide programs like the agency's timber program by tiering to a higher-level NEPA.

The agency does not have to reinvent the wheel here[mdash]it has the rough data to complete this analysis. As discussed, the carbon analysis in the FEIS is largely based on the Baseline Report and Disturbance Report. FEIS at 3-22. The agency has completed similar reports for each national forest which it can use to assess the cumulative effect of its timber program. For example, according to the Baseline Report, the forests in Region 8

(which includes the Pisgah- Nantahala) collectively stored approximately 912 million metric tons of carbon as of 2013.analysis. See 40 C.F.R. [sect] 1508.1(ff) (2020) (defining tiering). But that pathway is not available to the agency because it has never assessed the overall effects of its timber program. 125

Baseline Report, 13. Assuming that 47% of that carbon is above-ground (FEIS at 3-24), these forests stored 428 million metric tons of carbon in live aboveground biomass. Between 1990 and 2011, timber harvest caused an approximately 2% reduction in non-soil carbon stocks for all forests in Region 8. Disturbance Report, App. 4 at 20. A 2% reduction in 428 million metric tons of non-soil carbon is a loss of approximately 8.5 million metric tons. Assuming that at least 57% of this removed carbon has been emitted to the atmosphere, carbon emissions for the timber program in Region 8 from 1990-2011 were at least 4.8 million metric tons of carbon. According to EPA's Greenhouse Gas Equivalencies Calculator, this exceeds the annual CO2 emissions from operating four coal-fired power plants. Obviously, the cumulative effect of the timber program nationwide would be even more significant.

We recognize that the analysis in the paragraph above is rough and departs from the method the agency used to assess carbon effects in the FEIS. There, the agency appears to have used the same data sources to calculate the total loss of non-soil carbon per acre from 1990-2011 and converted the total loss into an annual loss. FEIS at 3-25, 3-29. The agency's calculations are not fully explained which has hampered our efforts to replicate them. Our point here is only that the agency has the data before it to quantify the carbon effects of its timber program here, and cumulatively. Presumably, an understanding of past and present effects would allow the agency to extend those effects into the future based on harvesting levels, forest types, and locations.

Adequate cumulative effects analysis could make a difference in the agency's choices. The agency is proposing an up to 375% increase in timber harvesting in the revised forest plan which will result in an associated increase in carbon emissions. FEIS at xiv. If every national forest made a similar decision, the resulting increase in carbon emissions would be highly significant[mdash]but this effect would never be analyzed or considered because the agency is not assessing the cumulative effect of its timber program. Proper consideration of cumulative effects could lead the agency to make different decisions regarding its timber program on the Nantahala- Pisgah, and in other places, such as avoiding harvests in the most carbon-dense areas.

Responding to comments on the DEIS, the agency asserts that "[c]limate change impacts, tradeoffs, and cumulative effects would be considered in project-level environmental analyses." FEIS App. A at 15. Project-level analysis is a poor vehicle for assessing the cumulative effect of the agency's timber program on carbon storage and emissions and cannot substitute for the agency's inadequate analysis in the FEIS. More to the point, the agency always skips over meaningful analysis of cumulative carbon effects at the project level.

For example, the Final Environmental Assessment for the Buck Project describes the project's effects on carbon storage and emissions as "miniscule" and limits its cumulative effects analysis to an approximately 20,000-acre "analysis area." Buck EA at 3, 116-17.125F The Final Environmental Assessment for the Southside Project uses identical language to dismiss effects on carbon storage and emissions and focuses its cumulative effects analysis on an approximately 19,000-acre "analysis area." Southside EA at 82-84.126F The Final Environmental Assessment for the Mossy Oak Project also uses identical language to dismiss effects on carbon storage and emissions and focuses its cumulative effects analysis on an approximately 9,500-acre "analysis area." Mossy Oak EA at 55-57. 128

The problem is not limited to North Carolina. Other forests in the region take the same approach[mdash]preventing meaningful consideration of cumulative impacts at the regional level. The Final Environmental Assessment for the AP White Pine Management Project on the Sumter National Forest in South Carolina concludes that "project would affect a relatively small amount of forest land and carbon on the Sumter National Forest" and includes no consideration of cumulative effects on carbon storage and emissions. White Pine Management Project EA at 25F

The Final Environmental Assessment for the Eastern Divide Phase II Project on the George Washington and Jefferson National Forests in Virginia limited its consideration of cumulative carbon effects to disclosing: "Any initial carbon emissions during the implementation of the proposed project would have a temporary influence on atmospheric carbon concentrations, because carbon will be removed from the atmosphere as forests regrow, minimizing or mitigating any potential cumulative effects." Project scale Carbon Effects - Phase II Project at 3.129F. The Final Environmental Assessment for the Fightingtown Creek Project on the Chattahoochee National Forest in Georgia concluded that the effects of the project on CO2 levels was "miniscule" and that there are "are no past, present, or reasonably foreseeable activities Each time[mdash]whether at the project level or, here, at the plan level[mdash]the agency explains that the effect of its action on carbon storage and emissions is an inconsequential drop in the bucket without ever considering the cumulative effect of its choices on carbon. This violates NEPA. Without the requisite analysis "the relevant 'decisionmaker' cannot determine 'whether, or how, to alter the program to lessen cumulative impacts' on climate change." Wildearth Guardians, 457 F. Supp. 3d at 894. potentially affecting climate which may be combined with those of the action alternatives." Fightingtown Creek EA at 49-50. 131

XI. Conclusion

For the foregoing reasons, we object to the Plan. We look forward to hearing from you about your plans for discussing resolutions to these objections.

Date: March 22, 2022

Sincerely,

Sam Evans

Ben Prater

Josh Kelly

Hugh Irwin