March 22, 2022

Objection Reviewing Officer
National Forests in North Carolina
ATTN: Objection Coordinator
160 Zillicoa St., Suite A
Asheville, NC 28801

RE: Objections to the Revised Forest Plan for the Pisgah and Nantahala National Forests

Dear Reviewing Officer,

Pursuant to 36 C.F.R. § 219.54, **Center for Biological Diversity (Center)** hereby submits these objections to the Nantahala and Pisgah National Forests' Land Management Plan (Forest Plan).

Table of Contents

I. THE PROJECT, THE OBJECTORS, AND OBJECTORS' INTERESTS

The Plan

The Center for Biological Diversity objects to the revised Land Management Plan for the Nantahala Pisgah National Forests.

Responsible Official and Ranger District

The responsible official who will approve the Record of Decision and the revised Forest Plan is Forest Supervisor James Melonas, National Forests in North Carolina, 160 Zillicoa Street, Suite A, Asheville, NC 28801. The responsible official for the list of species of conservation concern is Regional Forester Ken Arney, USDA Forest Service Southern Region, 1720 Peachtree Road NW, Suite 760S, Atlanta, GA 30309.

Timeliness

These objections are timely filed. The 60-day notice of opportunity to object to the final plan and final Environmental Impact Statement and the availability of Draft Record of Decision for the Nantahala and Pisgah National Forest Plan Revision, was published on January 21, 2022 in the Asheville Citizen-Times.

The Objectors

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Interests and Participation of the Objectors

The **Center for Biological Diversity ("Center")** is a nonprofit environmental organization dedicated to the protection of native species and their habitats through science, policy, and environmental and administrative law. The Center has over 1.6 million members and online activists dedicated to the protection and restoration of endangered species and wild places. The Center has worked for over twenty-five years to protect imperiled plants and wildlife, open space, air and water quality, and overall quality of life. Much of the Center's work focuses on protecting endangered and threatened species in the Southeastern United States. Several of these imperiled species occur in North Carolina and within the Pisgah and Nantahala National Forests.

The Center submitted comments on the Draft Revised Forest Plan and Draft Environmental Impact Statement on June 29, 2020. We received oral confirmation from Forest Service staff that our comments were received.

Connection Between Prior Specific Written Comments and the Content of the Objection

The Center previously submitted detailed, substantive formal comments regarding four primary deficiencies in the Draft Revised Forest Plan and the Draft EIS. These include: 1) The Forest Service's failure to provide adequate support for the decision to substantially increase the amount of regeneration harvests to create young forests; (2) The Forest Service's failure to conserve plant and animal diversity through a coarse-filter/fine-filter approach; (3) The Forest Service's failure to adequately assess its road plans for the Forests; and (4) The Forest Service's failure ensure the viability of vulnerable wildlife and contribute to species recovery. These issues are the basis of our objections.

II. LEGAL FRAMEWORK

A. National Forest Management Act

1. The Statute

The National Forest Management Act directs the Secretary of Agriculture to issue regulations "that set out the process for the development and revision of the land management plans, and the guidelines and standards prescribed by this subsection." 16 U.S.C. §1604(g). The Secretary "shall…incorporate the standards and guidelines required by this section in plans for units of the National Forest System…" *Id.* § 1604(c). NFMA further requires standards for timber and transportation management as well as for public participation in forest plans *Id.* §§ 1604(m); 1608(c); 1612(a).

2. The 2012 Planning Rule

In April 2012, the Forest Service finalized regulations implementing NFMA. These regulations, commonly referred to as the "2012 Planning Rule" established a process for developing and updating forest plans and set conservation requirements that forest plans must meet to sustain and restore the diversity of ecosystems, plant and animal communities and at-risk species found on these public lands. 36 C.F.R. § 219. The Rule addresses several aspects of forest planning, including among others:

Best Available Science (Section 219.3)

The 2012 Planning Rule requires the use of the best available scientific information and requires the Forest Service to explain how it has met this mandate. 36 C.F.R. § 219.3.

Ecological Sustainability (Section 219.8)

Ecological sustainability is the capability of ecosystems to maintain ecological integrity. 36 C.F.R. § 219.19. Plans "must include plan components, including standards or guidelines, to maintain or restore the ecological integrity of terrestrial and aquatic ecosystems and watersheds in the plan area…" Components must consider contributions of the plan area to ecological conditions within the broader landscape influenced by the plan area and conditions in the broader landscape that may influence the sustainability of resources and ecosystems within the plan area.

The rule also references "[s]ystem drivers, including dominant ecological processes, disturbance regimes, and stressors, such as natural succession" and wildland fire. 36 C.F.R. § 219.8.

Ecosystem Integrity and Diversity (Section 219.9(a))

The 2012 Planning Rule aims to ensure that the Forest Service does not elevate other values such as commercial timber harvesting over wildlife conservation. Rule 219.09(a)(1) requires plan components to include standards or guidelines to maintain or restore the ecological integrity of terrestrial and aquatic ecosystems and watersheds in the plan area, including plan components to maintain or restore their structure, function, composition, and connectivity. Rule 219.09(a)(2) mandates that Plans contain "components, including standards or guidelines, to maintain or restore the diversity of ecosystems and habitat types throughout the plan area…includ[ing] plan components to maintain or restore: (i) Key characteristics associated with terrestrial and aquatic ecosystem types; (ii) Rare aquatic and terrestrial plant and animal communities; and (iii) The diversity of native tree species similar to that existing in the plan area." The Forest Service is directed to take a "course-filter/fine-filter approach" to conserving the diversity of plant and animal communities. 36 C.F.R. § 219.9.

Recovery of listed species, conservation of proposed and candidate species, and maintain viable populations of species of conservation concern (Section 219.09(b)).

The 2012 Planning Rule also includes a distinct set of substantive requirements for management of wildlife. To protect Forest wildlife and plants, section 219.9(b) requires the Forest Service to "determine whether or not the plan components…provide the ecological conditions necessary 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." If the Plan components do not unequivocally achieve that mandate, then section 219.9(b) requires "additional, species-specific plan components, including standards or guidelines… to provide such ecological conditions in the plan area."

Wildlife Protection (Section 219.11)

Section 219.11 of the Planning Rule specifically requires that logging "be carried out in a manner consistent with the protection of soil, watershed, fish, wildlife, recreation, and aesthetic resources," and that "[w]here plan components will allow clearcutting, seed tree cutting, shelterwood cutting, or other cuts designed to regenerate an even-aged stand of timber, the plan must include standards limiting the maximum size for openings that may be cut in one harvest operation, according to geographic areas, forest types, or other suitable classifications."

Monitoring Program (Section 219.12)

Section 219.12 of the Planning Rule requires the development of "a monitoring program for the plan area" that "should enable the responsible official to determine if a change in plan components or other plan content that guide management of resources on the plan area may be needed." 36 C.F.R. § 219.12(a)(1). This monitoring is important as it is "designed to inform the management of resources on the plan area, including by testing relevant assumptions, tracing

relevant changes, and measuring management effectiveness and progress toward achieving or maintaining the plan's desired conditions or objectives." 36 C.F.R. § 219.12(a)(2). To that end the program's "questions and associated indicators" must address the "status of select ecological conditions including key characteristics of terrestrial and aquatic ecosystems," "status of focal species to assess the ecological conditions required under 219.9," and "status of a select set of the ecological conditions required under 219.9 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." 36 C.F.R. § 219.12(a)(5). They must also address "measurable changes on the plan area related to climate change and other stressors that may be affecting the plan area." 36 C.F.R. § 219.12(a)(5)(vi). The program must be developed as "part of the planning process for a …plan revision." 36 C.F.R. § 219.12(c).

B. National Environmental Policy Act

The National Environmental Policy Act ("NEPA") is America's "basic national charter for protection of the environment."[1] NEPA ensures that federal agencies "will have available, and will carefully consider, detailed information concerning significant environmental impacts" and that such information "will be made available to the larger [public] audience."[2]

To this end, NEPA requires federal agencies to prepare a detailed Environmental Impact Statement (EIS) for any "major federal action significantly affecting the quality of the human environment."[3] The EIS must describe (1) the "environmental impact of the proposed action," (2) any "adverse environmental effects which cannot be avoided should the proposal be implemented," (3) alternatives to the proposed action, (4) "the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity," and (5) any "irreversible or irretrievable commitment of resources which would be involved in the proposed action should it be implemented."[4] The Council on Environmental Quality ("CEQ") has promulgated regulations to implement NEPA, and all federal agencies must comply with the CEQ NEPA regulations.[5]

As part of the EIS, each federal agency must "study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources."[6] An agency must "rigorously explore and objectively evaluate all reasonable alternatives."[7] When conducting an alternatives analysis, "[t]he stated goal of a project necessarily dictates the range of 'reasonable' alternatives and an agency cannot define its objectives in unreasonably narrow terms."[8]

NEPA further requires that federal agencies take a "hard look" at the environmental consequences of their actions and do so while addressing reasonably foreseeable, direct, indirect,

[1] 40 C.F.R. § 1500.1(a).
[2] *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 349 (1989).
[3] 42 U.S.C. § 4332(2)(C).
[4] *Id*. § 4332.
[5] 40 C.F.R. § 1507.1.
[6] 42 U.S.C. § 4332(2)(E).
[7] 40 C.F.R. § 1502.14(a)-(c).
[8] *City of Carmel-By-The-Sea v. U.S. Dept. of Transp*., 123 F.3d 1142, 1155 (9th Cir. 1997).

and cumulative impacts to the natural and physical environment.[9] "Taking a 'hard look'…should involve a discussion of adverse impacts that does not improperly minimize negative side effects."[10] It also means "provid[ing] full and fair discussion of significant environmental impacts…General statements about possible effects and some risk do not constitute a hard look absent a justification regarding why more definitive information could not be provided."[11] Cumulative impacts are impacts that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over time.[12]

Moreover, "[a]gencies shall insure the professional integrity, including scientific integrity, of the discussions and analyses in environmental impact statements. They shall identify any methodologies used and shall make explicit reference by footnote to the scientific and other sources relied upon for conclusions in the statement."[13] Federal agencies have a continuing obligation to gather and evaluate new information relevant to the environmental impact of its actions. "An agency that has prepared an EIS cannot simply rest on the original document. The agency must be alert to new information that may alter the results of its original environmental analysis, and continue to take a 'hard look' at the environmental effects of [its] planned action, even after a proposal has received initial approval."[14]

C. Endangered Species Act

Congress enacted the ESA in 1973 "to provide a program for the conservation of… endangered species and threatened species" and to "provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved."[15]

If a federal project may affect a listed species, the action agency must engage in "consultation" with the U.S. Fish & Wildlife Service under Section 7 of the ESA. Section 7 is the central enforcement provision that operates to prohibit federal agencies from authorizing, funding, or otherwise carrying out any action that is likely to "jeopardize" the continued existence of an endangered species or result in the destruction or adverse modification of the species' critical habitat.[16]

Forest Plans are recognized as important programmatic documents that set out guidelines for resource management. Every project or activity on a national forest must be implemented in compliance with the applicable forest plan.[17] Section 7 Consultation is required for forest plans.[18]

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[9] *See* 40 C.F.R. §§ 1502.16, 1508.7, 1508.8. *See also Blue Mountains Biodiversity Project v. Blackwood*, 161 F.3d (9th Cir. 1998); *Earth Island Institute v. U.S. Forest Serv*., 442 F.3d 1147 (9th Cir. 2006).
[10] *League of Wilderness Defenders/Blue Mountains Biodiversity Project v. U.S. Forest Serv.*, 689 F.3d at 1075.
[11] *Conservation Cong. v. Finley*, 774 F.3d 611, 616 (9th Cir. 2014).
[12] 40 C.F.R. § 1508.7.
[13] *Id*. § 1502.24.
[14] *Marsh v. Oregon Natural Res. Council*, 490 U.S. 360, 373-74 (1989).
[15] 16 U.S.C. § 1531(b).
[16] *Id*. § 1536(a)(2).
[17] *Id*. § 1604(i).
[18] *See Pacific Rivers Council*, 30 F.3d at 1056.

Consultation is necessary as the Planning Rule requires Plans to "provide the ecological conditions necessary to: contribute to the recovery of federally listed threatened and endangered species," which consultation will allow the U.S. Fish and Wildlife Service to address.

D. Administrative Procedure Act

The Administrative Procedure Act prohibits "arbitrary and capricious" decision-making,[19] and provides an important layer of legal oversight to agency actions such as the Forest Plan process. The Forest Service must demonstrate a rational connection between the facts found and choices made.[20]

III. CONCISE STATEMENT EXPLAINING THE OBJECTION AND SUGGESTIONS HOW THE FINAL PLAN DECISION MAY BE IMPROVED.

Our objections focus on the following four issues:

A. The Final Forest Plan and FEIS Do Not Provide Adequate Support for the Decision to Substantially Increase the Amount of Regeneration Harvests to Create Young. Forests

The Final Plan calls for as much as a fourfold annual increase in the amount of regeneration harvests within the forests. Yet natural disturbances and climate change stressors are playing an increasingly prominent role in the creation of early forests that neither the Final Plan nor the FEIS adequately considers. Using the best available science, the Forest Service must assess these impacts into the next fifty years rather than restarting its natural disturbance modeling at 1950 baseline levels. The Forest Service should further explain in the EIS the limitations of using vegetation management to simulate natural disturbance in the creation of early successional habitat.

The Final Forest Plan's approach to using timber harvests as a tool for ecological restoration is further flawed because it fails to consider where, when, and why logging is appropriate to achieve the desired condition of creating young forests. The Final Plan does not consider the quality of existing habitats, their location, and species diversity. Forest types based on age classes are not fungible units and the Forest Service should carefully consider in the EIS how location, elevation, species diversity, and other factors should be considered when determining where to use regeneration harvests to create young forests.

The Final Plan further fails to properly consider "all lands" when calculating the amount of regeneration harvests needed to create more young forests. Rather than employing an "all lands" analysis across the 18-county region, the Forest Service improperly relies on a much narrower assessment of forests on adjacent public lands to inflate the importance of regeneration harvests to create young forests in the plan area and discount the amount of young forests elsewhere in the region. Most of the broader landscape throughout the 18-county area is comprised of privately owned, younger forests and the Forest Service needs to reexamine the purported need

[19] 5 U.S.C. § 706.
[20] *Motor Vehicle Mfrs. Ass'n v. State Farm Mut. Auto. Ins. Co*., 463 U.S. 29, 43 (1983).

to use regeneration harvests to create much of the same habitats. The Forest Service should adopt an alternative that entails substantially less regeneration harvests than Proposed Alternative E.

B. The Final Plan Fails to Conserve Plant and Animal Diversity Through a Coarse-Filter/Fine-Filter Approach.

The coarse filter falls short of meeting the needs of many listed species and species of conservation concern because it does not recognize the complex and nuanced relationships many species have within the forest and across the larger landscape. Many of these species are dispersal-limited and have patchy, isolated populations in the forests. Logging within these areas could have significant adverse impacts by interfering with gene flow, fragmenting important wildlife corridors, and destroying unique microclimates, leading to the potential extirpation of these species from the forests.

The fine-filter analysis is similarly deficient because the Final Plan and the FEIS do not adequately mitigate for the impacts to listed species from converting thousands of acres of mid to late aged forests to young forest through regeneration harvests. The FEIS does not discuss how these silvicultural practices may uniquely impact these species by fragmenting Carolina Northern Flying Squirrel habitat, removing important roosting habitat for Indiana bats and northern long eared bats, degrading water quality for listed aquatic species, and failing to protect important habitat for the threatened noonday globe.

Both the coarse filters and fine filters are also insufficient to fully capture and respond to the sensitivities, needs, and threats of many species of conservation concern, particularly those occurring within old growth forests, including salamanders, and several species of birds, terrestrial snails, and plants. The Forest Service needs to use a more rigorous coarse filter/fine-filter analysis so that it can more fully capture the impacts to listed and sensitive species and develop mitigation measures that are tailored to achieving viability and recovery goals.

C. The Forest Service Must Reassess its Road Plans for the Forests.

The Final Plan authorizes 6 miles of new roads a year under Tier 1 and an additional 4 miles of new roads a year under Tier 2. These roads are largely intended to accommodate future logging aimed at creating young forest conditions. Up to 300 miles of new roads could be built in the next 30 years.

Roads have a wide range of impacts on the forest environment. They contribute more sediment to streams than any other land management activity, act as barriers to species migration, cause direct mortality to terrestrial and avian species, fragment habitat, serve as a vector for non-native, invasive species, increase human presence in remote areas threatening sensitive resources and lead to an increased risk of wildfires.

The FEIS does not adequately examine the direct, indirect, and cumulative effects of the increased number and mileage of roads that will invariably be constructed to accommodate this much additional logging within the Forest. The FEIS fails to discuss where these roads would be constructed, how they will impact fish and wildlife, if old logging roads will be properly

decommissioned, and whether new roads can be constructed and maintained to withstand the impacts of more intense storms and rainfall events fueled by climate change.

The further expansion of the road system, coupled with the Forest Service's failure to reduce its road maintenance backlog, also results in ecological issues that threaten the viability of species of conservation concern and the recovery of federally listed species. These issues need to be addressed in the EIS and the Forest Plan to comply with the requirements of NEPA and the 2012 Planning Rule. In addition to selecting an alternative that calls for substantially less regeneration harvests, the Forest Service should also select an alternative that reduces the amount of new roads.

D. The Final Forest Plan Falls Short of Ensuring Viability of Vulnerable Wildlife and Contributing to Species Recovery.

The Final Plan falls short of ensuring viability of vulnerable wildlife and contributing to species recovery because it contains many desired conditions that conflict with species recovery while simultaneously failing to include standards and guidelines that adequately address the conservation needs of these species.

The absence of buffers for ephemeral streams threatens the breeding habitat of many imperiled and sensitive animals, including more than two dozen species of salamanders. The Forest Service needs to establish buffers that are at least as protective as those found on other National Forests in the region.

In addition, the Final Plan's standards for logging on steep slopes are not equipped to deal with the impacts of erosion. The Forest Plan must require debris hazard assessments where activities are planned on slopes greater than 40%, it must require the obliteration of skid roads and temporary roads and return to the area to grade upon completion of a logging project, and it must require ditches and culverts to be maintained. The Forest Service should also prohibit any logging that is proposed on slopes greater than 40% unless it is reviewed and approved by an interdisciplinary team and the line officer, as other Forests in the Southeast require.

The existing standards and guidelines regarding species protections are not only vague but they are also insufficient to mitigate the impacts resulting from plan components that are specifically designed to facilitate a significant increase in early seral conditions. Given the threats posed to listed species from logging to create early seral habitat across the forests, the Final Plan needs to contain specific standards and guidelines for recovering species that depend on closed-canopy, old growth conditions. These standards and guidelines should be based on measures identified in species recovery plans. Simply referencing species recovery plans does not provide the protections these species deserve.

IV. SPECIFIC OBJECTIONS

A. OBJECTION #1: The Final Forest Plan Does Not Provide Adequate Support for the Decision to Substantially Increase the Amount of Regeneration Harvests to Achieve Desired Young Forest Conditions.

The "central pillar" of the Final Forest Plan is to restore and maintain healthy forests (Final Plan at 24) and ecological restoration is a pervasive theme throughout the planning framework. (Final Plan at 50-52; 91; 223). Much of the Final Plan's restoration strategy, however, is focused on the creation of early seral habitats or young forests. The FEIS defines young forest as the early stage of development after a stand replacement event, which could be anthropogenic, such as timber harvest, or a natural disturbance event, such as wildlife or extreme winds (FEIS at 3-119). The Forest Service estimates that about 13,000 acres of the Forests contain young forest seral states. *Id*. Using a Natural Range of Variation (NRV) model, the Forest Service identified age and structural class categories for each ecozone (Final Plan at 50-64) and identified a total of 60,000-90,000 acres as desired young forests, including early successional conditions (Final Plan at 76). The Final Plan relies extensively on timber harvests to create these young forest conditions. Under the Tier 1 scenario the Final Plan contemplates an annual increase of regeneration harvests from 650 to 1,200 acres and 1,200 acres to 3,200 acres under the Tier 2 scenario (Final Plan at 70).

As explained in greater detail below, the Final Plan does not provide adequate support for the substantial increase in commercial harvests to achieve desired young forest conditions in the name of ecological restoration. The Forest Plan: 1) fails to adequately examine the role of natural disturbances and climate change stressors in the creation of early seral forests; 2) fails to consider the quality of existing habitats, their location, and species diversity; and 3) fails to consider "all lands" (i.e. the broader landscape) when calculating the amount of regeneration harvests needed to create more young forests. The Forest Service's failure to provide adequate support in the Final Plan for these regeneration harvests violates the 2012 Planning Rule and the APA.

Similarly, the FEIS fails to provide adequate support under NEPA for the "purpose and need" of increasing regeneration harvests. NEPA planning begins with an identification of the purpose and need for a project. NEPA's implementing regulations provide that an environmental document should specify the underlying purpose and need to which the agency is responding in proposing the alternative including the proposed action.[21] The manner in which an agency defines the project's purpose "sets the contours for its exploration of available alternatives." *Wyoming v. United States Dep't of Agric*., 661 F.3d 1209, 1244 (10th Cir. 2011). Therefore, an agency may not define the objectives of its action in terms so unreasonably narrow that only one alternative would accomplish the goals of the agency's action, and "the EIS would become a foreordained formality." *Citizens Against Burlington, Inc. v. Busey*, 938 F.2d 190, 196 (D.C. Cir. 1991). The purpose and need statement is based on false assumptions, contradictory information, and unsupported conclusions. By falsely assuming that regeneration harvests are necessary to create young forests, and that without these harvests the Forests will continue to deviate from the NRV, the Forest Service has defined the need and purpose of this project so narrowly that only alternatives calling for more regeneration harvests are considered. Consequently, the Forest Service has failed to examine less environmentally damaging alternatives that may otherwise address the concerns raised by the Forest Service about the Forests' deviation from the NRV.

[21] 40 C.F.R. § 1502.13 (emphasis added).

1. The Final Plan and FEIS Do Not Adequately Examine the Role of Natural Disturbances in the Creation of Early Seral Forests.

The Final Plan and the FEIS are flawed because the Forest Service failed to adequately examine the role of natural disturbances and climate change stressors and their relationship to active management approaches in the creation of early seral forests. These factors need to be considered by the Forest Service and adequate safeguards must be incorporated into standards and guidelines, which are notably absent from Desired Forest Conditions CC-DC-01-CC-DC-08. These measures would help ensure that the Forests remain resilient to climate change beyond just aspirational language contained in the plan.

Natural disturbances can be abiotic (e.g., fire, drought, wind, snow and ice) and biotic (e.g., insects and pathogens).[22] The spatial extent and magnitude of these disturbances can vary, ranging from small gap scale events to catastrophic events such as a Category 5 hurricane. Disturbances such as fires, insect outbreaks, and windthrow can disrupt the structure, composition and function of an ecosystem.[23]

Disturbance regimes have changed profoundly in many forests in recent years, with climate being a prominent driver of disturbance change.[24] Climate change is altering the frequency, intensity, duration, and timing of disturbances.[25] Disturbance change is expected to be among the most profound impacts that climate change will have on forest ecosystems in the future.[26] Warmer and drier conditions facilitate fire, drought and insect disturbances, while warmer and wetter conditions increase disturbances from wind and pathogens.[27]

Fire is the second most common disturbance on the forests after timber harvests, with the area affected by fires increasing over the years (FEIS at 3-25). Many climate models have projected an overall increase in temperature and a drying trend in many subtropical and mid-latitude regions, with wildfires likely increasing in these regions.[28] Temperature increases across the South would contribute to increased fire frequency and intensity, total burned area and longer fire seasons.[29]

Windthrows caused by large hurricanes and other intense storms have significant impacts on forest structure, species composition, successional development, and carbon storage and emissions.[30] The FEIS notes that flooding in WNC is often the result of intense rain events

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[22] Seidl, R. et al. 2017. Forest disturbances under climate change. Nat Clim Chang. Doi:10.1038/nclimate3303 (providing a global synthesis of climate change effects on natural disturbances).
[23] *Id.*
[24] *Id.*
[25] Dale, V. et al. 2001. Climate Change and Forest Disturbances: Climate change can affect forests by altering the frequency, intensity, duration, and timing of fire, drought, introduced species, insect and pathogen outbreaks, hurricanes, windstorms, ice storms, or landslides. BioScience. Vol. 51. Pg. 723-734.
[26] *Id.*
[27] *Id.*
[28] McNulty, et al. 2013. Forests and Climate Change in the Southeast USA, at https://www.srs.fs.usda.gov/pubs/ja/2013/ja_2013_mcnulty_001.pdf.
[29] *Id.*
[30] Xi, W. et al. 2019. Hurricane disturbances, tree diversity, and succession in North Carolina Piedmont forests, USA. Journal of Forestry Research, 30, 219-231. https://doi.org/10.1007/s11676-018-0813-4.

derived from localized thundershowers or large-scale hurricanes that have moved inland (FEIS at 3-56-3-57). Debris avalanches occurred across the forests in 2004 as a result of successive hurricanes (Frances and Ivan). *Id.* at 3-57. These hurricanes caused wide-spread flooding across the Forests (*Id*. at 3-35) and "triggered hundreds of landslides across the Nantahala and Pisgah NFS and Western North Carolina." *Id.*

Native insects and pathogens are an important part of a healthy forest but when environmental and biological conditions lead to outbreak levels, they can significantly impact forests (FEIS at 3-433). Non-native invasive species have been identified as one of four critical threats and can rapidly increase across the landscape with little resistance beyond control and mitigation measure *Id.* Both native and non-native insects and diseases cause above-normal mortality rates on Forest lands and in many instances they can be attributed to changes in forest conditions as well as climate change. *Id.* These disturbance agents can affect forests at varying scales and intensity from small groups of trees (gaps) to larger sizes and scales. *Id*. at 3-433-3-434. As the FEIS acknowledges, "because many insects and diseases are influenced by environmental conditions, future changes in climate can be expected to result in greater impacts from both non-native and native pests." *Id.* at 3-434.

The FEIS acknowledges the likelihood of more extreme weather events in the future:

> The potential for severe storms is expected to increase in the future, including more intense hurricanes making landfall in the southern US, with potential increases in flooding and landslides in mountainous landscapes. Conversely, extended periods of drought and forest stress may lead to drier fuels which will burn more easily and at hotter temperatures, and contribute to more and larger wildfires. More cloud-to-ground lightning due to warming may increase wildfire ignitions, even in mountainous areas where fires are historically less common…Shifting weather patterns throughout Appalachia and the southeastern U.S. will have a variety of effects on forest health. Increasing variability in precipitation distribution can impact both forest productivity and carbon sequestration…(FEIS at 3-20).

The 2012 Planning Rule requires the Forest Service to consider "[s]ystem drivers, including dominant ecological processes, disturbance regimes, and stressors, such as natural succession" and wildland fire when developing plan components to address ecological sustainability. 36 C.F.R. § 219.8. Section 219.5(a)(1) further states that assessments must evaluate information about "trends, and their sustainability and their relationship to the land management plan within the context of the broader landscape." It requires the Planning Team to evaluate "existing and possible future conditions and trends of the plan area." This would certainly include climate change.[31]

As discussed more fully below, the Forest Service's consideration of natural disturbances in the FEIS and Forest Plan remains deeply flawed in several respects.

[31] *See* Preamble to 2012 Planning Rule at p. 21212 (stating that the initial premise of ecological integrity is that "maintaining or restoring ecological conditions similar to those under which native species have evolved therefore offers the best assurance against losses of biological diversity and maintains habitats for the vast majority of species in an area, subject to factors outside of agency control, such as climate change.").

a. The Forest Service's Modeling is Flawed.

As a threshold matter, the Forest Service does not explain how the acreage of young forest created by natural disturbance would increase from one management approach (Tier 1) to another (Tier 2). The Forest Service explains on page 3-122 of the FEIS that "the Spectrum model was modified for Alternative E to incorporate a prescription for natural disturbances that create young forests. The amount of young forest created by wildfires, storms, and insects/diseases was estimated and tracked in that model." Table 38 depicts the amount of additional disturbance added to the model from natural disturbance. Under Tier 1, 1400 acres of natural disturbance creating young forests would occur in 10 years and 3,500 acres of natural disturbance would occur in 20 years. Under Tier 2, 1490 acres of natural disturbance would occur in ten years and 3,600 acres would occur in 20 years (FEIS at 3-123).

There is no explanation as to how storms, wildfire, insects, and other natural disturbances would increase the amount of young forest as the amount of regeneration harvests increases. This needs to be addressed by the Forest Service as it calls into question the integrity of the agency's modeling at the most basic level.

In addition, the model is fundamentally flawed because instead of starting with 2022 baseline conditions to evaluate increasing natural disturbances fueled by climate change, the model looks back fifty years ago to consider historic trends (Appendix D-19). Yet the weight of the science demonstrates that the effects of climate change are rapidly accelerating and therefore historic trends are likely not a reliable indicator of future trends. The Forest Service appears to have considered four different scenarios to develop estimates for future natural disturbance (Appendix D-19). Instead of continuing the arc from present day conditions, the Forest Service arbitrarily selected the Scenario that uses the estimated historic pattern over 5 decades and cycled that pattern over the planning horizon. *Id*. The Forest Service explains that they selected this scenario "because it is based on the available data or research for the Southern Blue Ridge ecoregion." *Id.*

The 2012 Planning Rule requires the use of the best available scientific information and requires the Forest Service to explain how it has met this mandate. 36 C.F.R. § 219.3. Data and methodology used in environmental analysis must be accurate, reliable, and relevant (FSH 1909.12, Sec. 7.12). "Reliability reflects how appropriately the scientific methods have been applied and how consistent the resulting information is with established scientific principles. *Id*. Relying on a model that is based on conditions dating back five decades rather than accounting for present and future natural disturbance trends is not consistent with the best available science requirement. The Forest Service implies that other scenarios were dismissed from further consideration because they were not based on the available data or research for the southern Blue Ridge ecoregion. But the Forest Service fails to elaborate and explain what additional data or research is needed, why without specific information relating to the Blue Ridge ecoregion only historical information can be utilized, and how using historic patterns is nevertheless accurate, reliable, and perhaps most importantly *relevant* to the issue of how natural disturbances *in the future* influence vegetation management decisions over the life of the revised plan.

NEPA also requires the use of the best available science. 40 C.F.R. § 1500.1(b). When an agency is evaluating reasonably foreseeable significant adverse effects on the human environment in an environmental impact statement, and there is incomplete or unavailable information, the agency shall make clear that such information is lacking. 40 C.F.R. § 1502.21(a). If the incomplete but available information relevant to reasonably foreseeable significant adverse impacts is essential to a reasoned choice among alternatives, and the overall costs of obtaining it are not unreasonable, the agency shall include the information in the EIS. *Id.* § 1502.21(b). If the information relevant to reasonably foreseeable significant adverse impacts cannot be obtained because the overall costs of obtaining it are unreasonable or the means to obtain it are not known, the agency shall include within the EIS (1) a statement that such information is incomplete or unavailable; (2) a statement of the relevance of the incomplete or unavailable information to evaluating reasonably foreseeable significant adverse impacts on the human environment; (3) a summary of existing credible scientific evidence that is relevant to evaluating the reasonably foreseeable significant adverse impacts on the human environment; and (4) the agency's evaluation of such impacts based upon theoretical approaches or research methods generally accepted in the scientific community.

The extent to which climate change driven natural disturbances will create young forests in the future is certainly relevant to the reasonably foreseeable significant adverse impacts of regeneration harvests to create young forests. In short, more natural disturbances will reduce the need for regeneration harvests to meet the desired forest conditions for young forests. Yet the Forest Service fails to follow NEPA implementing regulations when addressing the incompleteness and unavailability of the information it needs to consider when evaluating future natural disturbance trends in the modeling. No effort is made to discuss the relevance and importance of this missing information, what other existing credible scientific evidence might be relevant to evaluating future natural disturbance trends and the corresponding need or lack thereof of regeneration harvests, and how these impacts could otherwise be assessed in the absence of this missing information.

The Forest Service must re-run the Spectrum model and use scenarios that consider natural disturbance trends into the future, rather than simply relying on data from the last fifty years. To account for "the uncertainties in estimating disturbance regimes of the future in the face of a changing climate" (Appendix D-19), the Forest Service could identify varying levels of future disturbance across the spectrum and use these levels to help guide vegetation management over the life of the plan (i.e. 20 years). This could be accomplished through monitoring and through a feedback loop, the Forest Service could take an adaptive approach by adjusting the amount of regeneration harvests based on the levels of natural disturbance that are occurring throughout the forests.[32]

[32] In responding to comments that the Forest Service needs to monitor natural disturbances and take an adaptive management approach the Forest Service cites the climate change management approach in the climate change section of the Revised Plan. That section provides, "managing ecosystems in the face of climate change focuses on maintaining or creating resiliency and adaptability. Maintain a suite of adaptation and mitigation options, focusing on sustaining process and function" (Appendix A at 12). The Forest Service cannot rely on the climate change section alone to address these concerns. The section contains no standards or guidelines and does not include an adaptive management framework that monitors for natural disturbances and informs future decision-making when it comes to prescribing annual levels of regeneration harvests. The Forest Plan needs to specifically include a monitoring and adaptive management component that tracks natural disturbances across the forest and provides the

b. The FEIS Does Not Discuss How Natural Disturbances are Uniquely Affecting Each Ecozone.

According to the Forest Service, the Revised Plan "emphasizes management of ecosystems to meet the ecological needs of each forest community." To this end, the FEIS begins its analysis at the forest scale (young forest, old growth forest, and open woodlands) then steps down to ecozones (FEIS at 3-103-3-104). An ecological zone, or ecozone, is a unit of land that can support a specific plant community or plant community group based on environmental factors such as geology, temperature, moisture, soil fertility, and solar radiation (FEIS at 3-104). Ecozone composition or structure result from ecological processes, such as natural succession, as well as from disturbances such as fire and other biotic and abiotic stressors. *Id*. These ecozones all contribute to landscape integrity and diversity across the landscape through varied age classes and structural components, susceptibility to various disturbance regimes, and species composition and diversity. *Id*. Ecozones are impacted by historic events and management and present-day management, emerging threats, and climate change. *Id.*

Eleven ecozones have been mapped and include spruce-fir, northern hardwood, high elevation red oak, acidic cove, rich voce, mesic oak, dry-mesic oak, dry oak, pine-oak heath, shortleaf pine, and floodplains. *Id.* These ecozones are "dynamic, open systems where the current state is not fixed but rather always in a state of change due to ecological processes and disturbances." *Id*. The eleven ecozones spend different time periods in the young forest stage after a stand replacement event. These ages vary from rapidly growing mesic ecozones, such as rich cover forest at 10 years, to 35 years for slower growing high elevation site ecozones, such as spruce - fir." *Id.* at 3-119. Furthermore, it may take 100-140 years depending on the forest type to reach old-growth condition.

It is therefore extremely important that the Forest Service consider the extent to which the increased frequency and intensity of natural disturbances may be uniquely impacting each of these ecozones, how multiple, overlapping natural and manmade disturbance events could impact the recovery periods/return intervals within these ecozones, and how that may alter the decision-making when it comes to management actions (e.g., timber harvests) aimed at creating more young forests.

Unfortunately, the Final Plan falls significantly short in this regard. Very little attention is given to how natural disturbance has been impacting each of these ecozones, much less how these natural disturbances will be affecting these ecozones in the future. For example, for spruce-fir forests, the FEIS states that "low temperatures, high winds, hoar frost, and ice are important natural disturbances influencing this ecozone." FEIS at 3-135. The FEIS doesn't provide any more details and simply states that "most young forest conditions" would be created through passive management (i.e., natural disturbance) and canopy openings created by the balsam woolly adelgid. *Id.* Yet the discussion ends there. Group selection harvests would still occur despite the Forest Service's failure to analyze how these natural disturbances are uniquely

Forest Service with the opportunity to reduce the amount of regeneration harvests as natural disturbances increase so as not to exceed the NRV.

affecting spruce-fir across the Forests. *Id.* Without this analysis, there is no way to know whether these group selection harvests are even needed.

An almost identical discussion is included in the section for Northern Hardwood forests. Again, the FEIS states that "low temperatures, hoar frost, and ice storms are important natural disturbance events influencing the northern hardwood forest ecozone" (FEIS at 3-138). There are about 53,500 acres of northern hardwoods in the Forests. *Id*. Again, there is no further discussion of how natural disturbance has and will continue to impact this ecozone. Yet the Forest Service is proposing various "restoration" activities including thinning and release, various uneven-aged, and limited even aged treatments in northern hardwoods to benefit "structural development" and create more diverse habitat conditions for the endangered Carolina northern flying squirrel and golden-winged warbler (FEIS at 3-139). As with spruce-fir forests, there is no way to know whether these restoration activities are even needed without a closer look at how natural disturbances may already be contributing to desired forest conditions.

The same cursory treatment of the impacts of natural disturbances is provided for high elevation red oak forest despite their critical component in spruce-fir and northern hardwood habitats and their importance in maintaining many species of birds and mammals dependent upon other higher elevation forests (FEIS at 3-143-3-144). Nevertheless, prescribed fire and mechanical treatments would still be used in these areas as "restoration" opportunities even when the Forest Service hasn't considered how natural disturbance may be affecting these forests and species (FEIS at 3-144).

For dry oaks forests, "wind, ice storms, and fire are all important natural disturbances influencing this ecozone." Despite these natural disturbances, and the xeric site conditions that limit competitive mesic species from establishing, "combinations of management actions would be used to enhance different phases of oak's life-cycle, such as prescribed fire with thinning and irregular shelterwood treatments." FEIS at 3-154. Canopy manipulation and fire would be implemented (FEIS at 3-154-3-155). No analysis of how natural disturbance is affecting these forests is provided.

In the case of floodplain forests, only a brief mention of natural disturbance such as flooding is made, without any further discussion of how these (or other disturbances such as storms) are shaping and will continue to shape this ecozone in the future. Yet despite these "dynamic systems that are in a constant state of change" vegetation management of the tree canopy (including both commercial and noncommerical harvests) can occur in these areas (FEIS at 3-175). This will occur even though some timber practices like clearcutting can contribute to the introduction and spread of invasive plants. Invasive species are the very reason why floodplain forests are in "poor condition" and under Alternative E they are likely to remain in that condition (FEIS at 3-175).

In the section discussing cove-forests, a little more attention is given to natural disturbance, but the discussion still falls short of explaining how the effects of these natural disturbances should be considered when developing management options and where they should be applied in the landscape. The FEIS notes that acidic cove and rich cove ecozones occupy about 44% of the forests. Many of these forests have small canopy gaps resulting from individual tree mortality

and tree regeneration in the understory. Notably, "over the next 50 to 100 years, cove forests will increase in structural complexity because a patchwork of canopy gaps will increase structural elements such as understory plants, young trees, forest layers, foraging opportunities, and potential nest sites." Stands of eastern hemlock have been severely impacted by hemlock woolly adelgid resulting in standing dead stems and large quantities of snags in the ecozone. Large disturbances such as tornadoes have resulted in some cove forests being dominated by tulip poplar. Thus, it appears natural disturbances are influencing the structure and composition of cove forests in many ways. Although acidic coves "are generally stable, and subject to smaller-scale natural disturbances" with gap-phase dynamics favoring the increased abundance of certain species over time, the Forest Service is concerned that other species may compete for occupancy (FEIS at 3-159). Therefore, the Forest concludes that a "full range of management options" must be used to reduce these species dominance, including harvest of variable gap size and/or thinning. The reduction of great laurel layers may also be implemented in streamside zones.

But again, there is no discussion where these management actions should take place in the Forests and the Plan does not impose any limitations in these areas where natural disturbance is resulting in desired forest conditions. Similarly, for rich coves, which make up 199,000 acres in the Forests, they are "generally stable" and subject to smaller-scale natural disturbances. Herbaceous diversity is also expected to increase with small scale natural disturbance. However, given the potential for white pine or tulip poplar dominance, the FEIS states that a "full range of management options" are required (FEIS at 3-162). These options include harvest of variable gap sizes and or thinning as well as what appears to be the harvest of oaks species. Although the FEIS does not elaborate on what types of harvests these may include. But the Plan does not limit harvests only in areas where white pine or tulip poplars may be outcompeting other species. This is particularly concerning given that cove sites "are the most vulnerable ecozones to invasion of non-native invasive plant species" and many species (particularly salamanders) take a long time to recover following a harvest in these ecozones (FEIS at 3-163). Again, even with some discussion of natural disturbance, the FEIS does not examine the particular areas where vegetation management would augment natural disturbance and where it would be inappropriate. More importantly, the Forest Plan doesn't impose any sideboards that consider the effects of natural disturbance and where, when, and how management options should be pursued in the Forests.

It is particularly important for the Forest Service to analyze not just how natural disturbances may be uniquely impacting each ecozone, but also where in the landscape these natural disturbances are having the most significant impacts. This is particularly relevant in determining where and when to rely in vegetation management and this may have the greatest importance in areas that are subject to the greatest amount of logging. This is especially true for the Matrix, which is the largest management area in the Forests and functions as large patch landscape. Within the Matrix, active restoration activities are carried out to "augment natural disturbance to provide greater resiliency for ecosystems and wildlife, by enhancing composition, structure, function or connectivity." *Id*. at 3-115. Under Desired Condition MAT-DC-02, "Young forests, across all ecozones, occur at a higher frequency in Matrix compared to other management areas. Locally, young forest patch size will frequently exceed average natural disturbance gap size to provide for habitat diversity and benefit wildlife, and to facilitate restoration operations and

financial considerations, but will not contribute to exceeding the Natural Range of Variation at the landscape level." *Id.*

But without analyzing the ways in which climate change may be resulting in more frequent and intense wildfires, enabling and prolonging the outbreak of pests and disease, and causing greater windthrow during hurricanes, it begs the question whether using timber harvests to create more young forests is appropriate and necessary to "augment" natural processes and whether the Forest Service can accurately say these activities will not contribute to exceeding the NRV.

Although modifying forest structure and composition can modulate climate sensitivity of disturbance regimes in some instances by lowering the probability of a subsequent disturbance by the same agent,[33] an overzealous approach to creating more young forest conditions may ultimately lead an imbalance in the age and structural class of the national forests, making them more vulnerable to climate change.[34] Forests in the Southern United States already have the highest percentage of carbon lost to timber harvest of any region (92%)[35] and an increasing rate of natural disturbances driven by climate change could further diminish current net carbon uptake.[36]

The Forest Service's failure to adequately discuss the impacts natural disturbances are having on the landscape and the impacts they will have in the future, is arbitrary and capricious because it "fails to consider an important aspect of the problem."[37] The increasing frequency and magnitude of storms, floods, drought, fire, and other disturbances is critical to determining where, when, and how much regeneration harvests are needed across these forests. Without considering these effects, the Forest Service has not given the Plan the necessary "hard look" that is required before the agency leaps into engaging in a fourfold increase in logging throughout the Forests. This analysis must be included in the FEIS for this Plan and the Forest Service should reduce the amount of regeneration harvests in consideration of the effects of natural disturbances in the Forests.

c. <u>The FEIS Fails to Explain How Regeneration Harvests "Mimic" Natural Disturbances</u>.

[33] Seidl, R. et al. 2017.
[34] Older forests in the Eastern United States have been found to be less vulnerable to climate change than younger forests. *See* Thom, D. et al. 2019. The climate sensitivity of carbon, timber, and species richness covaries with forest age in boreal-temperate North America. Global Change Biology, 2019; DOI: 10.1111/gcb.14656.
[35] Harris, N.L. et al. 2016. Carbon Balance Manage 11:24. DOI 10.1186/s13021-016-0066-5.
[36] United States Global Change Research Program, Second State of the Carbon Cycle Report, Chapter 9, at https://carbon2018.globalchange.gov/chapter/9/.
[37] *See National Ass'n of Home Builders vs. Defenders of Wildlife*, 551 U.S. 644 (2007). *See also Wild Fish Conservancy v. Irving*, 221 F. Supp. 3d 1224, 1234 (E.D. Wash. 2015)(finding that the agency failed to consider an important aspect of the problem when it failed to consider the potential effects of climate change on stream flows in connection with its analysis of the effects of a hatchery's operations and water use on listed salmon and their critical habitat); *Pacific Coast Federation of Fishermen v. Gutierrez*, 606 F. Supp. 2d 1122, 1184 (E.D. Cal. 2008)(holding that the agency failed to consider an important aspect of the problem by failing to "address, adequately explain, and analyze" the effects of rising temperatures and hydrological changes to a river system when assessing the impacts of a water project on a listed species).

The FEIS assumes that vegetation management prescriptions like regeneration harvests can "mimic" the effects of natural disturbance. (FEIS at 3-393, 3-398, and 3-403). Yet not much is known about the ecological basis of this approach and an exact match between natural disturbance and forestry operations is likely "unattainable, as the basic idea of forestry is to remove timber from the forest."[38] In many instances, natural disturbance and human caused disturbance, such as clear-cutting, may differ substantially in their ecological effects across different scales.[39] Whether these harvests will come close to mimicking natural disturbances will likely turn on several factors, including the ecozone, their size and placement.

Further, clearcutting does not always mimic natural disturbances or yield the same species benefits. For example, as explained later, large 40-acre clearcuts neither mimic small gaps created by natural disturbance nor benefit species such as federally listed bat and bird species who depend on more mature forests and a closed canopy. In addition, post-disturbance forests have high loads of coarse woody debris which provides legacy habitat features and complex soil development, while canopy gaps created by regeneration harvests are devoid of such complexity.[40] If regeneration harvests don't deliver the same benefits, then it makes even less sense to rely on these management actions if natural disturbances are already creating desired forest conditions in the landscape due to climate change.

The 2012 Planning Rule requires the Forest Service to use the best available science (36 C.F.R. § 219.3) and NEPA requires the Forest Service to identify the methodologies it used and the data it relied upon to support its conclusions that management activities would otherwise "mimic" natural disturbance (40 C.F.R. § 1502.24).

The Forest Service, however, does not explain its assumptions nor does it examine the differences between human caused and natural disturbances, despite calling for up to a fourfold increase in regeneration harvests. These failures are compounded by the fact that the Forest Service discounts the amount of natural disturbances that will occur across the Forests in the future. The FEIS does not consider, for instance, whether these harvests will occur in a scattered fashion across certain ecozones or if they will be concentrated in areas where natural disturbances are unlikely to create such large openings, void of a canopy. It is the Forest Service's burden to support these assertions and the absence of such a discussion is a major deficiency in the Forest Plan and FEIS that needs to be addressed.

In sum, the Forest Service needs to reexamine the appropriateness of using timber harvests to create early seral forests given the impacts of climate change on natural processes. The Forest Service should not continue to assume that disturbances will have a relatively small and ephemeral impact on the forests and that active management is always necessary to achieve

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[38] Niemela, J. *Management in relation to disturbance in the boreal forest*. 1999. Forest Ecology and Management 115: 127-134.
[39] *Id.*
[40] *See* Swanson, M.E., et al. 2011. The Forgotten Stage of Forest Succession: Early-Successional Ecosystems on Forest Sites. Biological Sciences Faculty Publications. 278. http://scholarworks.umt.edu/biosci_pubs/278; Sippola, A.L., et al. 1998. Amount and quality of coarse woody debris in natural and managed coniferous forests near the timberline in Finnish Lapland. Scand. J. For. Res. 13: 204-214; Goodburn, J.M. and Lorimer, C.G. 1998. Cavity trees and coarse woody debris in old-growth and managed northern hardwood forests in Wisconsin and Michigan. Can. J. For. Res. 28:427-438.

desired young forest conditions. The Forest Service should proceed in a manner consistent with the precautionary principle, revisit the assumptions made in the PNV and NRV models regarding natural disturbance, and factor in the increase in frequency and intensity of climate change induced and amplified disturbances across the forests. These Forest Plan should also require monitoring of natural disturbances to better inform an adaptive management approach to the creation of young forests. Moreover, the Forest Service should provide a full accounting of the Forests' role in sequestering carbon, along with the cumulative impact of management and disturbance trends across the National Forest System.

2. The Final Forest Plan Fails to Consider the Quality of Existing Habitats, Their Location, and Species Diversity When Relying on Regeneration Harvests to Create More Young Forests.

The Final Plan's approach to using timber harvests as a tool for ecological restoration is further flawed because it fails to consider where, when, and why logging is appropriate to achieve the desired condition of creating young forests.

First, the Final Plan (as with the Draft Plan) does not differentiate between high quality habitats and degraded habitats when identifying timber harvests as the ecological tool of choice for creating young forests. While it may make sense to cut stands with low species and structure diversity such as pine plantations, it makes far less sense from a cost-benefit standpoint to log more diverse areas, especially old growth areas, especially if natural disturbances are already providing desired forest conditions.

As the Forest Service concedes, old growth forests "are currently rare in the Southern Appalachians" (FEIS at 2-13). While Alternative E establishes an old growth network that is larger than the other alternatives (FEIS at 2-4), and we appreciate the inclusion of additional 54,000 acres into the network, the Forest Plan provides no blanket protections for old growth that has not been inventoried as the network does not account for all pockets of old forest that may exist in the Forests (FEIS at 2-13). In fact, it provides few protections at all. It appears that Alternative E provides the Forest Service staff with just as much discretion to log these areas based on desired conditions of the management areas within which they occur as they have to protect these areas from logging. In describing Alternative E the FEIS explains, this approach "provides the local line officer discretion about what to do when additional high-quality old forest is found during the planning cycle. The district ranger, or the forest supervisor for multi-district projects, will retain the option of how to manage old trees, old stands, or old growth forest patches in the project itself, depending on the management area direction, site-specific conditions, and ecological needs in the area. If an area is identified as best managed for old growth characteristics, then the project can manage for those conditions, but the area will not be added to the forestwide Designated OG Network. With a Forest Plan that not only prioritizes the creation of young forest but also "increases the pace and scale of young forest habitat creation" (FEIS at 2-21), there is little standing in the way of the Forest Service from logging these old growth stands in the name of achieving "the management area direction" or "ecological needs" of the area. There are no standards or guidelines in the Forest Plan to help inform this decision-making process or any sideboards to protect these patches when the benefits of doing so clearly outweigh any temporary gains in increasing the acreage of young forest to meet the Plan's targets.

Moreover, Plan Standard OGN-S-02 sets the size and configuration of the designated Old Growth Network that is defined in the Forest Plan and the size and configuration is maintained through the life of the plan (FEIS at 3-406). Even if old growth characteristics are present in a stand that is slated for timber harvest, this patch will not be added to the network. This could have profound impacts on old growth patches within management areas such as the Matrix where the heaviest concentration of young forest creation will occur. Further, even if old growth areas are spared from the axe in a particular prescription, by not adding them to the old growth network the Forest Service cannot set aside these areas from future harvests much less fully account for the amount of old growth that is on the Forests. The monitoring and adaptive management plan is only focused on old growth patches *within the network* (Forest Plan at 291).

Given the continuing decline in old forests across the 18-county area resulting from development (FEIS at 3-412), the increase in natural disturbances that have contributed to the creation of young forest across the landscape, and the tremendous public support for increasing old growth protections, the Forest Service has not adequately explained why it is otherwise appropriate to maintain the status quo under the 1994 Plan and provide discretion about whether these patches should be managed for old growth characteristics versus other resource interests (FEIS at 3-386).

It is also worth noting that different tree species respond differently to regeneration harvests. Although some species may regenerate rather quickly, others may not be able to compete as effectively during regeneration.[41] For example, there can be challenges in regenerating oaks after clearcutting because other faster-growing species outcompete it.[42] Uneven aged-management such as group selection aimed at creating small openings could be an alternative to clearcuts because these treatments support oak regeneration and advance ESH wildlife habitat goals.[43] However, alternatives to regeneration harvests remained mostly unexplored and there are no standards for retaining these more vulnerable species to continue to provide species diversity. Moreover, regeneration harvests may present unique threats to certain high-quality areas, such as those found in rich cove ecozones. The Forest Service acknowledges that herbaceous species persist after logging based on their individual light capabilities and thus some species with narrower habitat condition requirements either persist in low densities or take a long time to recover following a harvest. These sites are also the most vulnerable ecozones to invasion of non-native invasive plant species after the canopy has been manipulated. Therefore, it is anticipated that the greater amount of canopy manipulation would result in a greater risk of invasive plant species introduction (FEIS at 3-163). Yet there is little consideration of these impacts in the FEIS and the Forest Plan does not include any standards or guidelines that specifically mitigate for these threats in these areas.

Given that annual regeneration harvests could nearly double under the Tier 1 scenario and nearly triple under the Tier 2 scenario, the FEIS must discuss the risks and limitations of using regeneration harvests in certain ecozones and provide greater specificity and direction regarding

[41] *See* Hannah, P.R. 1993. Composition and Development of Two Appalachian Hardwood Stands in North Carolina, Journal of the Elisa Mitchell Scientific Society 109(2): 87-98;
[42] *See* McNab, W.H. and Oprean, T.M. 2021. Composition and Structure of Reproduction in Group Selection Openings after 20 Years in a Southern Appalachian Mixed-Hardwood Forest. Forest Science 67(3): 335-346.
[43] *See id*.

where it would otherwise be an appropriate restoration tool. Although the FEIS points to forest plan management strategies such as "ensuring successful reforestation after harvest or mortality-inducing disturbances" (FEIS at 3-27), we have good reason to believe this will not occur. In a recent webinar on the Special Interest Areas (SIA) and Natural Heritage Areas (NHA) the Forest Service noted that many areas were not included as an SIA because the area is no longer high quality due to disturbance or management activities. In other words, the Forest Service's track record may not be great in ensuring successful reforestation after harvest or mortality-inducing disturbances. Accordingly, there should be a strict prohibition on creating early seral conditions in existing old growth and Natural Heritage Areas. As discussed later, species such as the Carolina Northern Flying Squirrel depend on these highly diverse, old growth habitats and are extremely sensitive to habitat loss and fragmentation.[44]

Second, in addition to not differentiating between high-quality and low-quality habitats when ascribing the use of regeneration harvests throughout the ecozones, the Final Plan does not consider the timing of these timber harvests and only provides an annual estimate of the acres that would be harvested. To re-emphasize our earlier point about natural disturbances, the Forest Plan needs to factor in natural disturbances (amplified by climate change) when determining the appropriate amount of early seral habitat. For example, it would not only be unnecessary but also detrimental to species diversity if a timber harvest is planned for an area where forest gaps have been recently recreated by natural disturbances, such as fire, windthrow, or insects. Moreover, studies have found that if drought and drought-induced fires become more common in the southern Appalachians, fire-tolerant oak and hickory species may become more abundant than less tolerant tulip poplar, maple, basswood, birch, and magnolia species, potentially reducing diversity in currently highly diverse mesic forests.[45] To proceed with harvesting these areas anyway without concern for maintaining species diversity and the future impacts of climate change, just to satisfy the NRV within the next ten years would be misguided, to say the least. Again, the Final Plan makes no mention of these considerations.

Third, the Final Plan does not adequately explain why timber harvests are the most appropriate tool. There is little discussion weighing the advantages and disadvantages of using regeneration harvests instead of other active management approaches (such as thinning and prescribed fire) or relying more on natural disturbance agents to achieve the NRV for young forests (FEIS at 3-50-54). The Forest Service in essence contends that the primary silvicultural systems employed have been even-aged with two-aged shelterwood removal harvest being the dominant type. In comparison, group selection and intermediate treatments like commercial thinning have been utilized to a much lower degree. While the FEIS recognizes that old approaches may need to be reassessed and new techniques should be considered for use to meet multiple objectives that require managing for species diversity, promoting heterogeneity, etc., the discussion does not go any deeper to examine the negative impacts associated with using traditional even-aged regeneration techniques to create young forests[46] and how more contemporary approaches should

[44] *See* Weigl, P.D. 2007. The Northern Flying Squirrel (Glaucomys Sabrinus): A Conservation Challenge. Journal of Mammalogy, 88(4): 897-907 ("The small and disjunct squirrel populations of central and southern Appalachia appear particularly vulnerable to any further modification or reduction of their habitats").

[45] McNulty, et al. 2013. Forests and Climate Change in the Southeast USA, at https://www.srs.fs.usda.gov/pubs/ja/2013/ja_2013_mcnulty_001.pdf.

[46] The FEIS notes elsewhere in the FEIS that historic clearcut harvesting has likely led to plant composition shifting to favor certain species like rhododendron in certain areas (*id*. at 3-43), changed streamflow and sedimentation in the

be pursued in certain instances. Impacts such as desiccation of the forest floor and the resulting impacts to dispersal limited species are ignored.

A key consideration under NEPA is whether the "selection and discussion of alternatives fosters informed decision-making and informed public participation." *California v. Block*, 690 F.2d 753, 767 (9th Cir. 1982). NEPA requires the Forest Service to "evaluate a reasonable range of alternatives to the proposed action, to allow the decision-makers and the public to evaluate different ways of accomplishing an agency goal." *Pacific Marine Conservation Council v. Evans*, 200 F. Supp. 2d 1194 (N.D. Cal. 2002). Without a more nuanced and robust discussion of the environmental costs and benefits of using timber harvests to create more young forests, the Final EIS fails to provide the public with enough information to meaningfully evaluate the alternatives and determine whether this is the appropriate management approach to achieving the desired condition of more young forests. The Forest Service must engage in a much more rigorous analysis which provides a clear basis for choice among options by the decisionmaker and the public.[47]

3. The Final Plan Does Not Adequately Consider "All Lands" When Calculating the Amount of Regeneration Harvests Needed to Create More Young Forests.

The young forest conditions of the broader landscape need to be considered in relationship to the Forest Service's plans to establish more early seral conditions. The 2012 Planning Rule states that a forest plan should "reflect the unit's expected distinctive roles and contributions to the local area, region, and Nation, and the roles for which the plan area is best suited, considering the Agency's mission, the unit's unique capabilities, and the resources and management of other lands in the vicinity." 36 CFR 219.2(b)(1). This "all lands approach" requires the Forest Service to "look across boundaries throughout the assessment, plan development/revision, and monitoring phases of the planning process." Preamble to 2012 Planning Rule, 77 Fed. Reg. 21162, 21173 (Apr. 9, 2012).

In preparing forest plans and plan revisions, the Forest Service must "consider and evaluate existing and possible future conditions and trends of the plan area, and assess the sustainability of social, economic, and ecological systems within the plan area, *in the context of the broader landscape*." 36 C.F.R. § 219.5(a)1(emphasis added). Plans "must include plan components, including standards or guidelines, to maintain or restore the ecological integrity of terrestrial and aquatic ecosystems and watersheds in the plan area…" 36 C.F.R. § 219.8 (a). Planning regulations foresee the Forest Service's beneficial role in sustaining desirable ecological conditions in the broader landscape but also recognize that activities on state and privately held land may adversely affect ecological conditions on national forests. Because of this, components must take into account "contributions of the plan area to ecological conditions *within the broader landscape* influenced by the plan area" and "*conditions in the broader landscape* that may influence the sustainability of resources and ecosystems within the plan area." 36 C.F.R. § 219.8(a)(ii)-(iii). "Landscape" is defined as "a defined area irrespective of ownership or other

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Coweeta watershed (*id*. at 3-59), and along with disease, fires suppression, roads, and invasives, contributed to "dramatic changes" in the appearance of these forests (*id*. at 3-471). The brief mention of these significant impacts elsewhere in the FEIS demands closer scrutiny of how clearcutting and two-aged shelterwood removal harvests (that mimic clearcuts in many ways) are continuing to impact the Forests.

[47] 40 C.F.R. § 1502.14.

artificial boundaries, such as spatial mosaic of terrestrial and aquatic ecosystems, landforms, and plant communities, repeated in similar form throughout such a defined area. 36 C.F.R. § 219.19. Thus, the broader landscape includes non-federal lands outside the national forest boundaries.

Despite these mandates in the 2012 Planning Rule, and the statement on page 24 of the Final Plan that the Forest Service uses an "all-lands approach, which considers the Forests in context with the surrounding landscape, because we know that problems do not stop at the Forest boundaries," the Final Plan fails to provide a clear picture of the role of the forest within the broader landscape and how the conditions of the broader landscape may influence the sustainability of resources and ecosystems within the plan area.

In Chapter 1, the Forest Service explains that the national forests make up "27 percent of all forested land in the 18-county plan area" (Final Plan at 13) and notes that "most of the forested land in WNC [Western North Carolina] is privately owned." (Final Plan at 14). In the FEIS the Forest Service includes a section to provide information regarding the condition of surrounding forests, presumably in an effort to address comments noting the absence of an "all lands" analysis for young forests (Appendix A at 35; FEIS at 3-131-132).

However, the FEIS contains an incomplete assessment of private and public lands and conflicting statements about the status and trends of young forests across the 18-county area. First, the FEIS limits its analysis on FIA data for privately owned timberlands, which is a subcategory of all forestland in the region based on the assumption that young forests are more likely to occur on private lands in this sub-category. *Id*. But this provides an incomplete picture of the total amount of young forest across the 18-counties and fails to completely capture current and future trends for all young forests in the region.

Even under this limited analysis, the FEIS presents more questions than answers. The FEIS provides estimates of age class for private and public timberlands across the study area. An estimated 10.7 percent of private timberlands are in the 10-20 year age classes (FEIS at 3-132). Private forest lands contain significantly more young forest than what the NRV model recommends for the forest. Not only is the proportion of young forest out of balance, but there is virtually no older growth forest on private lands. Currently, less than 2% of the forestland in the 18-county study area is 130 years or greater and all occurs on public lands. Further, some researchers have suggested that present-day amounts of young forests in northern hardwood and spruce-hardwood forests in some regions of the United States may be several times higher than in pre-settlement times.[48]

In addition, the vast majority of forested lands in the region are privately owned and timber companies make up an increasing percentage of that ownership. According to the North Carolina Division of Forest Resources, the 18-county area of Western North Carolina is home to nearly 4 million acres of forests. The 18-county region is 76 percent forested, and over 70 percent is privately owned. Ownership of private forests in the region by timber companies has increased

[48] Lorimer, G. and White, A.S. 2003. Scale and frequency of natural disturbances in the northeastern US: implications for early successional forest habitats and regional age distributions. Forest Ecology and Management 185 (2003) 41-64.

in the past decade.[49] The USFS Southern Research Station concludes that private companies own three times as much forest as the U.S. Forest Service.[50]

That private forest lands heavily skew toward young forests and woodlands, begs the question why, when viewed within the context of the broader landscape, do the Forests need so much more young forests? This specific question is not answered in the FEIS (despite several commentators posing this question in their earlier comments on the DEIS). This is a significant shortcoming of the FEIS and by not addressing this question the Forest Service has improperly foreclosed the possibility that other reasonable alternatives, which call for the creation of fewer acres of young forests exist. This runs afoul of NEPA, which requires agencies to "rigorously explore and objectively evaluate all reasonable alternatives."[51]

Moreover, in addition to failing to address how the overabundance of young forests in the surrounding landscape should be considered when determining how much more young forest is needed on the Forests, there is also no analysis of how the amount of young forest is trending across the broader landscape. The FEIS mentions a few impacts for young forests on private lands including land development, fragmentation, and a general observation that "forest landowners are changing and many new owners want to manage forests for aesthetic or cultural objectives rather than a working rural forest that produces young forests." In addition to these vague statements the Forest Service provides conflicting statements ranging from "early successional habitat on private lands is increasingly being developed," (Appendix A at 35) to "it is uncertain whether private land would maintain the amount of young forest into the future," (FEIS at 3-132) to "across the broader Southern Appalachians, continued development on private lands will result in loss of older forests toward more young forest conditions" (FEIS at 3-412). It is apparent that the Forest Service really hasn't assessed the trends for young forests in the region, and as other commenters have explained in previous comments on the Draft Plan, the data suggests that annual ESH creation on private forest lands is occurring at more than four times the rate of ESH creation on the Forests.[52] Therefore, to comply with the 2012 Planning Rule, the Forest Service must not only include information about these trends but also consider and evaluate the Forest Service's plans to create more young forests within the context of the present and future conditions of the broader landscape.

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[49] *See* Roeder, K. Forestry and Tree Planting in North Carolina.

[50] *See* Brown, M.J. et al. 2006. North Carolina's Forests, 2002. United States Department of Agriculture, Forest Service, Southern Research Station. Resource Bulletin SRS-113.

[51] 40 C.F.R. § 1502.14(a)-(c). NEPA requires federal agencies to "evaluate a reasonable range of alternatives to the agency's proposed action, to allow decision-makers and the public to evaluate different ways of accomplishing an agency goal." *Pacific Marine Conservation Council v. Evans*, 200 F. Supp. 2d 1194 (N.D. Cal. 2002). The statute also "does not permit the agency to eliminate from discussion or consideration a whole range of alternatives, merely because they would achieve only some of the purposes of a multipurpose project." *Town of Matthews v. U.S. Dep't. of Transp.*, 527 F. Supp. 1055 (W.D. N.C. 1981); *see also, North Buckhead Civic Assoc. v. Skinner*, 903 F.2d 1533, 1542 (11th Cir. 1990) (a discussion of alternatives that would only partly meet the goals of the project may allow the decision maker to conclude that meeting part of the goal with less environmental impact may be worth the tradeoff with a preferred alternative that has greater environmental impact.").

[52] *See* Southern Environmental Law Center, The Wilderness Society, MountainTrue, and Defenders of Wildlife, Comments on the Nantahala and Pisgah National Forests Draft Land Management Plan and Draft Environmental Impact Statement, 55 (June 29, 2020).

It is also important that the Forest Service consider the conditions of private and state-owned lands when it comes to the protection of rare species. As the Final Forest Plan acknowledges, many plants and animals may have opportunity to thrive across the broader landscape, but those that are rare or that require special conditions may be better protected or find refuge on parts of the landscape more common within the National Forest System lands and unique habitats found there (Final Plan at 14). Therefore, there may be an even greater need for additional mid-age, late-age, and old growth forest to compensate for the lack of these habitats across the broader landscape. The Planning Rules specifically contemplate instances where the National Forest may need to compensate for degraded conditions on the broader landscape or to mitigate the effects of external stressors to "contribute to maintaining a viable population of the species within its range." 36 C.F.R. § 219.9(b)(2)(ii). As we discuss later, some of these species may include the North Carolina Northern Flying Squirrel, several federally listed bat species, and over two dozen salamander species. However, the FEIS does not examine the status and trends of these species across the broader landscape, how private lands are either contributing to or detracting from species conservation goals, and what unique role the National Forests play in providing refuge for these species.

Instead, the FEIS and Final Plan explains at length how the agency needs to create more ESH to respond to demand to provide quality hunting opportunities for a small number of "demand wildlife species," such as grouse, deer, and turkey, and has established numerous desired conditions, standards, and guidelines to accomplish this (Final Plan at 65-69, 72, 179-80, 184-85, 189, 193, 205, 214). Most of these game species, however, have either stable or increasing populations. Deer populations have been stable over the last eight years (FEIS at 3-371). Turkey populations have expanded in range and density in last 25 years with a slight increase in harvests (FEIS at 374). Black bears (which are considered a game species in North Carolina) have relatively stable populations, and have experienced increased populations over the last several decades (FEIS at 3-378). The ruffed grouse population has only experienced a slight downward trend (FEIS at 3-364). Moreover, species such as deer and bear are generalists requiring a range of habitats and it is projected that all these species will persist and even increase in their populations under all alternatives, even under the no action alternative (FEIS at 3-369, 3-373, 3-377, 3-380). These facts do not support the purpose and need statement to increase ESH to increase populations of game species "in decline" (FEIS at 1-6), particularly at the expense of federally listed species and hundreds of species of conservation concern (as explained later in our comments). Rather, framing it is this way just appears to be a pretext for the Forest Service to create more open areas to increase harvest numbers for many of these species. The Forest Service must provide greater balance in its discussion of the impacts of creating more ESH in the Forests.

In sum, the Forest Service must consider the need for early seral forests when viewed through the lens of the broader landscape, and whether the amount of regeneration harvests called for by the Forest Plan is necessary and appropriate given the present and future trends of ESH on private lands.

4. Remedies

- Using the best available science, the Forest Service must reassess the impacts of climate change driven natural disturbances into the next fifty years. This modeling must begin with current baseline conditions rather than assessing the historical period from 1950 to present. The analysis must be included in the EIS.

- The Forest Service must analyze in the EIS the size, location, and impacts of past natural disturbances, howe these natural disturbances have affected (and are expected to affect) each ecozone, and how vegetation management will be carried out in consideration of these effects (e.g., whether regeneration harvests would occur within or in proximity to an area already impacted by natural disturbances).

- The Forest Service must analyze in the EIS the differences between human and natural disturbances, how vegetation management would or would not "mimic" natural disturbances, and the impacts of using regeneration harvests on forest health and biodiversity in view of increasingly larger, more intense, and more impactful natural disturbances occurring throughout the Forests.

- The FEIS must discuss the risks and limitations of using regeneration harvests in certain ecozones and provide greater specificity and direction regarding where it would otherwise be an appropriate restoration tool. The FEIS must also discuss the timing of these activities in relation to natural disturbances that have occurred across the Forests. The FEIS must also discuss the differences between the impacts of regeneration harvests and other management activities used to create ESH (prescribed fire, uneven management, thinning, etc.) and where non-even aged management approaches could be utilized to create ESH.

- The FEIS and Forest Plan must analyze the Forest Service's plans to create more young forest within the plan area, in the context of a broader landscape that has a much higher percentage of young forests and is trending towards even more young forest in the future. The analysis must include a discussion of how the Forests are sustaining desirable ecological conditions in the broader landscape, how regeneration harvests on state and privately held land (producing young forests) may adversely affect ecological conditions on national forests, and how ESH conditions in the broader landscape may influence the sustainability of resources and ecosystems within the plan area.

- The FEIS must include an additional alternative for the public to consider that places greater reliance on natural disturbances to create ESH and achieve the NRV.

B. OBJECTION #2: The Final Plan Fails to Conserve Plant and Animal Diversity Through a Coarse-Filter/Fine-Filter Approach.

The Forest Service is directed to take a "coarse-filter/fine-filter approach" to conserving the diversity of plant and animal communities. 36 C.F.R. § 219.9. Coarse filter strategies are based on providing a mix of ecological communities across a planning landscape (FEIS at 3-103).

Fine-filter approaches on the other hand are based on providing specific habitat elements needed by individual species, or other groupings of species. *Id.*

The Final Plan recognizes the need for both a coarse-filter and fine-filter to provide plant and animal diversity across the Forest (Final Plan at 74). The Plan explains that 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." *Id.* The fine filter provides for specific habitat needs that are not met by the coarse filter. *Id.* The Plan further states that the Terrestrial Ecosystem section primarily serves as the coarse filter while the Plant and Animal Diversity section primarily serves as the fine filter. *Id.*

Unfortunately, as explained below, neither the coarse-filter nor the fine-filter provide adequate protections for a long list of endangered and threatened species and species of conservation concern on the forest.

1. The Final Plan's Coarse Filter Does Not Account for the Needs of Many Listed Species and Species of Conservation Concern.

The Final Plan purports to adopt a coarse filter that identifies conditions to maintain or restore ecological integrity and resilience of ecosystems to account for the needs of most native species. *Id.* Unfortunately, the Final Plan falls far short of accomplishing this objective.

The coarse-filter is based on an assessment of eleven ecozones, which are identified by certain "key characteristics" that include variation, canopy, shrub layer, herbaceous layer, elevation, ecological processes, disturbance gap sizes, community patch size, and examples of wildlife species associated with that ecozone (Final Plan at 50-64). The coarse-filter identifies restoration priorities focused on restoring ecozone composition and structure (Final Plan at 51-52), the terrestrial wildlife habitat conditions across all ecozones (Final Plan at 66), and integrated ecosystem and wildfire habitat objectives and management approaches (Final Plan at 69-73).

The coarse filter falls short of meeting the needs of many listed species and species of conservation concern because it does not recognize the complex and nuanced relationships many species have within the forest and across the larger landscape. This is largely due to the Forest Service's reliance on the Ecological Sustainability Evaluation (ESE) tool when developing its coarse filter components. This tool captures "the primary analysis of effects to biodiversity, including rare species" (FEIS at 3-334; FEIS at 3-336). As the FEIS explains, the general approach to evaluating ecological sustainability and species diversity is to 1) define ecozones and unique habitats, key characteristics, stressors and threats to these systems; 2) identify species for these ecological systems and link them to species groups; 3) link species groups to ecological systems; 4) identify indicators and values to sustain all ecological systems and species groups; 5) estimate outcomes of the indicators for each alternative; 6) calculate ecological sustainability scores for each ecological systems and species group by alternative; 7) check plan components for species specific needs (FEIS at 3-107).

At its core, the ESE tool only takes a landscape-level approach because it looks to whether the forests are moving toward NRV to determine whether the plan components will meet species'

needs: "a key consideration in using the ESE tool in this evaluation is the direction of change from current conditions to expected future conditions over time" (FEIS at 3-107). As the FEIS explains, "using a coarse-filter perspective, when the ecological sustainability composite score improves over the existing condition by moving from a lower to a higher ranking, or by improving the score within the same ranking over time, *it is assumed that plant and animal species associated with the ecozone or species group would persist and potentially even expand*" (FEIS at 3-107) (emphasis added).

However, it is too simplistic to assume that no matter the species of plant or animal associated with an ecozone or species group it will persist and potentially expand so long as the Plan achieves the NRV for that ecozone. Some areas may represent "hotspots" of biodiversity. Due to their unique geographic location, they may serve as wildlife corridors and linkages to other species populations. They may also contribute to species dispersal and gene flow. Some stands may have a greater abundance of certain species due to the presence of certain geologic features, soil types, elevation, microclimates, and other characteristics. For instance, green salamanders may occur in higher concentrations in areas with a greater presence of shaded rock outcrops. Some stands with rich tree species diversity and that are old growth or trending to old growth may have a higher density of cavity trees for species such as the Carolina Northern Flying Squirrel, or maternity roost sites for listed bat species. Riparian areas and streamside zones that have substantial tree canopy may have a higher presence of aquatic species that require cooler water temperatures to survive. Moreover, certain species such as the CNFS may not be evenly distributed through spruce-fir and northern hardwood forests due to the presence of roads in certain areas.[53]

Unfortunately, the coarse filter does not consider the connections between these unique habitat elements and these species, nor does it consider the unique threats posed by management disturbances to species such as the CNFS. As explained later, the CNFS occurs in high densities in specific areas of spruce-fir forest and adjacent hardwood forests. Therefore, impacts to CNFS could occur from regeneration, and the extent of those impacts depends on the location of those harvests rather than where it will occur elsewhere in the forest. Yet the coarse filter approach essentially treats all stands within an ecozone the same-as fungible units-to justify a broad-brush approach to managing these lands through predominately regeneration harvests. The coarse filter assumes that so long as certain forest composition and structure needs are met, the needs of most wildlife will be met, even if that means a three–to fourfold annual increase in regeneration harvests regardless of the location. This approach may have significant consequences for species like the CNFS that occur in isolated "islands" throughout the Forests as well as dispersal limited species (such as salamanders) that only occupy specific areas of the forest and have limited ability to move elsewhere. For these dispersal limited species, how well an entire ecozone is trending toward the NRV may not be a reliable indicator of whether the Plan is maintaining their viability or contributing to their recovery.

[53] The species is extremely sensitive to disturbance, so much so that it has been documented not to cross forest roads, which results in divided subpopulations that have reduced access to mates, den sites, and foraging grounds. *See* Kelly, C.A., Diggins, C.A., and Lawrence, A.J. 2013. Crossing structures reconnect federally endangered flying squirrel populations divided for 20 years by road barrier. Wildlife Society Bulletin 37:375-379, https://doi.org/10.1002/wsb.249.

To protect Forest wildlife and plants, section 219.9(b) of the Planning Rule requires the Forest Service to "determine whether or not the plan components…provide the ecological conditions necessary 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." If the Plan components do not unequivocally achieve that mandate, then section 219.9(b) requires "additional, species-specific plan components, including standards or guidelines… to provide such ecological conditions in the plan area." To satisfy the requirements of the 2012 Planning Rule, the Forest Service must employ a coarse-filter analysis that is much more sensitive to and responsive to the unique needs of federally listed species and species of conservation concern, particularly those that are dispersal-limited.

2. The Final Plan's Fine Filter Analysis is Inadequate to Address the Needs of Listed Species and Species of Conservation Concern.

As with the coarse-filter analysis, the fine-filter analysis is similarly deficient because the Final Plan and the FEIS do not adequately consider the impacts to listed species from converting thousands of acres of mid-to late-aged forests to young forest through regeneration harvests. The FEIS does not discuss how these silvicultural practices may uniquely impact these species by fragmenting CNFS habitat, removing important roosting habitat for Indiana bats and northern long eared bats, degrading water quality for listed aquatic species, and failing to protect important habitat for the threatened noonday globe.

The Final Plan states that the fine-filter protections described in the Plant and Animal Diversity section are intended to provide for "specific habitat needs that are not met by the coarse filter." *Id*. at 74. The Plan purports to begin with a discussion of threatened and endangered species (*id*. at 74-76) followed by a description of the species groups found on the Forests and the unique habitats found there. *Id.* at 77-83. There are standards, guidelines, and management approaches for all species groups as well as specific standards and management approaches for a few select species. *Id.*

The Final Plan also fails to include specific standards to safeguard these species from the impacts of regeneration harvests, much less identify the specific measures that will be taken to contribute to species recovery. Contrary to the Forest Service's characterizations, the section does not contain a "discussion" of threatened and endangered species (*Id*. at 74-76) but rather a mere listing of species followed by vaguely worded statements about documenting the occurrence of a species within the forest and maintaining their presence within currently occupied habitat. These statements are often repeated for multiple species, with little attention paid to each species' unique conservation needs (*Id.* at 75-76).

By failing to engage in a rigorous analysis of the potential impacts of forest activities on listed species, the Forest Service has not satisfied the requirements of NEPA. It also cannot accurately state that sufficient species-specific habitat elements will be retained on the landscape to ensure that the Plan will maintain the diversity of plant and animal communities and the persistence of native species in the plan area. 36 C.F.R. § 219.9. Further, the Forest Service cannot ensure that its actions are contributing to the conservation (i.e. recovery) of listed species as required by the 2012 Planning Rule, as well as Section 7 of the Endangered Species Act. The potential impacts

to these species and the shortcomings of the Final Plan and FEIS with respect to these species, are discussed below.

a. Endangered and Threatened Species

i. Carolina Northern Flying Squirrel (*Glaucomys sabrinus coloratus*)

The Carolina northern flying squirrel (CNFS) is listed as endangered under the ESA. The species is found in high elevation, mixed red spruce-northern hardwood and spruce-fir forests.[54] In the course of scientific research, CNFS have been captured in stands of varying age, understory, and composition, but most have been taken from moist forest with at least some widely spaced, mature trees (ideally old-growth forest).[55] The FEIS notes that "Optimal habitat conditions include cool, moist, *mature* forest with abundant standing and down snags" (FEIS at 3-259) (emphasis added). In a study of winter habitat and nest trees in northwestern British Columbia, Cotton and Parker (2000) found that although *Glaucomys sabrinus* are not limited to old-growth habitats, within younger stands, they select the largest, oldest, and tallest trees.[56]

As the FEIS recognizes, northern hardwood forests provide habitat for numerous wildlife species (including the CNFS and spruce-fir moss spider) that also rely heavily on neighboring spruce-fir forests. Because of their spatial relationship between ecozones, and the fact that they share many ecological components and plant species, these forests are critical to maintaining many species of wildlife that are dependent upon spruce-fir habitats (FEIS at 3-139). Tree species such as yellow birch, beech, sugar maple, buckeye, and others often provide more natural cavities and decaying wood than spruce or fir, which is critical for the CNFS. *Id*. CNFS occupy tree cavities, leaf and twig nests, and underground burrows but appear to prefer cavities in *mature* trees as den sites (FEIS at 3-259). The FEIS notes that these forests "provide essential habitat for several animal species found nowhere else in North Carolina, including the CNFS and a suite of high elevation associated terrestrial salamanders (FEIS at 3-139).

The Forest Service intends to primarily engage in a passive management approach, although 50 acres of young forest a year will be created under the Plan. *Id.* at 3-72. In the case of northern hardwood forests, however, a much more aggressive management approach is contemplated, and the amount of young forest would follow forestwide trends of increasing over 10 years to 50 years for all action alternatives (FEIS at 3-140). Sixty to ninety thousand acres of young forest would be created with at least 70% above 2,500 feet elevation (Final Plan at 66). Further, the plan calls for prioritizing at least 50% of young forest treatment units (including regeneration harvest) in oak-dominated, northern hardwood, and rich cove ecozones, emphasizing unit sites appropriate to enhance and restore habitat for species such as ruffed grouse." *Id*. at 72.

This is concerning because the Plan and FEIS do not elaborate on the nature of the vegetation management that will be undertaken in CNFS habitat (FEIS at 3-265). Will there be clearcutting

[54] U.S. Fish and Wildlife Service, Carolina northern flying squirrel, *Glaucomys sabrinus coloratus*, at https://www.fws.gov/southeast/wildlife/mammals/carolina-northern-flying-squirrel/
[55] U.S. Fish and Wildlife Service, Appalachian Northern Flying Squirrels Recovery Plan (1990) at 7.
[56] Cotton, C.L. and Parker, K.L. 2000. Winter Habitat and Nest Trees used by Northern Flying Squirrels in Subboreal Forests. Journal of Mammalogy, 81: 1071-1086.

of mature and older growth stands in CNFS habitat? Will thinning be used instead to retain taller, older, and larger trees? How will fine-scale habitat desired conditions intended to conserve bird and bat species (i.e. leaving four or more snags per acre) also benefit a species that depends on closed canopy older forests? (FEIS at 3-261-262). What does the Forest Service mean when WLF-DC-06 states that trees greater than 9" DBH exhibiting crevices and other suitable denning characteristics are "present across the landscape" and how will this offset the loss of thousands of acres of older trees every year under tier one or tier two approaches? (FEIS at 3-261, 3-275). Similarly, how will the Forest Service "emphasize" native trees with exfoliating bark and natural crevices to provide denning habitat for the CNFS? (FEIS at 3-262). How might the lack of a tree canopy contribute to increased predation of CNFS? The FEIS does not address these issues, nor does it examine the potential impacts to the CNFS from the conversion of mature northern hardwood stands to young forest. Some timber harvest methods may be more harmful to the species than others and the Recovery Plan calls for the study of these methods (CNFS Recovery Plan at 24).

Research on the rare northern flying squirrels of the Appalachians has taught us lessons about northern flying squirrel food requirements, shelter, and locomotion as they move across the forest landscape to find food and mates. It is not just spruce forests but also older hardwood forests that play an important role in the life cycle of flying squirrels. As Dr. Peter Weigl, Professor Emeritus at Wake Forest University, explains:

> In the Appalachians northern flying squirrels are commonly found in *older* forests of spruce (*Picea rubens*), fir (*Abies fraseri*), beech (*Fagus grandifolia*), sugar maple (*Acer saccharum*), and yellow birch (*Betula alleghaniensis*), especially in the ecotones between conifers and hardwoods. *However, throughout the east from Nova Scotia, Canada (Lavers 2004), to southern North Carolina (Weigl et al. 2002) the species is known to occupy hardwood habitats without spruce and fir*. An array of studies have documented the squirrel's habitat diversity (Ford et al. 2004; Menzel et al. 2006; Payne et al. 1989; Stihler et al. 1987; United States Department of the Interior, Fish and Wildlife Service 2006; Urban 1988) pointing out the importance of hardwood and mixed forest habitats. *G. sabrinus* of West Virginia is more abundant and its populations more continuous than in most parts of the east. Many of the squirrels are caught in forests in which spruce is present, and this tree species supports one of the fungal genera (Elaphomyces) eaten by the squirrel (Loeb et al. 2000). Therefore, the United States Fish and Wildlife Service has decided that if forests containing spruce are protected in the national forests, the flying squirrel's preservation is insured, and it can be delisted, not to the ''threatened'' level but taken off the critical list entirely. The problems with this approach are many. First, it is not clear if there is any direct causality between the presence of flying squirrels and spruce. Both animal and plant may be responding independently to the same boreal conditions. Squirrels may nest in spruces occasionally and use them as one of many food sources, but there is no proof of any obligate relationship. Second, in more than 40 years of trapping and nestbox checking in various Appalachian habitats, I almost never captured animals in extensive, pure conifer stands, although telemetry revealed that they

> sporadically used them. Third, such a course of action fails to sufficiently protect the northern hardwood areas often used by *G. sabrinus*.[57]

Trapp, *et al.* (2017) described the importance of northern hardwood forests when it comes to the diet of the West Virginia Northern Flying Squirrel:

> The stable isotope analysis revealed that hypogeous fungi, epigeous fungi, invertebrates, lichen, and beechnuts were dominant components of the diet of flying squirrels… Epigeous fungi were most available in conifer habitat, and are more available in conifer, mixed conifer-hardwood, and hardwood habitats than in red spruce habitat, suggesting epigeous fungi may be available to dispersing *G. s. fuscus*. Although arboreal lichen was not encountered during our fieldwork, surveys of lichen abundance in New England found various species of lichen in both conifer and hardwood habitats, suggesting an availability of lichen across habitat types (Selva 1994). However, Selva (1994) found a strong connection between lichen abundance and forest age, with higher lichen availability in more mature forests. Furthermore, the importance value for American beech, which may correspond to the availability of beechnuts, was higher in hardwood and mixed conifer-hardwood habitats than in red spruce habitat. The beechnut crop corresponds with the dispersal season of *G. sabrinus* (Villa et al. 1999), potentially providing forage for dispersing individuals. However, *G. s. fuscus* may encounter high levels of competition for beechnuts from hard-mast specialists, such as *G. volans* and red squirrels (*Tamiasciurus hudsonicus*), and beechnuts are only available during a limited time period. Future research should focus on additional potential limiting factors, such as the behavioral exclusion of *G. s. fuscus* by *G. volans* in the habitat surrounding red spruce (Weigl 1978) and impacts of climate change on forest configuration and patch extent of red spruce (White and Cogbill 1992)…Furthermore, a greater understanding of dispersal behavior of *G. s. fuscus* may provide further insights regarding the energetic requirements of dispersing juveniles and whether dispersing juveniles forage for specific foods, or rely on energy stores while moving through the landscape (Zollner and Lima 2005).
>
> Based on our results, management of the dispersal matrix for *G. s. fuscus* should consider prioritizing mature red spruce patches that may act as connections between larger areas of red spruce. These patches may provide hypogeous fungi truffles and lichen for dispersing *G. s. fuscus*, as well as other diet items identified through stable isotope analysis. However, regardless of forest type, mature stands typically had structural features and composition that afforded food resources, whereas younger stands did not. This suggests that managers should consider stand age and structure to a greater degree than forest type for management of habitat outside of red spruce stands for *G. s. fuscus*.[58]

Smith (2007) identified the need to protect northern hardwoods from habitat degradation and fragmentation:

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[57] Weigl, P.D. 2007. The Northern Flying Squirrel (Glaucomys Sabrinus): A Conservation Challenge. Journal of Mammalogy, 88(4): 897-907 (emphasis added).

[58] Trapp, S. E., Smith, W.P., Flaherty, E.A. 2017. Diet and food availability of the Virginia northern flying squirrel (Glaucomys sabrinus fuscus): implications for dispersal in a fragmented forest. Journal of Mammalogy 98(6): 1688-1696.

> In the central Appalachians, nests were located within 100 m of the ecotone between pure conifer and mixed northern hardwood–conifer stands (Menzel et al. 2004). *G. sabrinus* invariably selected hardwoods, mostly beech (Fagus), birch (Betula), or maple (Acer), as nest trees in the southern Appalachians (Weigl and Osgood 1974) and as cavity trees in central Ontario (Holloway and Malcolm 2007). However, leaf nests are almost exclusively found in conifers (Holloway and Malcolm 2007; Weigl et al. 1999), high in the canopy (Stihler et al. 1987). Elevation, tree height, nest height, and mean diameter at breast height of overstory trees were all greater at leaf nest sites than at cavity sites in the central Appalachians (Menzel et al. 2004). Large hardwood snags are a common nesting structure in eastern forests (Gerrow 1996; Hackett and Pagels 2003; Holloway and Malcolm 2006, 2007), which likely is related to their higher decay rates and the preferences of primary excavators (Holloway 2006). Nest sites in eastern forests often occur on cooler, more mesic sites such as in spruce stands (Holloway and Malcolm 2007; Menzel et al. 2004; Weigl and Osgood 1974), on northern slopes (Menzel et al. 2004; Payne et al. 1989; but see Hackett and Pagels 2003), in ‘‘coves’’ (Payne et al. 1989), or in areas with large amounts of downed wood (Hackett and Pagels 2003), all of which are favorable conditions for higher decay rates and fungal growth (Loeb et al. 2000)… Nevertheless, *G. sabrinus* cannot live in all forest habitats. In addition to the resources highlighted in this paper, there are essential elements of forest habitat that I did not consider, such as structural features of the overstory and midstory that facilitate gliding (see Scheibe et al. 2007). Because food resources frequently are clumped and ephemeral, relatively dense canopies, large tall trees, and open midstories are needed for individuals to move through their home range efficiently and safely (Scheibe et al. 2006; Vernes 2001). …However, the most significant challenge is maintaining functional connectivity across landscapes. Many populations are fragmented and an increasing number of populations are becoming fragmented or more isolated throughout its range. Moreover, the relative importance of functional connectivity in sustaining viable and well-distributed populations of *G. sabrinus* increases as forests become increasingly altered, habitat suitability diminishes, and the uncertainty of persistence increases.[59]

Flaherty et al. (2010) identified the loss of food sources in managed habitats:

> Timber harvest changes the structure and microclimate of old-growth forests (Colgan 1997), removes the energy sources (trees) for fungi (Amaranthus et al. 1994; Colgan 1997), and damages the hyphal mat during logging operations (Carey et al. 2002). Thus, resulting clear-cuts, 2nd-growth, and thinned stands exhibit significantly lower fungal biomass and diversity than old-growth stands (Amaranthus et al. 1994; Carey et al. 2002; Waters et al. 1994), and little is known about the length of time required before fungi will reestablish colonies and begin to produce truffles (Amaranthus et al, 1994)…
>
> Our results suggest low availability of potentially critical food items in managed habitats, which may constrain dispersal of *G. sabrinus* across clear-cut and 2nd-growth habitats. Conifer seeds, truffles, and Vaccinium spp. were all significantly more abundant in old-

[59] Smith, W. P. Ecology of Glaucomys sabrinus: Habitat, Demography, and Community Relations. 2007. Journal of Mammalogy 88(4): 862-881.

> growth habitat. Furthermore, the hemlock and spruce cones we sampled in clear-cuts were likely remnants of the once present old-growth stand and consequently are likely only available for a short time post-logging. Similarly, although we encountered truffles in clear-cut plots, it is unclear how available this resource is in young regenerating stands, because we found truffles only where the roots of tree stumps had not completely died; we recorded no truffles in clear-cuts older than 2–3 years postharvest. Except for 1 sporocarp uncovered while digging a pitfall trap in a .40-year-old stand, we found no truffles in 2nd-growth habitat. Carey *et al.* (2002) suggested that harvest plans that leave legacy (i.e., old-growth trees) in managed stands will increase the persistence of truffles.[60]

As you can gather from the selected quotes from flying squirrel research, flying squirrels in the Appalachian Mountains are found in both northern hardwoods and conifers at high elevations, and depend heavily on a variety of underground fungus and lichens as well as beechnuts, which are mainly found in older growth forests. They require larger trees to help them move safely across the landscape and create nests in both conifers and hardwoods. The hyphal mats that produce truffles (a major food source for these squirrels) can be damaged by logging. This research argues against cutting hardwoods in and around flying squirrel habitat. We also believe that research shows that the truffles etc. eaten by squirrels require a moist forest floor and older tree stands. This food source would be negatively impacted if flying squirrel habitat and the buffer around it were to dry out or the soil become compacted due to logging. The Forest Service should not only avoid cutting soft and punky (pulpwood) trees that often serve as nesting sites, but the Forest Plan should protect all hardwood trees and the surrounding forest floor in suitable flying-squirrel habitat as they provide valuable food sources for the species. The FEIS, however, fails to address the loss of food sources from removing these trees from suitable CNFS habitat and buffer areas. Additional impacts to food sources would also likely stem from herbicide application in these areas (as they threaten to disrupt the symbiotic relationships between mycorrhizae and trees). Again, the FEIS does not discuss these effects. Finally, red spruce restoration should not serve as a substitute for CNFS protection. The species requires northern hardwoods as well as red spruce and other conifers. Therefore, red spruce restoration efforts, dependent on cutting associated northern hardwoods, may pose additional risks to the species that the FEIS fails to disclose.

Further, the Forest Service must not only consider the direct impacts to individual CNFS, their food sources, and locomotion and nesting requirements, but also the resulting fragmentation of habitat for a species that is already relegated to "islands" of spruce fir-and northern hardwood forests. The Forest Service recognizes that "individuals in such relict populations are imperiled by isolated gene pools and limited dispersal ability, analogous to populations of mammals on islands in marine environments" (FEIS at 3-259). Therefore, *the location* of these harvests is an equally important consideration, and this may have a compounding effect on the species if they further fragment these populations. Yet the FEIS fails to examine these reasonably foreseeable future impacts. The Plan also fails to provide standards or guidelines for road construction for the

[60] Flaherty, E.A., Ben-David, M. Smith, W.P. 2010. Diet and food availability: implications for foraging and dispersal of Prince of Wales northern flying squirrels across managed landscapes. Journal of Mammalogy. 91(1): 79-91.

50 annual acres and up to 2,236 total acres of spruce-fir harvests scheduled under the Plan (FEIS at 3-72). ECO-0-07 identifies a Tier 1 goal of 50 annual acres of spruce-fir harvest, and Alternative E places 1,517 acres of spruce-fir ecozone in Matrix and 719 in Interface (FEIS at 3-136). However, the Final Plan fails to provide any guidance for how spruce-fir restoration and harvest will occur. Road building in the spruce-fir ecozone will result in increased fragmentation of remaining spruce-fir islands.

To protect Forest wildlife and plants, section 219.9(b) requires the Forest Service to "determine whether or not the plan components…provide the ecological conditions necessary 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." If the Plan components do not unequivocally achieve that mandate, then section 219.9(b) requires "additional, species-specific plan components, including standards or guidelines… to provide such ecological conditions in the plan area."

Habitat loss and fragmentation from human activities (including forest clearing)[61] is a primary threat to the species and the Forest Service recognizes that lower densities of the species within the Forest will not effectively contribute to species' recovery. Therefore, the Forest Service needs to assess the impacts of timber harvests in these areas to ensure that the necessary ecological conditions are not just maintained but also improved. The Forest Service should take an approach (like one we suggest later for salamanders) that prohibits timber harvests and road construction from creating barriers to the movement of groups of CNFS at the individual or population level. It should also identify parts of the Forests where roads and other features that fragment CNFS habitat are removed. This would help preserve and improve habitat connectivity for this imperiled species. The Forest Service should further use the Forest Plan Revision process to implement a conservation program for the CNFS under Section 7(a)(1) of the Endangered Species Act to help conserve and recover this species. This would enable the Forest Service to serve as a conservation leader for a species whose future will likely depend on how well it is managed on Forest Service lands.

ii. Northern long-eared bat and Indiana Bat

The Northern long-eared bat (NLEB) was listed as threatened under the ESA in 2015. It is known to occur at numerous sites across the National Forests. FEIS at 3-286. As the FEIS points out, "The species is generally associated with mature forests and interior forest habitat. Late successional forest characteristics may be favored for several reasons, including the large number of partially dead or decaying trees that the species uses for breeding, summer day roosting, and foraging." *Id*. Most nursing colonies are in cavities or beneath loose bark in trees or snags in upland forests, with roost entrances generally below or within the tree canopy utilizing a variety of tree species. *Id*. Several known occupied hibernacula occur on the Forests and "summer maternity habitat is widespread across the Forests" (FEIS at 3-287).

[61] The DEIS included "the clearing of forests" as a primary threat to the CNFS but the Forest Service inexplicably dropped this language from the FEIS. *Compare* DEIS at 249 with FEIS at 3-259. We hope this omission was inadvertent because the Forest Service cannot downplay the significance of these practices on the species.

The Indiana bat was listed as endangered under the ESA in 1973. Summer maternity colonies are known to occur in Western North Carolina and at several sites across the Forests (FEIS at 287). Upland habitats appear to be used much more extensively by maternity colonies than previously thought. These roosts are not found in forests with open canopies (10-30%) or in old fields with less than or equal to 10% canopy cover. *Id*. Summer maternity habitat is widespread across the Forests (FEIS at 3-288). As the Recovery Plan for the Indiana bat cautions, "Silviculture that involves short rotations and/or removal of dead and dying trees threatens the integrity of roosting habitat for Indiana bats. Retention of large snags and preservation of over-mature trees to provide for a sustained supply of large snags is essential to maintaining summer habitat for tree-roosting bats in general, and Indiana bats specifically."[62]

Both the NLEB and Indiana bat are highly susceptible to white nose syndrome (WNS) and the disease has severely impacted the populations (FEIS at 3-287-288).

The Final Plan calls for a substantial increase in timber harvests to create young forests. Despite both the NLEB and Indiana Bat being highly dependent upon mature forests with closed canopies across several ecozones, the FEIS is virtually silent about the impacts to these species. The FEIS states that effects to listed bats (and the CNFS) are discussed in detail in the federally listed species section but there is no discussion of how roosting (and nesting) success can be compromised by changes in forest structure and composition. (FEIS at 3-337; 3-257-293). Despite, the fact that greater than 50% of known occurrences of listed bats are in the matrix and interface where most of the logging would occur (FEIS at 3-338). In a rather conclusory fashion, the FEIS states the Forests "will continue to contribute to improved foraging and roosting habitat for these species and contribute to the persistence of the species across its estimated range in Western North Carolina in the long term, while effectively minimizing or mitigating short term effects. No additional conservation measures are needed beyond those outlined in previous sections of this assessment…" (FEIS at 3-293-294).

To minimize the significance of these impacts, the Forest Service points to standards that limit opening size and configuration to no greater than 40 acres in hardwood-dominated forest types and 80 acres in pine-dominated forest types (FEIS at 3-270). But as the Forest Service concedes, NLEBs avoid openings larger than 20 acres (*id*.), and these cuts would rarely ever "mimic" in size the gaps created by natural disturbances (Final Plan at 55). These 40-acre cuts would be even greater than the 20-25 acre harvest unit size currently occurring across the forests (*id*.) (that currently do not support NLEBs) and would further threaten the species by fragmenting even more of its habitat.[63] The Forest Service has therefore failed to provide a satisfactory explanation why these measures would help minimize the impacts of regeneration harvests on listed bat species, as required under NEPA and the APA.[64]

The Forest Service needs to closely examine these impacts under NEPA and require in the Forest Plan that regeneration harvests must be less than 20 acres in hardwood-dominated forests where

[62] U.S. Fish and Wildlife Service, Indiana Bat (Myotis sodalist) Draft Recovery Plan: First Revision, 77 (Apr. 2007).
[63] Even if the Forest Plan includes a guideline to create irregular edges and past management activities have resulted in units much smaller than this, they still average 12-20 acres. This is still a size that NLEBs avoid. *See id.*
[64] *See Motor Vehicle Mfrs. Ass'n v. State Farm Mut. Auto. Ins. Co*., 463 U.S. 29, 43 (1983).

there is known or potential bat habitat. The status quo is not contributing to the recovery of these species as required under the 2012 Planning Rule and section 7 of the ESA.

In addition, although the finer-scale habitat desired conditions for young forests now states that "in areas known to be or potentially occupied by federally listed bats, snag recruitment and retention should also include snags equal or greater than 3" DBH (Forest Plan at 67), which is an improvement over the Draft Plan, more needs to be done to protect maternity colonies. The Forest Service needs to include a specific standard to ensure active roost trees and maternity roost sites identified during project implementation are protected. This is being done elsewhere on national forests within the range of these species.[65] This is particularly important for Indiana bats because they display a high degree of fidelity to roost sites (FEIS at 3-287).

iii. Appalachian elktoe, Little-wing pearly mussel, Cumberland bean, and Spotfin Chub

The Appalachian elktoe is a freshwater mussel listed as endangered in 1994. It is typically found in shallow, moderate to fast flowing currents with gravelly substrates (FEIS at 3-311). Main threats include siltation. *Id*. at 3-312. Clean, free-flowing water is critical to the persistence of these filter feeders. *Id*. The decline in the species throughout its range has been attributed to several factors, including siltation resulting from logging.[66]

The littlewing pearly mussel was listed as endangered in 1988 and is becoming increasingly rare in North Carolina. FEIS at 3-318. They inhabit coolwater streams with low turbidity. *Id*. Like the Appalachian elktoe, they are also threatened by siltation. *Id.* at 3-320.

The Fish and Wildlife Service highlights the threats posed by sedimentation to mussels in the recovery plan for the Appalachian elktoe:

> Land-clearing/disturbance activities carried out without proper sedimentation control pose a significant threat to freshwater mussels. Mussels are sedentary and are not able to move long distances to more suitable areas in response to heavy silt loads…Siltation has been documented to adversely affect native freshwater mussels both directly and indirectly. Siltation degrades water and substrata quality, limiting the available habitat for freshwater mussels (and their fish hosts), thereby limiting their distribution and potential for expansion and maintenance of their populations. It also irritates and clogs the gills of filter-feeding mussels, resulting in reduced feeding and respiration, and smothers mussels if sufficient accumulation occurs. Siltation increases the potential exposure of the mussels to other pollutants…Sediment accumulations that are less than lethal to adults may adversely affect or prevent recruitment of juvenile mussels into the population. Also, sediment loading in rivers and streams during periods of high discharge is abrasive to

[65] For example the George Washington Forest Plan calls for buffers around active roost trees and maternity roost sites identified during project implementation. *See* George Washington National Forest Revised LRMP at 4-5.
[66] U.S. Fish and Wildlife Service, Recovery Plan for the Appalachian Elktoe (Alasmidonata raveneliana) Lea, 3 (1996).

mussel shells. Erosion of the outer shell allows acids to each and corrode underlying layers.[67]

The spotfin chub is a small freshwater fish that was listed as threatened in 1977 (FEIS at 3-323). Its habitat includes large creeks or medium-sized rivers and females lay their eggs in areas with unsilted rubble and boulders (FEIS at 3-324). One of the rarest animals in the United States, the species is threatened by sedimentation. Growth rate at all life stages, spawning success, and gill condition are negatively correlated with sedimentation levels and stress levels are positively correlated with sediment.[68] Sedimentation may also alter foraging habitat.[69] In its 2014 Five-Year Review of the species, the Fish and Wildlife Service concluded that "sedimentation from various sources…continues to threaten all spotfin chub populations. The species depends on relatively silt-free foraging and spawning habitats for survival."[70]

The Final Plan barely mentions these species and when it does it inappropriately provides that the Forest Service is to merely "maintain species presence within currently occupied habitat on the NP" (FEIS at 75). This is insufficient under the 2012 Planning Rule as section 219.9(b) requires the Forest Service to "determine whether or not the plan components…provide the ecological conditions necessary *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." Not only is the wrong standard applied, but neither the FEIS nor the Plan point to the specific plan components that will contribute to species recovery. This is a glaring omission, particularly when the Forest Service states in its cumulative effects discussion that because of threats throughout the landscape, the recovery of the Appalachian elktoe and the littlewing pearly mussel "may be at risk without additional conservation efforts" (FEIS at 3-316, 3-322).

Further, 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 3-311-324. Yet there is no discussion of the impacts of increased logging and road construction on these species. *Id.* Roads compact the soil and deliver sediment into nearby rivers and streams. Up to ten miles of new roads may be constructed every year within the Forests to accommodate increased timber harvests aimed at creating more young forests. The Forest Service has acknowledged that there is a substantial maintenance backlog (FEIS at 3-490, 3-494, 3-551, 3-556). Despite an objective to reduce the maintenance backlog by an additional 10% annually, there is nothing in the Final Plan that requires the Forest Service to reduce the backlog. As it stands now, the Forest Service cannot provide any assurances that existing and future logging roads will ever be decommissioned or that the construction of new roads won't outpace the decommissioning of old roads, further compounding the risks to these species (Final Plan at 107).

[67] U.S. Fish and Wildlife Service, Recovery Plan for the Appalachian Elktoe (Alasmidonata raveneliana) Lea, 3 (1996).
[68] U.S. Fish and Wildlife Service, Spotfin Chub (Erimonax monachus) 5-Year Review: Summary and Evaluation, 26 (Aug. 2014).
[69] *Id*.
[70] *Id*. at 9.

Accordingly, the Forest Service cannot assume existing and future roads will be decommissioned and the agency needs to consider how increased sedimentation and siltation may impact these species. To the extent that the Forest Service is relying on BMPs to minimize the impacts to the species, as other commenters have pointed out, the Forest Service has overestimated the effectiveness of BMPs in the Forests.[71] The Forest Service must analyze the direct, indirect, and cumulative impacts forestry activities will have on these species, particularly as a result of sedimentation. The Forest Service must also perform a rigorous fine-filter analysis so that it can provide the ecological conditions necessary to contribute to the recovery of these endangered and threatened species. 36 C.F.R. § 219.9. Plan components should also call for habitat and population surveys, the identification of suitable habitat within the NF, and specific measures to protect these habitats from siltation to contribute to the species' recovery. One such measure would be to prohibit logging and manage for old growth where suitable habitat occurs, such as in Natural Heritage Areas.

iv. *Noonday Globe*

The noonday globe is a terrestrial snail known from only about two miles of high cliffs within the Nantahala Gorge in Western North Carolina.[72] The lower gorge supports the only known population (Final Plan at 189). The species was listed in 1978 as threatened under the ESA.

The noonday globe occurs in an area containing mature forests, with many large trees and a large diverse plant community.[73] The forest floor has a thick, rich hummus layer, and the area has many exposed calcareous rocks.[74] The calcium that is found on these cliffs is vital to snails because it is a major component of their shells.[75]

The Final Plan recognizes that the diverse ecosystems within the gorge are dominated by rich cove forests, interspersed with acidic cove and oak forests. "These lower slopes are vital to the persistence of the noonday globe" (Final Plan at 188). Yet the Final Plan does not explicitly prohibit logging within these areas. In fact, the Final Plan specifically calls for increased logging in acidic cove and rich cove forests to create more young forest habitat (Final Plan at 184-185). Logging within noonday globe habitat (in addition to forest fires, road building, mineral exploration, and trampling) is identified by the U.S. Fish & Wildlife Service in the Recovery Plan as a threat to the species.[76] The Recovery Plan states "it is essential to recovery that the snail population and its habitat be protected from disturbance. *Id*. The Recovery Plan also calls for the assessment and monitoring of population levels and habitat quality. *Id.* at 17.

Goal NG-GLS-02 vaguely states that the Forest Service is to "maintain and restore intact forest habitat for the noonday globe" (Final Plan at 189) and "maintain species presence within

[71] *See* SELC, The Wildlife Society, MountainTrue, and Defenders of Wildlife, Comments on the Nantahala and Pisgah National Forests Draft Land Management Plan and Draft Environmental Impact Statement, at 149, Att. 26.
[72] U.S. Fish & Wildlife Service, Noonday globe snail, Petera clarkia Nantahala, Fact Sheet, at https://www.fws.gov/southeast/pdf/fact-sheet/noonday-globe-snail.pdf
[73] *Id.*
[74] *Id.*
[75] *Id.*
[76] U.S. Fish and Wildlife Service, Recovery Plan for the Noonday Snail (Mesodon clarki nantahala), 16, (1984), available at https://ecos.fws.gov/docs/recovery_plan/noonday%20snail%20recov%20plan.pdf

currently occupied habitat on the NP" (Final Plan at 75).[77] This hardly provides the necessary direction for the Forest Service to contribute to the species recovery as required under the 2012 Planning Rule and Section 7 of the ESA. Species recovery is not just limited to maintaining the presence of habitat but ensuring that all necessary steps are taken so that the species no longer needs to be listed under the EPA. As the Plan is currently drafted, there are no assurances that this will be the case. The goal of maintaining and restoring intact forest habitat is left largely to a future, currently undefined process. As it is currently written, the goal of maintaining habitat could be interpreted to allow for mitigation so long as there is no net loss of species habitat.

Moreover, in consideration of the Final Plan's reliance on commercial logging as a "restoration tool," the goal could also be interpreted to permit timber harvests to create young forest conditions as it would "restore" forest conditions when viewed through a course filter lens. Such an approach would be terribly misguided, and no doubt undermine species recovery under the ESA, as the loss of forest canopy has likely contributed to the historic decline of the species (FEIS at 3-306). There could be significant, long-term consequences to logging within noonday habitat. Under the Tier 2 Objectives for all alternatives, Rich Cove and Acidic Cove ecozones appear to have poorer health than other ecozones 50 years in the future and it may be attributed to overharvesting (FEIS at 161, 165). Further, Table 5 is of little consolation because it is neither a standard nor a guideline. As the Final Plan points out, text, tables, or figures that do not contain a code do not constitute plan decisions and are instead background material, explanations, or descriptions of management approaches. *Id*. at 25.

Therefore, the Plan needs to provide a much clearer goal, include an objective articulating how the Forest Service will accomplish this goal, and include standards to protect this highly vulnerable species from logging and other ground disturbances. This could be accomplished in part by adding a standard that would require any vegetation management near noonday globe habitat to maintain or restore that habitat, by preserving a moist microclimate and an abundance of leaf litter. NG-GLS-04, which calls for "recurrent prescribed burning" in the Gorge, must also be revised as it poses a threat to this species. Given that the noonday globe is a fire intolerant species, fire must be avoided in this species' limited range. As NG-GLS-04 is currently written, it would likely conflict with NG-GLS-02, which calls for maintaining and restoring intact forest habitat for the species. The Final Plan also needs to commit to a rigorous monitoring program as prescribed by the species' Recovery Plan. At this time, the Forest Service cannot state with any reasonable level of confidence that the Final Plan will contribute to the species' recovery as the FEIS concedes that the "current knowledge of occupied habitats for noonday globe prohibits conclusions on species persistence and subsequent recovery" (FEIS at 3-310).

v. Rusty Patched Bumblebee

We also find it rather disingenuous of the Forest Service to further justify the need for a three to nearly fourfold increase in regeneration harvests by pointing to population declines of pollinator species such as the rusty patched bumblebee (*Bombus affinis*) (FEIS at 3-120). The Plan notes that these and other species "are experiencing pronounced population declines as quality young forest habitat is lost on the Forests" *Id.*

[77] The Forest Service continues to include this boilerplate language referencing the "NP" for a species that is only found within the Nantahala NF. *See* Final Plan at 75.

In listing the rusty patched bumblebee as endangered, the U.S. Fish and Wildlife Service cited several threats including pathogens, pesticides and herbicides, habitat loss and degradation, climate change, and synergistic effects. 82 Fed. Reg. 3186-3209 (Jan. 11, 2017).

Habitat loss is one of several threats facing the species, but not in the manner the Forest Service suggests in the Final Plan. The long-term contributor to bee declines is the loss of native grasslands of the Northeast and upper Midwest, not the lack of young forests in the Southeastern United States. *Id*. In fact, the Fish and Wildlife Service noted that "large monocultures do not support the plant diversity needed to provide food resources throughout the bees' long foraging season." *Id.* But that is exactly what the use of regeneration harvests (clear-cuts) to maintain young forests of the same age class and largely the same species composition will yield. Moreover, young forest created through clearcutting would only provide a small window of opportunity for foraging before it closes up. What is needed, if anything, is more permanent forest openings specifically designed with the introduction of native, flowering plants to provide long-term foraging opportunities.

Further, the Final Forest Plan states that the Forest Service will document the presence or absence of the bee, but it does not provide any specific information on how or when those efforts will occur (Final Plan at 75). This direction is also set forth in a table, which is not a plan decision (Final Plan at 146). Without adequate baseline data, the Forest Service cannot confidently state that regeneration harvests would benefit the species.

To conserve the rusty patched bumblebee, the Forest Service must survey and monitor for the species. This should be done before projects are undertaken on the forest to ensure this species and its habitat is not degraded before the Forest Service has updated occurrence data. Where habitat creation or restoration is planned, it should be performed in those areas that are currently degraded and provide little species diversity but under the right conditions could provide suitable habitat. These habitats should also be maintained through natural process or through practices such as thinning and prescribed fire. The Final Forest Plan should also require post-project monitoring.

Moreover, although habitat loss has long had negative effects on bumblebees, it may not be the main driver of the recent, widespread North American bee declines. 82 Fed. Reg. 3186-3209. Rather, the use of neonicotinoids has been strongly implicated as the cause of the decline of bees in general and specifically for the rusty patched bumblebee, due to the contemporaneous introduction of neonicotinoid use and the precipitous decline of the species. *Id*. at 3190.

The Forest Service should also limit the broad discretion afforded by the Final Plan when determining where and when herbicides and pesticides may be applied.[78] Neither the Final Plan nor the FEIS mention the specific herbicides that the Forest Service intends to use on the Forests,

[78] *See, e.g.*, Final Plan at page 45 (stating that no pesticide or herbicide, except as described below, should be aerially applied within 200 horizontal feet nor ground-applied within 30 horizontal feet of perennial streams, intermittent springs and streams, wetlands, or open bodies of water without specific advice from the appropriate resource specialists); Final Plan at 125 ("Maintenance activities such as mowing and/or herbicide applications should be timed to minimize adverse effects to rare plants").

much less discuss the direct, indirect, and cumulative impacts of these chemicals on the bee or other species (FEIS at 3-294-298).[79] This runs afoul of NEPA, which requires the agency to discuss all reasonably foreseeable direct, indirect, and cumulative effects of this action. Based on a review of previous projects on the PNNF, it appears glyphosate and triclopyr are two of the primary herbicides used on the forests and each may have significant impacts on pollinators (such as the rusty-patched bumblebee) and other wildlife that need to be examined under NEPA.

A recent EPA analysis found multiple environmental harms from glyphosate use. Use of glyphosate in accordance with the label was found to:

1) Result in concentrations that can potentially impact the survival and biomass of aquatic plants, upland plants, and riparian/wetland plants.[80]
2) Result in residues on foliage that can potentially impact the growth of herbivorous birds, reptiles and terrestrial amphibians.[81]
3) Potentially impact the growth and reproduction of terrestrial mammals following ground applications of glyphosate.[82]

This analysis also indicated that considerable no-spray buffers would be needed to keep off-target plants from being harmed by glyphosate use, more than 1000 feet for certain aerial applications and nearly 400 feet for certain ground applications.[83] The states of California and Arkansas both have mandatory no-spray buffers of 500 feet for aerial applications.[84]

Ecological incident data also reinforce the finding that the current labelled uses of glyphosate are having devastating effects to plant and animal life outside of the sprayed field.[85] Approximately 600 incidents have been reported and logged on the Ecological Incident Information System (EIIS) and Avian Monitoring Information System (AIMS) databases. A separate Incident Data System (IDS) database has identified 269 separate aggregate incident reports. Ecological incidents are also significantly underreported for pesticides so this should be viewed as the absolute bare minimum of ecological incidents that involve glyphosate.

Some glyphosate formulations and co-formulants have been found to be "highly toxic" to certain species of fish.[86]

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[79] The FEIS also does not analyze the impacts of pesticides and herbicides on the Appalachian Tawny Crescent. (FEIS at 3-339). It also includes conflicting statements about the importance of roads for species conservation. In one section it states that roads would provide open areas and edges while in another section (FEIS at 3-339) the FEIS notes that roads exacerbate the threat of over-collection by forest users. (FEIS at 3-342).

[80] EPA. Preliminary Ecological Risk Assessment for Glyphosate and Its Salts. Sept. 8, 2015 page 2. Available here: https://www.regulations.gov/document?D=EPA-HQ-OPP-2009-0361-0077.

[81] *Id.*

[82] *Id.*

[83] *Id.* page 92.

[84] EPA. Drinking Water Assessment for the Registration Review of Glyphosate. June 15, 2017. Pg. 16.

[85] EPA. Preliminary Ecological Risk Assessment for Glyphosate and Its Salts. Sept. 8, 2015. Pgs 59-62. Available here: https://www.regulations.gov/document?D=EPA-HQ-OPP-2009-0361-0077.

[86] *Id.* at 82, 84.

Researchers have found negative associations between glyphosate use and monarch population size.[87] Use of glyphosate has been tied to widespread declines of milkweed, which is essential to monarch butterfly survival.[88]

The World Health Organization's International Agency for Research on Cancer ("IARC") conducted an exhaustive review of the publicly available scientific literature in 2015 and concluded that glyphosate is "probably carcinogenic to humans" (Group 2A).[89] IARC carefully weighed evidence in three areas, and found that: 1) There was sufficient evidence to conclude that glyphosate causes cancer in animal studies; 2) There was limited evidence that exposure to glyphosate causes cancer (non-Hodgkin lymphoma) in humans; and 3) There was strong evidence that glyphosate can damage DNA and induce oxidative stress,[90] two well characterized pathways that can lead to cancer.[91]

IARC's finding that glyphosate causes cancer in animals prompted California's Office of Environmental Health Hazard Assessment to list glyphosate as a known carcinogen under California's Proposition 65 law.[92] The agency has also finalized a No Significant Risk Level for glyphosate, which estimated the daily exposure level that will result in a 1/100,000 chance of developing cancer, of 1.1 mg/day.[93]

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[87] Semmens, B. X., D. J. Semmens, W. E. Thogmartin, R. Wiederholt, L. Lopez-Hoffman, J. E. Diffendorfer, J. M. Pleasants, K. S. Oberhauser and O. R. Taylor (2016). "Quasi-extinction risk and population targets for the Eastern, migratory population of monarch butterflies (Danaus plexippus)." Sci Rep 6: 23265.

[88] Center for Biological Diversity, Petition to Protect the Monarch Butterfly (*Danaus Plexippus Plexippus*) Under the Endangered Species Act, 7 (2014), available at http://www.biologicaldiversity.org/species/invertebrates/pdfs/Monarch_ESA_Petition.pdf ("*A primary threat to the monarch is the drastic loss of milkweed caused by increased and later season use of the herbicide glyphosate in conjunction with widespread planting of genetically engineered, herbicide-resistant corn and soybeans in the Corn Belt region of the United States and to planting of genetically-engineered cotton in California. In the Midwest, nearly ubiquitous adoption of, glyphosate-resistant 'Roundup Ready' corn and soybeans has caused a precipitous decline of common milkweed, and thus of monarchs, which lay their eggs only on milkweeds. The majority of the world's monarchs originate in the Corn Belt region of the United States where milkweed loss has been severe, and the threat that this habitat loss poses to the resiliency, redundancy, and representation of the monarch cannot be overstated*.").

[89] WHO. IARC Monographs on the Evaluation of Carcinogenic Risks to Humans. Volume 112: Some Organophosphate Insecticides and Herbicides. Glyphosate. 2017. Available at: http://monographs.iarc.fr/ENG/Monographs/vol112/mono112.pdf

[90] *Id.*

[91] Klaunig, J.E., et al., The role of oxidative stress in chemical carcinogenesis. Environ Health Perspect, 1998. 106 Suppl 1: p. 289-95; and Lee, S.J., et al., Distinguishing between genotoxic and non-genotoxic hepatocarcinogens by gene expression profiling and bioinformatic pathway analysis. Sci Rep, 2013. 3: p. 2783.

[92] OEHHA. The California Environmental Protection Agency's Office of Environmental Health Hazard Assessment. Glyphosate Listed Effective July 7, 2017, as Known to the State of California to Cause Cancer. Available at: https://oehha.ca.gov/proposition-65/crnr/glyphosate-listed-effective-july-7-2017-known-state-california-cause-cancer.

[93] OEHHA. The California Environmental Protection Agency's Office of Environmental Health Hazard Assessment. Amendment to Section 25705 No Significant Risk Level - Glyphosate April 10, 2018. Available at: https://oehha.ca.gov/proposition-65/crnr/amendment-section-25705-no-significant-risk-level-glyphosate-april-10-2018.

EPA has found that the range, pastureland, and rights-of-way uses of triclopyr can expose birds, reptiles and terrestrial amphibians to levels of the herbicide that cause reduced survival of offspring.[94] The same uses can expose mammals to 37 times the amount of triclopyr known to reduce litter size.[95] All labelled uses of triclopyr were found to expose adult and larval bees to levels estimated to reduce survival and larval emergence.[96] Harm to bee larva was estimated more than 1000 feet from the application site.[97] Terrestrial plants were also estimated to be exposed to levels of triclopyr that were known to cause harm more than 1000 feet away from the site of application, even for ground applications.[98]

Triclopyr butoxyethyl ester (BEE) is classified as "highly toxic" to aquatic organisms. Range, pastureland and meadow uses of BEE can expose fish and aquatic invertebrates to levels of the pesticide known to cause acute harm.[99]

The best available science reviewed here must be incorporated into any analyses of herbicide use on the PNNF. In consideration of the impacts of pesticides and herbicides on pollinators such as the rusty patched bumblebee as well as many other wildlife species, the Forest Plan should include more specific and rigorous standards and guidelines to protect these species. It is a positive step that the Final Plan requires the consideration of biological controls, hand control methods, and lastly pesticides as part of a sequential process when determining which actions are needed to respond to insect outbreaks (Final Plan at 219). But there should also be greater clarity and specificity in the Forest Plan regarding the use of pesticides and safeguards that can be put in place to minimize the impacts to imperiled species. This should include adopting a standard that prohibits the application of herbicides in suitable habitat from early March to the beginning of hibernation to reduce the risk that necessary foraging resources will be damaged. The impacts of pesticides (particularly neonicotinoids) also need to be examined in the FEIS.

b. Species of Conservation Concern

The 2012 Planning Rule requires the regional forester to identify Species of Conservation Concern (SCC) that are "known to occur in the plan area" for which "the best available scientific information indicates substantial concern about the species' capability to persist over the long term in the plan area" (FEIS 3-105). The SCC list includes 339 species. The FEIS denotes the number of species "associated" with each ecozone (*id*. at 3-136, 3-139, 3-144, 3-147, 3-151, 3-155, 3-159, 3-163, 3-167, 3-171, 3-174) as well as the number of species associated with closed canopies, edge habitats, and interior forest associates. *Id*. at 3-177-179. It further identifies the number of bark and leaf epiphytes, species that are associated with coarse woody debris and downed wood, snag and den tree associates, hard and soft mast associates, species sensitive to road densities, and fire intolerant and fire adapted associates. *Id*. at 3-180-3-187.

[94] EPA. Triclopyr (Acid, Choline salt, TEA salt, BEE): Draft Ecological Risk Assessment for Registration Review. Sept. 30, 2029. Pg. 6. Available here: https://www.regulations.gov/document?D=EPA-HQ-OPP-2014-0576-0026.
[95] *Id.* at 8.
[96] *Id.* at 9.
[97] *Id.* at 90.
[98] *Id.* at 94-95.
[99] *Id.* at 9.

Both the coarse-filters and fine filters are insufficient to fully capture and respond to the sensitivities, needs, and threats of many species of conservation concern, particularly those occurring within old growth forests. The FEIS states that there are 84 old growth associates (FEIS at 3-125). Because old growth patches are not always protected under the Final Plan and those that are not included in the designated network will be managed consistent with the management area where they are found, the SCC in these areas face substantial threats from commercial logging. The coarse-filter's treatment of these species is even more cursory than that of federally listed species, as most of the SCC are not even identified in the Final Plan and the reader must consult appendix C for this information. The section on Plant and Animal Diversity (which provides the coarse filter) merely identifies the desired conditions of unique habitats where presumably the SCC occur (although that is not entirely clear) followed by a short list of plant and animal diversity objectives and standards that are applicable "to all species groups" (Final Plan at 74-81).

There is no discussion or consideration in the Final Plan or FEIS of the unique threats these species may face from a three to nearly four-fold annual increase in regeneration harvests within the Forests. There is no discussion of how these unique habitats may be impacted by regeneration harvests, much less any discussion about other habitats wherein these species occur that may also be impacted by commercial logging to create more young forest. The Plan appears to assume that so long as the desired conditions for these unique habitats are achieved, these species will continue to persist and there will be no need to list these species in the future. Yet none of these desired conditions and objectives directly address maintaining old growth patches *Id.*

To the extent the Forest Service relies on NC Natural Heritage Program areas to protect SCC, the Forest Plan does not require non-designated old growth patches be designated as natural areas. Even within these natural areas, regeneration harvests may be used (FEIS at 3-391). These State Natural Heritage Areas should be managed only to maintain their exemplary natural communities.

The standards aren't much help to SCC either. While project-level field surveys for listed species and SCC are contemplated, they are to be "commensurate with the risk of potential activities" and may not be required at all (Final Plan at 80). Field surveys are only required when <u>all</u> the following factors are present: when the proposed treatment area has a high potential for occupancy, project activities may affect these species, population inventory information is unavailable, and information on the number and location of individuals and habitat conditions would improve project design, the application of mitigations to reduce adverse effects, or the assessment of effects on the population. *Id*. The absence of any one of these factors allows the Forest Service not to survey a stand before conducting a regeneration harvest. Considering that the Final Plan essentially treats all lands within a particular ecozone the same (ignoring the value of individual stands and geographic hotspots of diversity) and considers most SCC usage of old growth to be only "moderate," the Final Plan sets the stage for many old growth areas not to be surveyed because the proposed treatment area may not be seen as having a "high potential for occupancy" even if there is inadequate inventory information that is available. This could prove disastrous for many old growth associated species, such as salamanders that may be found in

exceptionally high concentrations in certain old growth patches within the Forest due to certain geologic and microhabitat features.

Further, there are no specific guidelines when it comes to SCC and management approaches applicable to all species groups are vague and lack specific direction when it comes to ensuring that SCC will continue to persist. These approaches largely consist of cooperating, collaborating, and coordinating with other agencies and stakeholders. *Id.* at 81. Moreover, there are only a couple of standards and guidelines that are relevant to timber harvests in the Coarse-Filter such as protecting eagle nests (which is required by the Bald and Golden Eagle Protection Act regardless of what the Plan may provide) and maintaining canopy tree buffers for green salamanders, spruce fir moss spider, and rock gnome lichen (Final Plan at 82-83).

Many species of conservation concern may be uniquely and profoundly impacted by regeneration harvests and the coarse filter fails to adequately consider these impacts. Some of the species that may face the greatest impacts are discussed below.

1) <u>The Fine Filter Analysis for Salamanders and Other Amphibians is Deficient and There Must be Stronger Protections for Ephemeral Streams and Limitations on Logging During the Breeding Season.</u>

There are 29 species of salamanders that occur within old growth forests on the Pisgah and Nantahala. The mountain chorus frog is also found within old growth forests. As highlighted below, several of these species are listed by the State of North Carolina as endangered or threatened, have patchy and/or isolated distributions across the Forests, and have very specific habitat requirements.

Spotted salamanders (*Ambystoma maculatum*) breed in shallow freshwater pools, often ephemeral wetlands of the Nantahala Pisgah National Forest.[100]

Mole salamanders *(Ambsytoma talpoideum)* are found in isolated populations in the Nantahala Pisgah. They inhabit upland forests near bodies of water that are used as breeding ponds. They reproduce between October and March[101] and are considered by the state of North Carolina as a special concern species.[102]

Seepage salamanders (*Desmognathus aeneus*) are found in moist areas under rocks, logs, and leaf litter near small streams. It has a patchy distribution and where present it is often locally abundant.[103] Seepage salamanders are threatened by clearcutting and by the conversion of

[100] Amphibians and Reptiles of North Carolina, Spotted Salamander, Ambystoma maculatum, at http://herpsofnc.org/?s=spotted+salamander
[101] Amphibians and Reptiles of North Carolina, Mole Salamander, Ambystoma talpoideum, at http://herpsofnc.org/?s=mole+salamander
[102] North Carolina Wildlife Resources Commission, Protected Wildlife Species of North Carolina (October 2017), at https://www.ncwildlife.org/Portals/0/Conserving/documents/Protected-Wildlife-Species-of-NC.pdf
[103] Amphibians and Reptiles of North Carolina, Seepage Salamander, Desmognathus aeneus, at http://herpsofnc.org/?s=seepage+salamander

hardwood forests to pine plantations.[104] Ford et al. (2002) found higher abundances of seepage salamanders in stands of older, hardwood trees, implicating the loss of mature deciduous stands as a threat to this species.[105] Gratwicke (2008) identifies numerous threats to the seepage salamander and other salamanders in Appalachia, including mining, logging, development, and pesticide use.[106] NatureServe (2020) identifies the seepage salamander as vulnerable in North Carolina and threatened by incompatible forest management practices.[107] Petranka (1998) recommended forest buffers around seepages and headwater streams in areas scheduled for timbering.[108]

Imitator salamanders (*D. imitator*) are found only at high elevations in the Great Smoky Mountains NP and a few surrounding locations.[109]

Waterrock knob salamanders *(D. imitator pop. 1)* are a population of the imitator salamander that is only found on wet rock faces above 1650 meters on Waterrock Knob.

Pygmy salamanders are a rare endemic of the southern Appalachian Mountains. In 2010 it was reclassified as two distinct species (*D. organi* and *D. wrighti*) with ranges divided by the French Broad River. Both are listed as federal species of concern and rare in NC. Haas (2016) found there were no differences in abundance between spruce-fir and northern hardwood forests or northern hardwood and cove forests. They exhibit a strong preference for round wood cover objects and selected sites with greater amounts of small and large sized down woody debris than randomly available.[110]

Santeetlah dusky salamanders (*D. santeetlah*) are found only at high elevations in the mountains in and around the GSMNP.[111]

Junaluska salamanders are listed as threatened by the state of North Carolina and a federal species of special concern. They have a very limited range in Tennessee and North Carolina and occur in fewer than 12 sites. In North Carolina they are only found in the Nantahala National

[104] Petranka, J.W. 1998. Salamanders of the United States and Canada. Smithsonian Institution Press, Washington, D.C.
[105] Ford, W.M., B.R. Chapman, M.A. Menzel, and R.H. Odom. 2002. Stand age and habitat influences on salamanders in Appalachian cove hardwood forests. Forest Ecology and Management 155(1-3): 131-41.
[106] Gratwicke, B (ed). 2008. Proceedings of the Appalachian Salamander Conservation Workshop. IUCN/SSC Conservation Breeding Specialist Group: Apple Valley, MN.
[107] NatureServe Explorer, Seepage Salamander, Desmognathus aeneus, at https://explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.100247/Desmognathus_aeneus
[108] Petranka, J.W. 1998. Salamanders of the United States and Canada. Smithsonian Institution Press, Washington, D.C.
[109] Amphibians and Reptiles of North Carolina, Imitator Salamander, Desmognathus imitator, at http://herpsofnc.org/?s=imitator
[110] Haas, I. 2016. Habitat use of northern pygmy salamander (Desmognathus organi) and Southern Pygmy Salamander (D. wright) in North Carolina. Proceedings of the National Conference on Undergraduate Research 2016. University of North Carolina Asheville. Asheville, NC (April 7-9, 2016).
[111] Amphibians and Reptiles of North Carolina, Santeetlah Dusky Salamander, Desmognathus Santeetlah, at http://herpsofnc.org/?s=santeetlah

Forest of Graham County and in Great Smoky Mountains National Park. One of the three NC populations is thought to have been extirpated due to human disturbance upstream.[112]

Long-tailed salamanders (Eurycea longicauda) are a state species of special concern that occur primarily in the extreme northwestern corner of Pisgah National Forest. They can be found in caves or along the margins of sale or limestone stream beds. Breeding occurs between late fall and early spring.[113]

Blue Ridge Gray-Cheeked Salamanders (*Plethodon amplus*) are one of four species of gray-cheeked salamanders. They are found in a small area to the east of the southern grey-cheeked salamander in Buncombe, Rutherford, and Henderson counties, North Carolina at an elevational range of at least 1,109-1,116 meters.[114] They occur in mesic forest, often under leaf-litter, logs, or mossy rocks.[115] It is known from fewer than five locations[116] and some local extirpations apparently have occurred as a result of habitat destruction and modification.[117] Conservation activities that promote mature closed-canopy forests should benefit this species.[118]

Tellico salamanders, Chattahoochee slimy salamanders, northern slimy salamanders, and southern Appalachian salamanders (*Plethodon glutinosus spp.)* are members of the slimy salamander complex.[119] The Tellico salamander occurs on lower slopes and in lowlands on and around the Unicoi Mountain range on the border of North Carolina and Tennessee. It is found in shaded stream valley woodlands and adjacent uplands within its limited range. It prefers deciduous stands, and the highest abundance has been found in the vicinity of bottomlands with an abundance of leaf litter, rotting logs, and organic soil layer.[120]

Cheoah bald salamanders (*Plethodon cheoah*) are a micro-endemic that only occurs at high elevations on a single mountain in North Carolina in the Nantahala National Forest of Graham and Swain counties. It is found in mesic forest, often under leaf-litter, logs, or mossy rocks. They are terrestrial breeders.

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[112] Amphibians and Reptiles of North Carolina, Junaluska Salamander, Eurycea Junaluska, at http://herpsofnc.org/junaluska-salamander/

[113] Amphibians and Reptiles of North Carolina, Long-Tailed Salamander, Eurycea longicauda, at http://herpsofnc.org/long-tailed-salamander/

[114] Highton, R. and R.B. Peabody. 2000. Geographic protein variation and speciation in salamanders of the Plethodon jordani and Plethodon glutinosus complexes in the southern Appalachian Mountains with the description of four new species. Pages 31-93 in R.C. Bruce, R. G. Jaeger, and L.D. Houck, editors. The biology of plethodontid salamanders. Kluwer Academic/Plenum Publishers, New York. Xiii + 485 pp.

[115] Hammerson, G. and D. Beamer 2004. Plethodon amplus. In: IUCN 2011. IUCN Red List of Threatened Species. Version 2011.2.

[116] *Id*.

[117] Beamer, D.A., and M.J. Lannoo. Plethodon amplus Highton and Peabody. 2000. Blue Ridge gray-cheeked salamander. Pages 789-790 in M. Lannoo, editor. Amphibian declines: the conservation status of United States species. University of California Press, Berkeley.

[118] *Id.*

[119] Amphibians and Reptiles of North Carolina, Slimy Salamander Complex, at http://herpsofnc.org/slimy-salamander-complex/

[120] Gap Data Tool, North Carolina Species Report, Tellico salamander, Plethodon aureolus, at http://www.basic.ncsu.edu/ncgap/sppreport/aaaad12250.html

Red-legged salamanders (*Plethodon shermani*) are also found primarily at high elevations and are limited to the Unicoi and Nantahala Mountains of Nantahala National Forest. Both the Cheoah bald salamander and red-legged salamander were formerly considered to be subspecies of the Jordan's salamander.[121]

Crevice salamanders (*P. yonahlossee*) occur in mature, primarily deciduous, woodlands of upland areas.[122] Greatest abundances appear to be in old growth forest[123] and they are found within 30 m of mountain streams.[124] They are considered a special concern species in North Carolina.[125]

Southern ravine salamanders (*Plethodon richmondi*) are primarily found in the extreme northwest corner of Pisgah National Forest but may be locally abundant in suitable habitat. They are found on wooded slopes of ravines and hillsides at high elevations and is also associated with rocky habitats.[126]

Southern zigzag salamanders *(Plethodon ventralis)* only occur in small, primarily calcareous areas of the Nantahala and Pisgah National Forests.[127] They are considered a special concern species in North Carolina.[128]

Wehrle's salamanders *(Plethodon wehrlei)* are a state listed species and are only found in a small area in northwestern NC.[129] They are only known to occur from specimens collected in Stokes County and are found near the entrances of caves and among rock outcrops. They are most frequently found in rocky gorges that are covered with mesic hardwood forest.[130]

Weller's salamanders *(Plethodon welleri)* are a state species of special concern.[131] They only occur in spruce fir forests and northern hardwood forests of western North Carolina and eastern

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[121] Amphibians and Reptiles of North Carolina, Cheoah Bald and Red-Legged Salamanders, Plethodon Cheoah, Plethodon shermani, at http://herpsofnc.org/cheoah-bald-and-red-legged-salamanders/
[122] Gap Data Tool, North Carolina Species Report, Yonahlossee salamander, Plethodon yonahlossee, at http://www.basic.ncsu.edu/ncgap/sppreport/aaaad12240.html
[123] Petranka, J.W. 1998. Salamanders of the United States and Canada. Washington DC: Smithsonian Ist. Press.
[124] Gap Data Tool, North Carolina Species Report, Yonahlossee salamander, Plethodon yonahlossee, at http://www.basic.ncsu.edu/ncgap/sppreport/aaaad12240.html
[125] North Carolina Wildlife Resources Commission, Protected Wildlife Species of North Carolina (October 2017), at https://www.ncwildlife.org/Portals/0/Conserving/documents/Protected-Wildlife-Species-of-NC.pdf
[126] Amphibians and Reptiles of North Carolina, Ravine Salamander, Plethodon richmondi, at http://herpsofnc.org/ravine-salamander/
[127] Amphibians and Reptiles of North Carolina, Southern Zigzag Salamander, Plethodon ventralis, at http://herpsofnc.org/southern-zigzag-salamander/
[128] North Carolina Wildlife Resources Commission, Protected Wildlife Species of North Carolina (October 2017), at https://www.ncwildlife.org/Portals/0/Conserving/documents/Protected-Wildlife-Species-of-NC.pdf
[129] Amphibians and Reptiles of North Carolina, Wehrle's Salamander, Plethodon wehrlei, at http://herpsofnc.org/wehrles-salamander/
[130] Gap Data Tool, North Carolina Species Report, Wehrle's salamander, Plethodon wehrlei, at http://www.basic.ncsu.edu/ncgap/sppreport/aaaad12220.html
[131] North Carolina Wildlife Resources Commission, Protected Wildlife Species of North Carolina (October 2017), at https://www.ncwildlife.org/Portals/0/Conserving/documents/Protected-Wildlife-Species-of-NC.pdf

Tennessee. They are terrestrial breeders and primarily associated with wet, high elevation spruce-fir habitat.[132]

Mountain chorus frogs (*Pseudacris brachyphona*) are a state species of special concern. They are found in an extreme southwestern corner of North Carolina where they have been documented from only a few sites. Breeding occurs in hillside streams, shallow ponds, and ditches. The species was rediscovered in 2001.[133]

There has been widespread destruction, degradation, and fragmentation of imperiled amphibian habitats in the Southeast.[134] Dodd (1997) states: "The integrity of both aquatic and terrestrial habitats is important to amphibian survival, even among species that never venture beyond a single habitat type. Furthermore, the various life history stages (eggs, larvae, young, adults) may be differentially susceptible or sensitive to environmental perturbations…Although vast areas have been cleared in the Southeast for agriculture, industry, and urban use, there is virtually no assessment of the landscape effects of land conversion on amphibian populations. It seems evident, however, that habitat changes…, and with them changes in amphibian populations, have been enormous."[135]

Habitat loss and degradation obviously negatively affects amphibian populations.[136] Habitat fragmentation can lead to amphibian extirpation by disrupting metapopulation dynamics and preventing dispersal and rescue between source and sink habitat. Dodd (1997) states: "Land use patterns resulting in fragmentation can influence amphibian population genetic structure…if populations become overly fragmentated, emigration and immigration may be inhibited or stopped, thus preventing recolonization from source populations…Small isolated populations are particularly susceptible to environmental perturbations and to stochastic variation in demography that can lead to extinction even without external perturbations. Isolation by habitat fragmentation thus becomes a threat to the regional persistence of species."[137]

There is general agreement that timber harvests in temperate regions can have numerous negative effects on species richness and abundance of forest-dependent species, including amphibians in particular.[138] Logging is detrimental for both aquatic and terrestrial amphibian

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[132] Amphibians and Reptiles of North Carolina, Weller's Salamander, Plethodon welleri, at http://herpsofnc.org/wellers-salamander/

[133] Amphibians and Reptiles of North Carolina, Mountain Chorus Frog, Pseudacris brachyphona, at http://herpsofnc.org/mountain-chorus-frog/

[134] Vial, J.L. and Saylor, L. 1993. The status of amphibian populations: a compilation and analysis. IUCN, 98 pp.; LaClaire, L.V. 1997. Amphibians in Peril: Resource Management in the Southeast. P. 307-321 In: Benz, G.W. and D.E. Collins (editors). 1997 Aquatic Fauna in Peril: The Southeastern Perspective. Southeast Aquatic Research Institute Special Publication 1, Lenz Design and Communications, Decatur, GA. 553 pp.

[135] Dodd, C.K., Jr. 1997. Imperiled amphibians: a historical perspective. pp. 165-200. In Benz, G.W. and D.E. Collins (Eds.), Aquatic Fauna in Peril: The Southeastern Perspective. Special Publication Number 1, Southeast Research Institute, Lenz Design and Communications, Decatur, GA. 553 pp.

[136] *See* LaClaire (1997).

[137] Dodd (1997) at 197.

[138] *See* Bury, R.B. 1983. Differences in amphibian populations in logged and old-growth redwood forests. Northwest Science 57: 167-178.; Petranka et al. 1993. Effects of timber harvesting on southern Appalachian salamanders. Conservation Biology 7:363-370; Petranka et al. 1994. Effects of timber harvesting on southern Appalachian salamanders. Forest Ecology and Management 67: 135-147; deMaynadier, P.G., and M.L. Hunter. 1995. The

habitat because it eliminates shade, increases soil and water temperature, alters stream flow, increases sedimentation, reduces the input of coarse wood debris and organic matter into streams, reduces forest floor litter (especially if litter is piled and burned), reduces soil moisture, reduces and eliminates burrows and hiding places, and destroys wetlands. Logging also frequently involves the use of herbicides, which can be detrimental for amphibians.[139] Logging is known to decrease amphibian abundance and reproductive success.[140]

In particular, studies by Semlitsch et al. (2009) generated dozens of statistically significant negative effects of timber harvest treatments on a broad range of pond-breeding amphibian responses.[141] Removal of the forest canopy or course woody debris exposes amphibians to warmer and drier microclimate conditions[142] eventually reducing leaf litter[143] and food resources.[144] These changes eventually lead to lower survival[145] or higher evacuation of habitats.[146] Timber harvests that create large canopy gaps may also expose amphibians to UVB

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relationship between forest management and amphibian ecology: a review of the literature. Environmental Reviews 3: 230-261; Dupuis et al. 1995. Relation of terrestrial-breeding amphibian abundance to tree-stand age. Conservation Biology 9: 645-653; Ash 1997, A.N. 1997. Disappearance and return of plethodontid salamanders to clearcut plots in the southern Blue Ridge Mountains. Castanea 60: 89-97; Dodd (1997); Herbeck, L.A., and D.R. Larsen 1999. Plethodontid salamander response to silvicultural practices in Missouri Ozark Forests. Conservation Biology 13: 623-632; Grialou et al. 2000. The effects of forest clearcut harvesting and thinning on terrestrial salamanders. Journal of Wildlife Management 64: 105-113; Ross et al. 2000, DeGraaf and Yamasaki 2002, Adams and Bury 2002, Herrig, J. and P. Shute. 2002. Chapter 23: aquatic animals and their habitats. Southern Region, USDA Forest Service and Tennessee Valley Authority. 45 pp. In: Wear, David N., Greis, John G., eds. 2002. Southern forest resource assessment. Gen. Tech. Rep. SRS-53. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station. 635 pp; Ford, W.M., Chapman, B.R., Menzel, M.A., and Odom, R. 2002. Stand age and habitat influences on salamanders in Appalachian cove hardwood forests. Forest Ecology and Management 155(1):131-141; Knapp et al. 2003. Initial effects of clearcutting and alternative silvicultural practices on terrestrial salamander abundance. Conservation Biology 17:752-762; Russel et al. 2004, Karraker, N.E. and H.H. Welsh, Jr. 2006. Long-term impacts of even-aged timber management on abundance and body condition of terrestrial amphibians in northwestern California. Biological Conservation 131: 132-140; Olson et al. 2007. Biodiversity management approaches for stream-riparian areas: Perspectives for Pacific Northwest headwater forests, microclimates, and amphibians. Forest Ecology and Management 246: 81-107.; Semlitsch et al. 2009. Effects of Timber Harvest on Amphibian Populations: Understanding Mechanisms from Forest Experiments. BioSciences 59(10): 853-862.

[139] *See* Amphibiaweb. 2020. University of California, Berkeley, CA, at http://amphibiaweb.org/declines/ChemCon.html.

[140] Dodd (1997), LaClaire (1997).

[141] Semlitsch, R.D. et al. 2009. Effects of timber harvest on amphibian populations: Understanding mechanisms from forest experiments BioScience 59:853-862.

[142] Kennan R.J., and J.P. Kimmins. 1993. The ecological effects of clear-cutting. Environmental Review 1: 121-144; Ash, A.N. 1995. Effects of clear-cutting on litter parameters in the southern Blue Ridge Mountains. Castanea 60: 89-97; Harpole, D.N., and C.A. Haas. 1999. Effects of seven silvicultural treatments on terrestrial salamanders. Forest Ecology and Management 114: 245-252; Chen et al. 1999. Microclimate in forest ecosystem and landscape ecology. BioScience 49: 288-297, Zheng et al. 2000. Effects of silvicultural treatments on summer forest microclimate in southeastern Ozarks. Climate Research 15: 45-59.

[143] Hughes JW, and T.J. Fahey. 1994. Litterfall dynamics and ecosystem recovery during forest development. Forest Ecology and Management 63: 181-198; Ash (1995).

[144] Seastedt, T.R., and D.A. Crossley Jr. 1981. Microarthopod response following cable logging and clear-cutting in the southern Appalachians. Ecology 62: 126-135.

[145] Todd B.D., and B.B. Rothermel. 2006. Assessing quality of clearcut habitats for amphibians: Effects on abundances versus vital rates in the southern toad (Bufo terrestris). Biological Conservation 133: 178-185.

[146] Semlitsch et al. 2008. Effects of timber harvesting on amphibian persistence: Testing the evacuation hypothesis. Ecological Applications 18: 283-289.

radiation, causing mutations and cell death in addition to slow growth rates, impaired immune systems, and sublethal damage at the individual level.[147] Exposure to UV radiation has also been linked with the disease chytridiomycosis.[148]

Salamander species may be some of the most vulnerable to regeneration harvests aimed at creating more young forests. Petranka et al. (1993) compared species richness and abundance of salamanders on six clearcuts with salamander densities in mature forest stands in the Appalachian Mountains. They found that salamander densities in the mature stands were five times higher than those in recently cut plots. From these surveys, Petranka et al. (1993) estimated that timber harvesting in the Appalachian Mountains resulted in the loss of 14 million salamanders annually.[149]

Petranka, et al. (1994) examined the effects of timber harvesting on southern Appalachian salamander communities in the Pisgah National Forest.[150] Salamander abundance and species richness were lowest in very young stands and highest in stands more than 120 years old.[151] Comparisons of clearcuts less than 5 years old with mature stands more than 80 years old suggested that terrestrial salamanders were completely eliminated or reduced to very low numbers when mature forests were clear cut.[152]

Of those salamanders that initially survive clearcuts, researchers have found that a large portion of the amphibian population dies if they stay in clear cut areas, especially small juveniles.[153] deMaynadier and Hunter (1995) found that across 16 research projects, control stands had about 4.3 times more captures of salamanders than clearcut stands. Behavioral studies also show that both juvenile and adult amphibians often avoid entering clearcuts when given a choice,[154] causing habitat fragmentation and isolation of populations.

Research by Ford et al. (2002) indicates stand age is an important factor in explaining abundance and community composition of salamanders in southern Appalachian cove hardwood communities. Because these communities are slow to recover and are substantially changed

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[147] Schneider, D.R. 2010. Salamander communities inhabiting ephemeral streams in a mixed mesophytic forest of southern Appalachia. Indiana University of Pennsylvania, Thesis. 8-9.
[148] *Id*. at 9.
[149] Petranka et al. 1993. Effects of timber harvesting on southern Appalachian salamanders. Conservation Biology 7:363-370.
[150] Petranka, et al. 1994. Effects of timber harvesting on low elevation populations of southern Appalachian salamanders. Forest Ecology and Management. 67:135-147.
[151] *Id*.
[152] *Id*.
[153] Rothermel B.B., and T.M. Luhring. 2005. Burrow availability and desiccation risk of mole salamanders (Ambystoma talpoideum) in harvested versus unharvested forest stands. Journal of Herpetology 39: 619-626; Todd and Rothermel 2006, Harper, E.B. 2007. The role of terrestrial habitat in the population dynamics and conservation of pond-breeding amphibians. PhD dissertation. University of Missouri, Columbia; Patrick et al. 2008. Terrestrial habitat selection and strong density-dependent mortality in recently metamorphosed amphibians. Ecology 89: 2563-2574; Todd et al. 2008. Habitat alteration increases invasive fire ant abundance to the detriment of amphibians and reptiles. Biological Invasions 10: 539-546.
[154] Rittenhouse, TAG, R.D. Semlitsch. 2006. Grasslands as movement barriers for a forest-associated salamander: Migration behavior of adult and juvenile salamanders at a distinct habitat edge. Biological Conservation 131:14-22; Patrick et al. 2008; Todd et al. 2009. Effects of forest removal on amphibian migrations: Implications for habitat and landscape connectivity. Journal of Applied Ecology 46: 554-561.

following disturbances such as clearcutting, populations in small, isolated cove hardwood stands might be more vulnerable to extirpation or may require longer recovery times than those in larger coves. Therefore, managers should assess habitat features such as cove extent and habitat connectivity to minimize impacts on these taxa.[155]

The harmful effects of clearcuts on amphibians are long lasting with scientists concluding that population recovery requires 50-70 years[156] or even longer.[157]

Other silvicultural practices may also cause lasting reductions of terrestrial salamander populations due to both low population growth rates and changes to habitat.[158] Methods such as group selection and shelterwood involve several entries into the stand, which not only exposes the salamander community to a reopening of the canopy and the associated drying of the environment, but it also results in recompaction or disturbance of the soil and leaf litter from tree felling and logging traffic.[159]

Road construction and operation (frequently associated with timber harvests) can also have significant impacts to amphibian populations. Roads can divide breeding locations from overwintering sites and increase mortality for migrating adults and dispersing juveniles. Roads also can disrupt metapopulation dynamics and lead to population isolation, and light and noise from roads can disrupt breeding and feeding behaviors.[160]

Unfortunately, as explained earlier, the Final Plan's coarse-filter analysis fails to capture these impacts and essentially treats all impacts to this species group the same, regardless of their location on the forests. Many salamanders occur across the forests in a very patchy distribution and for many salamander species, they are only found in a very small and isolated geographic area. Sometimes they are found only in a single county. Some of these areas may have never been surveyed or include old growth patches that have not been added to the old growth network and may otherwise be managed consistent with the management area in which they are found. Salamander community composition and structure may also be determined by competition among different species in addition to food and burrow availability, predation, and intra-specific dominance.[161] Many species of salamanders could be at risk if these small, concentrated populations are not protected and regeneration harvests proceed in these areas. There is only passing mention of how salamanders are susceptible to changes in forest floor microclimate and drying out of the forest floor (FEIS at 3-334) and no discussion of how the Forest Plan will minimize or mitigate these impacts of regeneration harvest. The FEIS also does not examine the

[155] Ford, W.M., Chapman, B.R., Menzel, M.A., and Odom, R. 2002. Stand age and habitat influences on salamanders in Appalachian cove hardwood forests. Forest Ecology and Management 155(1):131-141.
[156] Petranka et al. 1993.
[157] Petranka et al. 1994; Homyak, Jessica A., and Carola A. Haas. 2009. Long-term effects of experimental forest harvesting on abundance and reproductive demography of terrestrial salamanders. Biological Conservation 142: 110-121; Semlitsch et al. 2007. Salamander abundance along road edges and within abandoned logging roads in Appalachian forests. Conservation Biology 21: 159-167.
[158] Homyack and Haas. 2009.
[159] Knapp et al. 2003. Initial effects of clearcutting and alternative silvicultural practices on terrestrial salamander abundance. Conservation Biology 17: 752-762.
[160] Dodd. 1997.
[161] Schneider at 15-16.

use of herbicides before and after timber harvests and how these practices can impact theses species. Many researchers have studied the impacts of pesticides and herbicides on amphibians and other aquatic organisms[162] yet the impacts of these activities go unexamined in the FEIS and the Plan does not contain any standards to mitigate the impacts.

New roads could divide breeding locations and overwintering sites and further fragment and isolate populations. Yet there is only a single sentence about how roads lead to the crushing of salamanders, particularly as they move to areas to breed. There is no discussion of how more roads will further threaten these species. (FEIS at 3-340-341). To the extent the Forest Service relies on TA-DC-08 and TA-S-04 to mitigate road impacts, these standards are vague and inadequate. The FEIS and Forest Plan do not explain when roads would "contribute to migration stress" for these animals and what specific measures would be undertaken to avoid this from occurring. Moreover, while stream crossings may help mitigate impacts for salamanders traveling from upland to riparian areas, they do not address the impacts of roads fragmenting upland salamander habitat or minimize roadkill in these upland areas. (Forest Plan at 106; 108-109). They also do not help salamanders access ephemeral streams because these important breeding areas remain unprotected under the Plan. Therefore, the analysis of the potential impacts to these species needs to be much more nuanced and sensitive to their location on the forests.

To make matters worse, in the absence of coarse-filter protections, the Forest Service has engaged in a deficient fine-filter analysis, yielding few protections for these species. Many species of salamanders depend on ephemeral water sources for breeding; yet the Final Plan (unlike the Cherokee National Forest Plan, for example) does not require any buffers for ephemeral streams and no seasonal restrictions on harvests to avoid impacting the breeding season.

Ephemeral streams support a variety of fauna including macroinvertebrates, fishes, amphibians, and streamside mammals, reptiles, and birds. They serve as sites of oviposition, spawning, rearing, refugia from drying, and dietary hotspots. They can support rare or unique macroinvertebrate species, provide fish with untapped food resources, and provide dietary hotspots for riparian animals.[163]

Ephemeral streams play a particularly important role in salamander ecology. Many of the salamander species in the southern Appalachians depend, at least in part, on stream habitats.[164]

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[162] *Id*.; Hayes et al. 2002. Hermaphroditic, demasculinized frogs after exposure to the herbicide atrazine at low ecologically relevant doses. Proceedings of the National Academy of Sciences of the United States of America 99: 5476-5480; Hayes, T., K. Haston, M. Tsui, A. Hoang, C. Haeffele, and A. Vonk. 2002. Herbicides: Feminization of male frogs in the wild. Nature 419: 895-896.; Herrig and Shute. 2002. Chapter 23: aquatic animals and their habitats. Southern Region, USDA Forest Service and Tennessee Valley Authority. 45 pp. In: Wear, David N.l Greis, Hohn G., eds. 2002. Southern forest resource assessment. Gen. Tech. Rep. SRS-53. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station. 635 pp.; Cauble and Wagner. 2005. Sublethal effects of the herbicide glyphosate on amphibian metamorphosis and development. Bulletin of environmental contamination and toxicology 75: 429-435; King, J.J. and R.S. Wagner 2010. Toxic effects of the herbicide Roundup Regular on Pacific Northwestern amphibians. Northwestern Naturalist 91: 318-324.

[163] *See* McDonough, O.T., Hosen, J.D., Palmer, M.A. 2011. *The Hydrology, Geography, and Ecology of Non-Perennially Flowing Waters*, In: River Ecosystems: Dynamics, Management and Conservation.

[164] Schneider at 1.

Some species inhabit upland habitats most of the year but return to these streams seasonably to breed.[165] Adults may use rocks and logs along small streams and seeps and lay eggs under submerged debris in running water.[166] In the southern Appalachians, the larval phase is usually one year in ephemeral streams.[167] Metamorphosis usually occurs between April and July. After adults breed, they migrate up hill and sometimes travel more than 100 meters. Other salamanders may inhabit ephemeral streams but do not require them during the breeding season.[168]

Species that have been found near ephemeral streams include the eastern newt, spotted salamander, and marbled salamander.[169] Additionally, several species of lungless salamanders in the *Plethodontidae* family may also occur in ephemeral streams. A study by Schneider (2010) showed the importance of ephemeral streams compared to perennial streams in Kentucky's Robinson Forest for certain salamanders including slimy and two-line salamanders.[170] Although ephemeral streams are dry most of the year, the time of year when water is present coincides with the breeding activities of many species.[171] Because they are dry most of the year, this limits fish populations allowing many salamanders to complete a successful lifecycle due to decreased predation.[172] Therefore, ephemeral streams may be of great importance for sustaining viable populations of amphibian species inhabiting deciduous forests of the eastern United States.[173]

Whereas BMPs have been developed to protect perennial and intermittent streams, fewer protections are in place for ephemeral streams.[174] Despite their importance to salamander communities and other biodiversity, they may be at high risk from timber harvests because there are no regulations associated with proximity of harvest to this stream type.[175] These risks may even extend to species such as dusky salamanders which may depend on perennial streams more than ephemeral streams for reproduction. That is because dusky salamander populations in perennial streams may be negatively impacted by activities that degrade ephemeral streams as this species is easily eliminated by siltation and pollution.[176]

These impacts go unexamined by the Forest Service in the FEIS and the Forest Plan contains no standards or guidelines specially aimed at protecting these species or their ephemeral stream habitats. The Forest Service does add language to the FEIS acknowledging the importance of ephemeral streams. The Plan also states that "the Forests recognize that ephemerally flowing streams are often headwater channels, connecting to a network of streams that support an abundance of aquatic life and other beneficial uses of water" (Final at 47). Despite recognizing the importance of these features, the Forest Service fails to explain why protections for these ephemeral streams are not warranted or how other aspects of the Plan will adequately protect

[165] *Id*. at 11.
[166] *Id*.
[167] *Id*.
[168] *Id*. at 12.
[169] *Id*. at 9-12.
[170] *Id*. at 58.
[171] *Id*. at 3.
[172] *Id*.
[173] *Id*
[174] *Id*. at 2-3.
[175] *Id*. at 3.
[176] *Id*. at 59.

these important resources (FEIS at 2-11; 3-75; 3-91). WTR-DC-06 for example states that the Forest Service is to "emphasize the protection of all stream channels" and "protect the integrity of perennial, intermittent, and ephemeral stream channels including their bed and banks" (Final Plan at 42). However, unlike standards in place for perennial and intermittent streams, there are no standards for ephemeral streams. The only language in Plan that comes remotely close to addressing this issue is under "management approaches," which provides that the Forest Service is to "manage ephemeral stream channels and their areas of impact to reduce the risk of erosion and sedimentation by minimizing disturbance during management. For example, temporary road and skid trail crossings are allowed by minimized, and timber is managed while minimizing soil disturbance and retaining vegetation for slope stability" (Forest Plan at 49). The Forest Plan, however, does not explain what specific steps will be taken to "minimize" these impacts and it is devoid of any specific measures or guidelines to guide activities in and around these streams.[177]

The Forest Service's discussion not only falls short of meeting the fine filter analysis requirements under the 2012 planning rule, but it also runs afoul of the APA and NEPA. In this instance, the Forest Service has utterly failed to examine the relevant data and articulate a satisfactory explanation for its action including a rational connection between the facts found and the choice made. *Motor Vehicle Mfrs. Ass'n v. State Farm Mut. Auto. Ins. Co*., 463 U.S. 29, 43 (1983). The FEIS needs to closely examine the alternatives' impacts to these unique habitat features, and the Final Plan needs to include specific, fine-filter protections (including buffers for ephemeral streams) to ensure that isolated populations of rare salamanders are not adversely impacted (or worse, inadvertently extirpated) as a result of timber harvests and other habitat disturbances. Attention should also be paid towards protecting certain habitat features near these ephemeral streams (i.e. cover objects) to better protect the integrity of the stream channel and bank microhabitat.[178] This includes leaving slash in and adjacent to ephemeral streams while maintaining other aspects of stream integrity and canopy closure.[179] The Forest Service needs to take an approach that is consistent with other Forests in the region in providing such protections and this is a glaring deficiency in the FEIS and Forest Plan that needs the Forest Service's utmost attention.

In addition to establishing buffers for ephemeral streams, the Forest Service needs to consider management techniques to reduce the impacts to salamanders, including buffers along headwater streams and using harvesting techniques which assure that the basic structure and function of forests remain intact following timbering operations.[180] Moorman et al. (2011) writes, "small forest openings such as group selection harvests and wind-created downburst gaps with multiple treefalls, or partial harvests that retain a large percentage of the overstory, can mitigate the negative effects of timber harvests on amphibians by maintaining shade and leaf litter input and providing refuge and recolonization sources."[181] Overstory retention adjacent to wetlands can

[177] Further, the Final Plan negates whatever minimal protections are in place for these habitats by explaining in detail the many features it considers not to be ephemeral streams because they may not be connected to a downstream stream network. This exempts a number of features from even qualifying as ephemeral streams in the first place. Final Plan at 47.
[178] Schneider at 63.
[179] *Id*.
[180] Petranka et al. (1994).
[181] Moorman, C.E. et al. 2011. Chapter 11. Reptile and Amphibian Response to Hardwood Forest Management and Early Successional Habitats, pp. 191-198. In: Sustaining young forest communities: ecology and management of

also be critical to maintaining connectivity between reproductive sites and other habitat features.[182] Researchers have recommended at least 50% of the overstory to minimize negative effects on amphibian populations although as little as 41% reduction in the overstory may result in declines in the abundance of plethodontid woodland salamanders similar to clearcuts.[183]

In addition to avoiding old growth stands, designated "no harvest areas" on the landscape could serve as sources for repopulating nearby harvest units.[184] This could be accomplished by including PARCAs—Priority Amphibian and Reptile Conservation Areas- in the Plan and designating them as no harvest areas. These protection areas have been proposed by Partners in Amphibian and Reptile Conservancy, and there are six PARCAs on the Nantahala Pisgah (FEIS at 3-356, 3-357). Top herpetologists have recommended these six areas to be recognized as core areas of protection for salamanders and other amphibians. Without any analysis, the Forest Service refused to further consider PARCAs in the FEIS, asserting that "these areas alone will not offer conservation value to all terrestrial salamanders. Therefore, this approach to summarizing potential effects by alternative on terrestrial salamanders was not used." (FEIS at 3-356). Essentially, the Forest Service throws its hands in the air and says the best opportunity to maintain, restore, or enhance habitat is within mature and old growth forests. (FEIS at 3-357). This is ironic given that potentially thousands of acres of old growth forests that are not inventoried will receive no protection under the Plan. No effort is made to evaluate and protect population hotspots (particularly those in the matrix) where older forests may be vulnerable to regeneration harvests. Even if PARCAs would not provide complete protection for these species, these scientifically defensible protected areas are a logical starting point for specifically protecting dispersal-limited salamanders and other SCC. The Forest Service could then build upon the protections provided by PARCAs and protect additional areas as surveys and monitoring identify other important habitats.

Increasing the rotation length may also help ensure that a portion of the area contained large trees, high accumulations of large diameter CWD, and other structural characteristics associated with late-seral forest.[185]

Mitigation measures also need to be scrutinized because some measures like coarse woody debris retention may provide only short-term benefits by providing refuge from desiccating conditions immediately post-harvest, and may not prevent declines.[186] Instead, old growth stands that contain significant amounts of decaying coarse woody debris should be avoided. There should also be a forest-wide standard aimed at preventing the fragmentation of salamander habitat by prohibiting timber harvests and road construction from creating barriers to the movement of groups of salamanders at the individual or population level.[187] Finally, the Forest

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early successional habitats in the Central Hardwood Region, USA. C.H. Greenberg, B.S. Collins, F.R. Thompson III, editors. Springer, New York, NY. USA.

[182] *Id.*

[183] *Id.*

[184] *Id.*

[185] *Id.*

[186] *Id.*; Mosely et al. 2004. Coarse woody debris and pine litter manipulation effects on movement and microhabitat use of Ambystoma talpoideum in a Pinus taeda stand. For Ecol Manage 191:387-396; Semlitsch et al. (2009).

[187] This would also be consistent with NPNF Partnership Recommendations. We are further dismayed to see in the Final Plan the Forest Service's cursory treatment of this issue as evidenced by the failure to cite to any plan

Service must monitor disturbances and commit to mitigating their impacts by adjusting management levels if unexpected levels of disturbance are occurring during implementation.

2) The Fine Filter Analysis for the Green Salamander is Deficient and There Must be Stronger Protections for this Species.

The **green salamander** (*Aneides aeneus)* is listed as endangered by the state of North Carolina. It occurs in moist, shady crevices in cliffs and rock faces. In North Carolina it is only found in a small mountainous region in the southwestern corner of the state and because of its specific habitat requirements it has a patchy distribution and is generally uncommon throughout its range. Females guard their eggs and later the hatchlings for several months, seldomly eating. Because of their high energetic cost of reproduction, females only breed every other year. There may be four distinct lineages that warrant species status.[188] Three of these lineages occur in the Nantahala Pisgah National Forest. *Id.*

To the extent the Service may argue that fine-filter protections are in place for the green salamander, these too are inadequate. There is a 300-foot buffer for the green salamander "if appropriate" (Final Plan at 82). However well intentioned, the species could be buffered into tiny islands of shrinking habitat. The FEIS does not consider the dispersal limitations of this species and the cumulative effects of potentially isolating several populations of green salamanders with multiple cuts and 300-foot buffers.[189] The Forest Service must analyze these impacts and identify an alternative that prohibits logging within known and suitable green salamander habitat. Considering the species' extremely limited range (4,500 acres of known occupied habitat) (FEIS at 3-360), it would not be unreasonable to impose such restrictions to protect this imperiled species.

3) The Fine Filter Analysis for Several Bird Species is Deficient and There Must be Stronger Protections for these Species.

The FEIS fails to adequately consider the impacts of regeneration harvests on several bird species and the Plan's fine-filter analysis fails to adequately protect these species.

Cerulean warblers (*Setophaga cerulea*) breed in large tracts of older deciduous forests with tall trees, using elm, birch, beech, basswood, linden, sycamore, black ash, white oak, cucumber magnolia, bitternut hickory, and sugar maple while avoiding red oak and red maple.[190] They

components that would maintain salamander habitat. The Forest Service's place maker ("cite plan component") suggests a lack of concern for these species and a hurried attempt to finalize the Plan. To the extent the Forest Service points to Table 4's statement to suggest salamander habitat would be maintained with coarse woody debris, again, this is not a binding standard or guideline.

[188] Amphibians and Reptiles of North Carolina, Green Salamander, Aneides aeneus, at http://herpsofnc.org/?s=green+salamander

[189] Cumulative impacts are impacts that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. 40 C.F.R. § 1508.7.

[190] The Cornell Lab, All About Birds, Cerulean Warbler, Life History, at https://www.allaboutbirds.org/guide/Cerulean_Warbler/lifehistory#; Audubon Guide to North American Birds, Cerulean Warbler, at https://www.audubon.org/field-guide/bird/cerulean-warbler.

spend most of their time in the highest portions of the canopy of larger, mature trees, especially in mature and old growth forests. Populations have declined by 72% between 1970 and 2014.[191] The global population is estimated to be 570,000, and if current rates of decline continue the species will lose another half of their remaining population by 2041.[192] 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).

Cerulean warblers place territories and nests in northern hardwood forests with well-spaced, large diameter trees, and the species favors the complex canopy structure characteristics of uneven-aged stands and old growth forest. Heterogenous stand structure including large trees, canopy gaps, and understory vegetation promote density and reproductive success of cerulean warblers.

The primary driver of population declines appears to be habitat loss and degradation. As the U.S. Fish &Wildlife Service, notes over 50 percent of the historical forests within the species' breeding range have been cleared and replaced and where they do remain, they lack suitable habitat.[193] This is often due to forest management practices that remove the largest trees, eliminating the structurally diverse canopy that the cerulean needs. It can also be attributed to an increase in second-growth stands of similar sized and relatively young trees.[194] Again, these stands lack the structural complexity preferred by the species.[195] Forest tracks that are mostly cleared are unsuitable habitat as well because they have high rates of nest parasitism and predation.[196] Cerulean warbler abundance and occurrence has been documented to be greater in 70-80 year old mature forests than in 15-80 year old clear-cuts.[197]

The impacts to the population of cerulean warblers resulting from habitat loss may be further exacerbated by the effects of climate change. The species has experienced a 98% loss of its historical range in the Midwest, mid-Atlantic, and Southeast, and its range appears to be shifting north into New England and Canada due to climate change induced weather patterns such as spring heat waves, increased precipitation, and wildfires.[198]

Therefore, conservation efforts include long rotation timber extraction and selective logging to create natural canopy gaps and uneven-aged forest stands.[199] Researchers have recommended that in mature forest stands that have high cerulean densities and high nest success, the no-

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[191] *Id*.
[192] *Id*.
[193] U.S. Fish & Wildlife Service, Midwest Region, Species of Concern, Cerulean Warbler (Dendroica cerula) Fact Sheet, at https://www.fws.gov/midwest/es/soc/birds/cerw/cerw-fctsheet.html.
[194] *Id*.
[195] *Id*.
[196] *Id*.
[197] Duguay, J.P. 2005. Cerulean warbler use of regenerated clearcut and two-age harvests. Wildlife Society Bulletin. 33(3):851-858.
[198] Audubon Guide to North American Birds, Cerulean Warbler, at https://www.audubon.org/field-guide/bird/cerulean-warbler.
[199] The Cornell Lab, All About Birds, Cerulean Warbler, Life History, at https://www.allaboutbirds.org/guide/Cerulean_Warbler/lifehistory#.

harvest option is most favorable for sustaining cerulean populations.[200] Where there is active management, a basal area of 40-90 ft/acre should be retained.[201] Maintaining a significant portion of the management area as mature forest is also important for sustaining forest-interior birds that are sensitive to the amount of mature forest cover at larger spatial scales.[202]

The Final Plan proposes substantial increases of timber harvests in northern hardwood forests, yet it fails to provide any protections to ensure the cerulean warbler and its habitat persist.

The **veery** *(Cartharus fuscescens)* is found predominately in dense, damp, and mostly deciduous high-elevation forests.[203] It has experienced slow but significant declines over the past fifty years with populations declining 42% from 1966 to 2014.[204] Possible causes include the destruction or fragmentation of breeding habitats, which may also increase nest parasitism by Brown-headed cowbirds.[205] Regeneration harvests in mesic forests that eliminate the dense understory and result in the drying out of the forest floor could negatively impact this species.

The **chimney swift** primarily nests in chimneys and other artificial sights but they also nest in caves and hollow trees of old-growth forests.[206] The species has been in a long-term, rangewide decline of about 2.5% per year between 1966 and 2015, resulting in a cumulative decline of 72%, according to the North American Breeding Bird Survey.[207] With traditional brick chimneys now deteriorating and modern chimneys becoming less suitable for nesting, logging of old-growth forests can reduce the availability of natural nest sites.[208] Consequently, regeneration harvests in old growth stands on the Forests could have adverse impacts to the species.

The **Acadian flycatcher** uses relatively undisturbed mature forest both on their breeding and wintering grounds.[209] As such, the species is an indicator of relatively mature forest interiors and the biggest threat is the loss and, especially, the fragmentation of deciduous forest habitat.[210] The latter results in lower reproductive success and an increased rate of brood parasitism by Brown-headed Cowbirds.[211] Regeneration harvests in mature mesic forests could negatively impact this species.

The **Kentucky warbler** is found in dense forests with substantial understory. One of the biggest threats is habitat loss and degradation. It faces increased cowbird parasitism as forest is broken

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[200] Wood, P.B. et al. 2013. American Bird Conservancy. Management guidelines for enhancing Cerulean Warbler breeding habitat in Appalachian hardwood forests.
[201] *Id*.
[202] *Id*.
[203] The Cornell Lab, All About Birds, Veery, Life History, at https://www.allaboutbirds.org/guide/Veery/lifehistory
[204] *Id*.
[205] *Id*.
[206] The Cornell Lab, All About Birds, Chimney Swift, Life History, at https://www.allaboutbirds.org/guide/Chimney_Swift/lifehistory
[207] *Id*.
[208] *Id*.
[209] The Cornell Lab, All About Birds, Acadian Flycatcher, Life History, at https://www.allaboutbirds.org/guide/Acadian_Flycatcher/lifehistory
[210] *Id*.
[211] *Id*.

up into smaller patches.[212] It is also threatened by the disappearance of forest understory caused by over-abundant white-tailed deer.[213] It has experienced a 36% decline between 1966 and 2014.[214] It is on the State of the Birds Watch List, which lists species that are at risk of becoming threatened or endangered without conservation action.[215] Regeneration harvests that remove forest understory may adversely affect the population of this species within the Forests.

The **Field sparrow** is referenced as a species benefiting from the Forest Plan direction of creating more young forests. The use of regeneration harvests to produce young stands of the same forest type, however, will not provide long-term benefits to this species, which has experienced population declines due to the loss of old fields and encroaching suburban development. Restoring habitat will require the long-term maintenance of open, shrubby areas controlled through frequent prescribed burns, not using clear cuts to regenerate even-aged oak forests, which in many cases is what the Forest Service appears to have in mind and only incentivizes continued commercial logging within the Forest in the name of "ecological restoration."

Despite the threats posed to these species, the Final Forest Plan relies predominately on regeneration harvests to create stands of similar sized young trees. The Final Plan and FEIS fail to discuss the potential direct, indirect, and cumulative impacts on these species. While the Final Plan's protections for the cerulean warbler focal area are a significant improvement over the Draft Plan, much more needs to be done to protect this species and other species of conservation concern.

This could be achieved by protecting all North Carolina Natural Heritage Areas. More than 70% of rare species occurrences overlap with these state natural heritage areas. Although the Plan protects some natural heritage areas, it excludes more than 65,000 acres of natural heritage areas and places them in the Matrix. Protecting these natural heritage areas are essential to ensuring that increased timber harvests do not affect a majority of rare species occurrences and habitat. Short of that, the Forest Service should include plan components that require the surveying of cerulean warblers in these areas to determine where the highest concentrations of these species occur. Where there are high densities of cerulean warblers, no logging should occur. Special attention should be paid to protecting and enhancing habitats along ridges and steep upper slopes, as well as knobs and bluffs. Ridge top forests with north and northeast facing slopes with well-spaced, large diameter trees should be protected from regeneration harvests. (FEIS at 3-347). Where the Forest Service has identified the need to create cerulean habitat, alternative silviculture treatments should be implemented, that along with natural disturbances, create canopy gaps within uneven-aged forest stands while retaining large mature trees and other important features (such as grape vines that serve as a favored source of nesting material).[216]

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[212] Audubon, Guide to North American Birds, Kentucky Warbler, Geothlypis formosa, https://www.audubon.org/field-guide/bird/kentucky-warbler
[213] American Bird Conservancy, Kentucky Warbler, at https://abcbirds.org/bird/kentucky-warbler/
[214] The Cornell Lab, All About Birds, Kentucky Warbler, Life History, at https://www.allaboutbirds.org/guide/Kentucky_Warbler/lifehistory
[215] *Id.*
[216] *See* Wood et al. 2013.

4) The Fine Filter Analysis for Several Terrestrial Snails and Slugs is Deficient and There Must be Stronger Protections for these Species.

The Forests are home to several imperiled species of terrestrial snails, which occur in spruce-fir, northern hardwood, high-elevation red oak, and mesic oak forests. These species are particularly vulnerable to regeneration harvests and prescribed fire as they have limited dispersal ability.

The **black mantleslug** (*Pallifera hemphilli*) is considered imperiled in North Carolina according to Nature Serve.[217] It is a species of high elevation, wet spruce-fir forests and can be found hiding under exfoliating bark and rotting logs in advanced stages of decay.[218] It may be seriously impacted by ecological perturbations occurring in high-elevation spruce-fir forests.[219]

The **sculpted supercoil** (*Parvitrea ternaria*) is found under moist leaf litter on wooded hillsides and slopes[220] and is listed as a threatened species by North Carolina.[221] The **lamellate supercoil** (*Paravitrea lamellidens*), **dwarf proud globe** (*Patera clarki clarki*), and **glossy supercoil** (*Paravitrea placentula*) are North Carolina Special Concern Species.[222] The glossy supercoil is found in mesic to rich hardwood forests while the lamellate supercoil and the dwarf proud globe occur on forested mountainsides.[223]

The **Mirey Ridge supercoil** (*Paravitrea clappi*) has been mapped in only 8 known locations. Found in the high elevations in Swain County, it is considered "critically imperiled" in North Carolina.[224]

Additional species include the **Fragile Glyph, Spiral Coil, Velvet Covert, High Mountain Supercoil, and Roan Supercoil.** *See* FEIS at 3-335-3-336.

Regeneration harvest would likely threaten these and other terrestrial snails and slugs by removing necessary habitat features such as rotting logs and by drying out the forest floor. The FEIS recognizes the threat of habitat loss through desiccation, (FEIS at 3-339) but the document does provide any discussion about how the plan alternatives will contribute to this problem nor does it point to any specific standards that would protect these species. In fact, the Plan doesn't even mention these species, much less provide them with any habitat protections. Further, these species are sensitive to the effects of fire (FEIS 3-186). The Forest Service identifies them as fire intolerant species, but the FEIS includes no discussion of these impacts. Again, the Forest Plan provides no standards to safeguard these species from prescribed fire.

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[217] Natural Heritage Program, List of Rare Animal Species of North Carolina, 47 (Feb. 4, 2017), at https://explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.107947/Pallifera_hemphilli
[218] *Id.*
[219] *Id.*
[220] Natural Heritage Program, List of Rare Animal Species of North Carolina, 47-48 (Feb. 4, 2017), at https://files.nc.gov/dncr-nhp/documents/files/2016-nhp-list-of-rare-animals-of-nc-revised-20170404.pdf
[221] North Carolina Wildlife Resources Commission, Protected Wildlife Species of North Carolina (October 2017), at https://www.ncwildlife.org/Portals/0/Conserving/documents/Protected-Wildlife-Species-of-NC.pdf
[222] *Id.*
[223] Natural Heritage Program, List of Rare Animal Species of North Carolina 2016, revised April 4, 2017, at https://files.nc.gov/dncr-nhp/documents/files/2016-nhp-list-of-rare-animals-of-nc-revised-20170404.pdf
[224] NatureServe Explorer, Paravitrea clappi, Mirey Ridge Supercoil, at https://explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.116592/Paravitrea_clappi

As with the noonday globe, prescribed fire should be restricted where these snails and slugs are known to occur. Given that little may be known about these species, there should be pre-and post-project monitoring in areas slated for prescribed fire to identify their locations in the Forests and learn more about their response to habitat disturbance. Further, the Forest Plan should contain a component that implements the Forest Service's work with the NCNHP to review, update, and expand its knowledge of this species group (FEIS at 3-336). This should include a monitoring program.

5) The Fine Filter Analysis for Several Plant Species is Deficient and There Must be Stronger Protections for these Species.

The widespread use of regeneration harvests in old growth, northern hardwood, cove, and mesic oak forests also threatens several rare plant species, many of which are endemic to North Carolina. These plants also include several species of imperiled and critically imperiled lichen.

Blunt-lobed Grape-fern (*Sceptridium oneidense*) is found in cove forests and considered to be imperiled in North Carolina.[225]

Hitchcock's sedge (*Carex hitchcokiana*) is found in moist to dryish forests over calcareous or mafic rocks and is considered "critically imperiled" in North Carolina.[226]

Crested coralroot (*Hexalectris spicata*) occurs in dry or mesic woods on basic soils and is considered imperiled in North Carolina.[227]

Mountain heartleaf (*Hexastylis contracta*) is found in acidic forests under rhododendron in only three counties (Buncombe, Caldwell, and Henderson). It is considered "critically imperiled" in North Carolina.[228]

Mountain catchfly (*Silene ovata*) is found on rich slopes, cove forests, and montane oak-hickory forests and is considered vulnerable in the state of North Carolina.[229]

Textured lungwort (*Lobaria scrobiculata***),** which is found on the bark of hardwoods at high elevations (primarily in the spruce-fir zone), is considered possibly imperiled due to rarity.[230]

Rock skullcap (*Scutellaria saxatilis*) is found in northern hardwood forests and rocky woodlands and is considered "critically imperiled" in the state.[231] It is a closed canopy associate.

[225] *Id*. at 56.
[226] *Id*. at 18.
[227] *Id*. at 34.
[228] *Id.*
[229] *Id*. at 58.
[230] *Id*. at 84.
[231] *Id*. at 57.

Small Yellow Lady's slipper (*Cypripedium parviflorum var. parviflorum*) is an imperiled species found on upper slopes of rich high elevation forests.[232] It is a closed canopy associate.

Smoky Mountain mannagrass (*Glyceria nubigena*) is associated with northern hardwoods and is found on high elevation seeps. It is considered imperiled in the state of North Carolina.[233]

Bent avens (*Geum geniculatum*) is imperiled and is found in high elevation forests, streambanks, and seepage slopes.[234]

Meehania (*Meehania cordata*) is found in cove forests and considered imperiled in North Carolina.[235]

Large purple-fringed orchid (*Platanthera grandiflora*) occurs in high elevation moist forests and banks and is also considered imperiled in the state.[236]

Fruitful locust (*Robinia hispida var fertilis*) is a "critically imperiled species" in the state. It is found in acidic cove forests and northern hardwood forests.[237]

Kelsey's locust (*Robinia hispida var. kelseyi*) is a critically imperiled species in high elevation red oak forest.[238]

Fruitful locust (*Robinia hispida var. fertilis*) occurs in acidic cove forests, northern hardwood forests, and high elevation granitic domes. It is also considered "critically imperiled" in the state.[239]

Clingman's Hedge-nettle (*Stachys clingmanii*) is found in spruce-fir forests and northern hardwood forests and is possibly imperiled in the state.[240]

White Mandarin (*Streptopus amplexifolius*) is found in the same forests as Clingman's hedge-nettle and is considered "critically imperiled" in the state.[241]

Starflower (*Trientalis borealis*) is found in coves and northern hardwood forests and is also considered "critically imperiled" in the state.[242]

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[232] *Id*. at 25.
[233] *Id*. at 33.
[234] *Id*. at 32.
[235] *Id*. at 42.
[236] *Id*. at 48.
[237] *Id*. at 53.
[238] *Id*. at 54.
[239] *Id*. at 53.
[240] *Id*. at 116.
[241] *Id*. at 62.
[242] *Id*. at 64.

Ambiguous ditrichum (*Ditrichum ambiguum*) is only found in acidic cove forests in Macon County and is considered critically imperiled.[243]

Appalachian fringe lichen (*Heterodermia appalachensis*) is a critically imperiled species that is found on hardwood bark or rock faces, and is possibly associated with old growth forests.[244] It is a closed canopy associate.

Mealy-rimmed shingle lichen (*Pannaria conoplea*) is also a critically imperiled species of lichen that is found on bark at high elevations.[245]

Mountain red dot lichen (*Arthonia kermesia*) is strictly endemic to North Carolina. It is considered "critically imperiled" in North Carolina with only 1-5 extant populations.[246]

Appalachian wart lichen (*Pertusaria appalachensis*), found only in high elevation granitic rock and associated with northern hardwoods in Avery County, is critically imperiled.[247] It is a closed canopy associate.

Mount Sterling Script Lichen (*Graphis sterlingiana*) aka "sterling lips," which occurs in high elevation spruce-fir forests in Haywood county is also considered critically imperiled in the state with only 1-5 extant populations.[248]

Speckled shield lichen (*Punctelia reddenda*) is found on bark on hardwoods at high elevations and is considered a vulnerable species.[249]

Powdered moon lichen (*Sticta limbate*) is critically imperiled and found on bark and over mosses on trees and rock in high elevation red oak forests in Haywood County.[250]

Drepanolejeunea appalachiana is a liverwort found on the bark of hardwoods in spruce-fir forests. It too is considered "critically imperiled" in the State of North Carolina.[251]

Roan Mountain Sedge (*Carex roanensis*) occurs in rich soils of mid-to high-elevation mesic forests in the southern Appalachians, including rich cove and northern hardwood forests. It is most abundant on moderate to steep, rocky, wooded but generally more sparsely vegetated slopes. It is considered imperiled in North Carolina. It is threatened by land-use conversion, habitat fragmentation, and forest management practices.[252] Smith et al. 2004 reviewed all known

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[243] *Id.* at 71.
[244] *Id.* at 84.
[245] *Id.*
[246] Natural Heritage Program, List of Rare Plant Species of North Carolina, 134 (Feb. 24, 2017).
[247] *Id.* at 131.
[248] *Id.*
[249] *Id.*
[250] *Id.* at 84.
[251] *Id.* at 79.
[252] NatureServe Explorer, Carex roanensis, Roan Mountain Sedge, at https://explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.145979/Carex_roanensis

collections and previously unpublished records and presented a distribution map.[253] They noted that in some of the North Carolina populations, it occurs in rich cove forests with a lush, diverse herbaceous layer.[254] In these instances, it is generally restricted to areas with sparser herbaceous growth, often along trail or on steeper slopes.[255]

Regeneration harvests where these species occur would almost certainly result in death and injury to individuals of these species and potentially result in their extirpation due to their patchy and often isolated distribution. Moreover, because the coarse filter only accounts for the ecozone and age class, it ignores other facts such as elevation preferences. Many of these imperiled plant species only occur at certain elevations and therefore the coarse filter approach does not account for the potentially disparate impacts to these species if regeneration harvests are used uniformly across an ecozone regardless of the elevation.

Much greater attention needs to be paid to the impacts to these species and specific conservation measures need to be adopted to protect them from the damaging impacts of logging. This includes surveys, staff training to identify these species, setbacks/buffers, and pre- and post-project monitoring. These considerations need to be included in a fine filter analysis for these species and reflected in the Forest Plan.

6) The Fine Filter Analysis for Several Closed Canopy Associates is Deficient and There Must be Stronger Protections for these Species.

Regeneration harvests to achieve a younger age class could also have disparate impacts to a host of closed canopy associate species, particularly those that are only found at certain elevations. These species include the **northern pine snake** *(Pituophis melanoleucus*), a secretive burrowing species that is thought to be declining throughout much of its range due to roads and habitat loss.[256] In the southern mountains they are extremely rare (as they are only found in Cherokee and Swain counties) and the NCWRC and Eastern Band of Cherokee Indians have been conducting surveys for pine snakes and their habitat.[257] It is state listed as a Threatened species and is identified in the North Carolina Wildlife Action Plan as a Species of Greatest Conservation Need. They occur within pine-oak forests.[258]

Other closed canopy associates found in coves, northern hardwoods forests, and other habitats include the following critically imperiled and imperiled plant species: **Carey's sedge**, **Long-flower alumroot**, **Harbinger of spring**, **Eastern beakgrass**, **Radford's sedge**, **Purple sedge**, **Lance-leaf moonwort**, **Riccardia jugata**, **Dark mountain fringe moss, Porella wataugensis**, **Carolina starmoss**, **Piedmont crustose lichen**, **Cheilolejeunea evansii**, **Rota's feather moss, starflower, mottled trillium, sweet white trillium,** and **Foliose lichen**. Some of these species are restricted to a specific elevation.

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[253] Smith, et al. 2004. The Geographic and Ecological Distribution of the Roan Mountain Sedge, Carex roanensis (Cyperaceae). Castanea 71(1):45-53.
[254] *Id.*
[255] *Id.*
[256] North Carolina Wildlife Resources Commission, Northern Pine Snake, North Carolina Wildlife Profiles, at https://www.ncwildlife.org/Portals/0/Learning/documents/Profiles/Reptile/Northern-Pine-Snake-Wildlife-Profile.pdf
[257] *Id.*
[258] *Id.*

The coarse filter approach fails to meaningfully consider the unique habitat requirements of these species and their locations within the forests. Again, simply managing for a specific percentage of age class and ecozone throughout the forest fails to account for the needs of dispersal limited species, including elevation, microclimates, and distribution specific habitat characteristics (woody material, geologic features, etc.). Moreover, in some areas there is a dearth of survey data. For example, the Forest Service has no recent survey data for Swain County where the northern pine snake is found. The lack of survey data precludes the Forest Service from making informed decisions based on the best available science as required under the 2012 planning regulations. 36 C.F.R. § 219.3.

The Forest Service needs to re-examine the coarse filter approach to better account for the presence and distribution of these species within specific areas of the forest. The Forest Plan must also include fine filter protections such as pre- and post-project surveying and monitoring of these species and staff training to identify and protect these species prior to timber harvests. Areas where there are high densities of these species should be avoided. Great care should also be taken to establish buffers that do not create tiny islands of shrinking habitat.

3. Remedies

- The Forest Service must employ coarse-filter and fine-filter analyses that are much more sensitive to and responsive to the unique needs of federally listed species and species of conservation concern, particularly those that are dispersal-limited.

- The FEIS must discuss the silvicultural practices that may uniquely impact listed species and species of conservation concern. For federally listed species, these impacts include (among the others discussed above): the fragmentation of CNFS habitat, the removal of important roosting habitat for Indiana bats and northern long eared bats, the degradation of water quality for listed aquatic species, and the impacts of prescribed fire on the threatened noonday globe. For species of conservation concern, these impacts include (among the others discussed above): the degradation and fragmentation of salamander, cerulean warbler, terrestrial snail, plant, and closed canopy species habitat.

- The Forest Plan must include more rigorous protections for listed species that will be adversely affected by regeneration harvests. These protections include:

    - CNFS: Prohibit the killing of spruce fir and large hardwoods in spruce-fir/ spruce-fir/northern hardwood forests. (This includes logging, girdling, and the use of herbicides). Prohibit timber harvests and road construction from creating barriers to the movement of groups of CNFS at the individual or population level. Identify parts of the Forests where roads and other features that fragment CNFS habitat are removed.

- Federally Listed Bats: Limit management prescriptions to 20 acres or less in suitable bat habitat to more closely simulate canopy gaps caused by natural disturbances. Include a specific standard to ensure active roost trees and maternity roost sites identified during project implementation are protected.

- Federally listed Freshwater Mussels: Require habitat and population surveys, the identification of suitable habitat within the NF, and specific measures to protect these habitats from siltation to contribute to the species' recovery. One such measure would be to prohibit logging and manage for old growth where suitable habitat occurs, such as in Natural Heritage Areas.

- Noonday Globe: Add a standard that would require any vegetation management near noonday globe habitat to maintain or restore that habitat, by preserving a moist microclimate and an abundance of leaf litter. Avoid the use of prescribed fire in the species' limited range. Commit to a rigorous monitoring program as prescribed by the species' Recovery Plan.

- Rusty Patched Bumble Bee: Survey and monitor the species presence within the Forest. Adopt a standard that contributes to species recovery by managing ESH and woodland habitats in RPBB suitable habitats that promotes the seeding and natural regeneration of native, flowering plants (rather than the regeneration of commercially valuable tree species). Prohibit the application of herbicides in suitable habitat from early March to the beginning of hibernation to reduce the risk that necessary foraging resources will be damaged.

- The Forest Plan must include more rigorous protections for species of conservation concern that will be adversely affected by regeneration harvests. These protections include:

    - Salamanders: Establish buffers for ephemeral streams. Establish Priority Amphibian and Reptile Conservation Areas (PARCAs) and prohibit timber harvests in these areas. In other suitable salamander habitat, use group selection harvests rather than regeneration harvests to retain a large percentage of the overstory, maintain shade and leaf litter, and provide refuge and recolonization opportunities. In addition to avoiding old growth stands, designate "no harvest areas" on the landscape that could serve as sources for repopulating nearby harvest units. Increase the rotation length to help ensure that a portion of the area contains large trees, high accumulations of large diameter CWD, and other structural characteristics associated with late-seral forest. Establish a forest-wide standard aimed at preventing the fragmentation of salamander habitat by prohibiting timber harvests and road construction from creating barriers to the movement of groups of salamanders at the individual or population level. Monitor

disturbances and commit to mitigating their impacts by adjusting management levels if unexpected levels of disturbance are occurring during implementation.

- Cerulean Warbler: Protect all North Carolina Natural Heritage Areas. Include plan components that require the surveying of cerulean warblers in these areas to determine where the highest concentrations of these species occur. Where there are high densities of cerulean warblers, no logging should occur. Special attention should be paid to protecting and enhancing habitats along ridges and steep upper slopes, as well as knobs and bluffs. Ridge top forests with north and northeast facing slopes with well-spaced, large diameter trees should be protected from regeneration harvests. Where the Forest Service has identified the need to create cerulean habitat, alternative silviculture treatments should be implemented, that along with natural disturbances, create canopy gaps within uneven-aged forest stands while retaining large mature trees and other important features.

- Terrestrial Snails and Slugs: Prescribed fire must be restricted where these snails and slugs occur. Require pre-and post-project monitoring in areas slated for prescribed fire to identify their locations in the Forests and learn more about their response to habitat disturbance. Include a plan component that implements the Forest Service's work with the NCNHP to review, update, and expand its knowledge of this species group. This should include a monitoring program.

- Plants: There must be plan components that require plant surveys, staff training to identify these species, setbacks/buffers, and pre- and post-project monitoring.

- Closed Canopy Associates: There must be plan components that require species surveys and pre- and post-project monitoring. Avoid logging where high densities occur and design management activities so that species populations are not further fragmented into tiny islands across the Forests.

- The vulnerable 65,000 acres of Natural Heritage Areas placed in Matrix and Interface should be moved to Backcountry or SIA.

C. OBJECTION #3: The Forest Service Does Not Adequately Consider the Impacts from Roads.

1. The FEIS Fails to Adequately Discuss the Direct, Indirect, and Cumulative Effects of Roads.

The FEIS also does not adequately examine the direct, indirect, and cumulative effects of the increased number and mileage of roads that will be constructed to accommodate this much additional logging within the Forest.

NEPA requires the consideration of reasonably foreseeable, direct, indirect, and cumulative impacts to the natural and physical environment.[259] "Indirect effects," are defined as effects that:

> are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems.[260]

Cumulative impacts result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over time.[261]

The best available science shows that roads cause significant adverse impacts to national forest resources.[262] The construction and presence of forest roads can significantly change the hydrology and geomorphology of a forest system, leading to reductions in the quantity and quality of aquatic habitat. Compacted roadbeds reduce rainfall infiltration, intercept and concentrate water, and contribute more sediment to streams than any other land management activity.[263] This increased sedimentation can have a profound impact on fish and aquatic habitat as it has been linked to decreased fry emergence, decreased juvenile densities, loss of winter carrying capacity, increased predation of fish, and reductions of macro-invertebrate populations that are a food source to many species.[264] Roads can also act as barriers to migration.[265] For terrestrial species, forest roads can cause direct mortality, changes in movement and habitat use patterns, and interfere with predator/prey relationships.[266] Roads also fragment habitat, increase the edge-effects, and serve as a vector for non-native, invasive species.[267] Forest roads can also increase human presence in remote areas threatening sensitive resources and lead to an increased risk of wildfires (as ORVs can be a significant source of fire ignition on forestlands).[268] Climate change can also have an additional impact on roads as roads designed for storms and water flows typical of past decades may be unable to handle the effects of more extreme weather events such as increased flood severity, more frequent landslides, and changes in sedimentation rates and delivery processes.[269]

Under the Final Plan, all alternatives, including the no action alternative, call for a similar, substantial increase in the miles of new roads within the Forests to accommodate future logging

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[259] *See* 40 C.F.R. §§ 1508.7, 1508.8
[260] *Id*. § 1508.8(b).
[261] 40 C.F.R. § 1508.7.
[262] *See* 66 Fed. Reg. at 3208 ("Scientific evidence complied to date suggests that roads are a significant source of erosion and sedimentation and are, in part, responsible for a decline in the quality of fish and wildlife habitat.").
[263] The Wilderness Society, May 2014. Transportation Infrastructure and Access on National Forests and Grasslands: A Literature Review, at 2.
[264] *Id*. at 4.
[265] *Id*.
[266] *Id*.
[267] *Id*. at 6.
[268] *Id*. at 9.
[269] *Id*.

aimed at creating young forest conditions. With continued implementation of Alternative A, 6.0 additional miles of road will likely be needed annually (FEIS at 3-494). Alternatives B, C, and D call for an annual increase of 4.1-6.0 miles. (FEIS at 497). Alternative E authorizes 6 miles of new roads annually under Tier 1 (FEIS at 3-496-497) and 4 additional miles of new road annually under Tier 2 (FEIS Table 196, 3-497), for 10 miles annually. Over the 30-year life of the plan, 300 miles of new roads could be added to the forest.

The Forest Service is required to determine the effects of the road system in the plan area on diversity (FSM 7712.1) and this analysis must be included in the FEIS. Moreover, the Forest Service must determine whether the provision of roads in the plan components achieve species persistence under Rule 219.9. Unfortunately, the Final Plan does not satisfy these requirements as the FEIS fails to adequately discuss the direct, indirect, and cumulative impacts of constructing and operating an additional 10 miles of forest roads a year through the life of the Plan. The Final Plan provides few details about where these roads would be constructed other than to say that many would occur within the Matrix. The location of new roads is extremely important. For example, roads constructed on steep slopes near streams could further exacerbate sedimentation impacts while roads constructed in areas with high species biodiversity could have significant habitat degradation and fragmentation impacts.

Although the FEIS recognizes the impacts of roads[270] and the fact that existing roads and trails predominately occur within soils rated as having a "Severe" erosion hazard (FEIS at 3-48), the FEIS repeatedly downplays the potential impacts by relying on future mitigation measures and decommissioning (FEIS at 3-51, 3-52, 3-67-3-73). Impacts to species are similarly downplayed or even dismissed as insignificant or negligible based on BMPs and other future mitigation. *See* FEIS at 3-59 (while acknowledging that in one instance following a clearcut "it took 15 years for the majority of road derived sediment to move out of the watershed stream system"). But the Forest Service has experienced a chronic shortage in funding for road decommissioning projects and as the Forest Service concedes, many existing roads need frequent maintenance or relocation or obliteration (FEIS at 3-48). The FEIS notes there is a "backlog of maintenance needs" (FEIS at ix, 3-490) and "U.S. Forest Service road maintenance budgets historically have not been sufficient to maintain the road system to an adequate level" (FEIS at 3-492). Moreover, even with improved road location, design, construction and engineering practices, total erosion and sediment yields are still at least 50 percent or more than natural yields over time.[271] Thus, it is inappropriate to write off any impacts as "temporary" based on future road decommissioning that may not occur based on the agency's track record. A critical question remains unanswered: Assuming a static trend of road maintenance and decommissioning continues (FEIS at 3-50-53), how will the annual addition of up to 10 miles of roads impact the ecological integrity and diversity of the Forests? The FEIS fails to consider an important aspect of the problem, and the Forest's conclusions are therefore arbitrary and capricious.

Moreover, the Forest Plan needs to contain much more detail about the type of road decommissioning that the Forest intends to implement to mitigate environmental impacts. The

[270] *See, e.g.,* FEIS at 3-36 (noting the construction of roads can increase ground disturbance resulting in project-induced landslides).
[271] Gucinski et al. 2001. Forest Roads: A Synthesis of Scientific Information. USDA For. Serv. Gen. Tech. Rep. PNW-GTR-509. Portland OR.

objective of road decommissioning is to "stabilize, restore, and revegetate unneeded roads to a more natural state to protect and enhance NFS lands."[272] It appears, however, that the Forest Service is increasingly relying on abandoning roads to satisfy decommissioning objectives.[273] This is not enough. Closing a road, ripping up the roadbed, or installing waterbars have short-term benefits.[274] This is not the same as recontouring roads, which studies have shown leads to greater rooting depths and soil organic matter[275] and increased wildlife use.[276] Removing culverts at stream crossings results in restoring aquatic connectivity and expanding habitat.[277] More than any other treatment, road recontouring leads to complete decompaction of the roadbed, incorporates native soils that were side-cast during construction, and prevents motorized use.[278] These practices in turn increase plant rooting depths, soil carbon storage, tree growth, and wildlife use.[279] Applying road recontour BMPs also reduce the risk of noxious weed expansion.[280] Therefore, it is extremely important that the Forest Plan commit to actual road decommissioning (recontouring) and clarify what other specific measures the Forest Service intends to implement over the next 10-15 years. The FEIS is deficient because it fails to examine this important issue.

Furthermore, the Forest service must consider the impacts of climate change and whether new roads will be constructed and maintained in a manner that can respond to more intense storms and rainfall events. The Forest Service only states that they would be constructed based on current standards (FEIS at 3-73). The Forest Service provides no further discussion. This provides little comfort given that the Forest Service notes elsewhere in the FEIS that "in recent years, large storm events have further impacted road conditions and road maintenance needs" (FEIS at 3-492) and "[i]n 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 reduce, either by reducing mileage or reducing existing maintenance levels" *Id*. at 3-493. This is another issue that remains unexamined by the Forest Service in the FEIS, in violation of NEPA.

2. The Expansion of Forest Roads Does Not Provide Adequate Ecological Conditions as Required by the 2012 Planning Rule.

[272] FSM 7734.0.
[273] *See* WildEarth Guardians, The Environmental Consequences of Forest Roads and Achieving a Sustainable Road System (Mar. 2020) (citing Apodaca et al. 2018. Guidelines for storing and decommissioning roads. USDA Forest Service. National Technology and Development Program. 59 p.).
[274] *Id*. (citing Luce, C.H. 1997. Effectiveness of road ripping in restoring infiltration capacity of forest roads. Restoration Ecology 5(3): 265-70; Switalski, et al. 2004. Benefits and impacts of road removal. Frontiers in Ecology and the Environment. 2(1):21-28).
[275] *Id*. (citing Lloyd et al. 2013. Influence of road reclamation techniques on forest ecosystem recovery. Frontiers in Ecology and the Environment 11(2): 75-81).
[276] *Id*. (citing Switalski and Nelson. 2011. Efficacy of road removal for restoring wildlife habitat: black bear in the Northern Rocky Mountains, USDA. Biological Conservation 144: 2666-2673).
[277] *Id*. (citing Erkinaro, J. et al. 2017. Road culvert restoration expands the habitat connectivity and production area of juvenile Atlantic salmon in a large subarctic river system. Fisheries Management and Ecology. 24: 73-81).
[278] *Id*.
[279] *Id*.
[280] *Id*.

The Forest Service recognizes that the new Plan must "mange a sustainable road system that includes road construction and reconstruction as well as direction for closing out unneeded roads, including temporary roads in environmentally or geologically hazardous locations" (FEIS at 1-6).

However, the Final Plan falls far short of achieving this mandate given the inadequate discussion of the impacts of roads in the FEIS and the uncertainties regarding future mitigation projects. This is particularly concerning considering the terrestrial condition assessment (TCA) for national forests assigned a "very poor" rating of the total road density metric for the Nantahala and Pisgah National Forests.[281]

The 2012 Planning Rule guides the development, amendment, and revision of forest plans, with a goal of promoting ecological integrity and ecological and fiscal sustainability of National Forest lands:

> *Plans will guide management of [USFS] lands so that they are ecologically sustainable and contribute to social and economic sustainability; consist of ecosystems and watersheds with ecological integrity and diverse plant and animal communities; and have the capacity to provide people and communities with ecosystem services and multiple uses that provide a range of social, economic, and ecological benefits for the present and into the future.*[282]

To accomplish these goals, the rule imposes substantive mandates to establish plan components, including standards and guidelines, which maintain or restore healthy and aquatic and terrestrial ecosystems, watersheds, and riparian areas, and air, water, and soil.[283] The Forest Service must determine whether plan components provide the ecological conditions necessary to contribute to the recovery of threatened and endangered species, provide the ecological conditions necessary to conserve proposed and candidate species, and provide the ecological conditions necessary to maintain a viable population of each species of conservation concern in the plan area. 36 C.F.R. § 219.09(b). "Ecological conditions" include "roads and other structural developments." *Id*. § 219.19.

The further expansion of the road system, coupled with the Forest Service's failure to reduce its road maintenance backlog, is incongruous with preserving the ecological integrity and sustainability of National Forest lands. This approach also threatens the viability of species of conservation concern and the recovery of federally listed species. These issues need to be addressed in the Forest Plan to comply with the 2012 Planning Rule. To this end, no new road should be constructed until the Forest Service reduces its maintenance backlog.

3. Remedies

[281] Cleland, D. et al. 2017. Terrestrial Condition Assessment for National Forests of the USDA Forest Service in the Continental US. Sustainability 9:2144; doi:10.3390/su9112144.
[282] 36 C.F.R. § 219.1(c).
[283] *Id*. §§ 219.8(a)(1)-(3); 219.9(a)(corresponding substantive requirement to establish plan components that maintain and restore the diversity of plant and animal communities and support the persistence of native species).

- No new roads should be constructed until the Forest Service reduces its maintenance backlog.
- The FEIS must discuss how the annual addition of up to 10 miles of roads would impact the ecological integrity and diversity of the Forests if historical trends continue and the road maintenance backlog is not reduced.
- The FEIS and Forest Plan must discuss the specific "decommissioning" activities that will occur on the forest and how these activities will mitigate environmental impacts occurring throughout the Forests.
- The FEIS and Forest Plan must consider the impacts of climate change and whether new roads will be constructed and maintained in a manner that can respond to more intense storms and rainfall events.
- The Forest Service should include an alternative in the EIS that significantly reduces the miles of new roads that will be constructed through the duration of the plan.

D. OBJECTION #4: The Final Forest Plan Falls Short of Ensuring Viability of Vulnerable Wildlife and Contributing to Species Recovery.

As explained above, the use of regeneration harvests to create more young forests will have significant, adverse impacts to several listed species. The Plan does not address or account for this problem, and thus does not contain standards or guidelines to ensure viability. This renders the Forest Plan inconsistent with the 2012 Planning Rule. The Forest Service needs to depend less on regeneration treatments to achieve desired conditions, improve aquatic resources across the forest, and develop standards that ensure species recovery.

1. The Forest Plan Will Not Ensure the Viability of Vulnerable Wildlife and Contribute to the Recovery of ESA-Listed Species Without Adequate Streamside Buffers.

The FEIS acknowledges that under the action alternatives, the water quality of 67% of local watersheds will experience continued decline, with sedimentation identified as a primary threat (FEIS 3-76). The FEIS points to BMPs and future restoration projects to support a finding that Forest Service practices will not contribute significantly to sedimentation and other water quality impacts. *Id.* The Final Plan, however, does not provide adequate support for this conclusion because the Final Plan and FEIS do not explain how the Plan components are adequate to avoid and minimize impacts to these watersheds.

Alternative E of the Final Plan includes a 100-foot buffer to protect perennial streams and a 50-foot buffer for intermittent streams (FEIS at 3-74; Final Plan at 48). This is a marked improvement over the Draft Plan and we support these changes. However, the Forest Service should also allow for the expansion of buffers depending on site sensitivity conditions like slope. This Forest Service has taken this approach on several other forests including the George

Washington, Cherokee, and Chattahoochee National Forests.[284] This would help ensure riparian and ecological functions are emphasized in plan components. 36 C.F.R. § 219.19.

Unfortunately, despite the agency's recognition of the importance of ephemeral streams and numerous comments urging the Forest Service to create similar buffers for ephemeral streams, these streams remain unprotected under the Final Plan. As explained earlier, this is a glaring deficiency in the FEIS and Forest Plan and one that could have significant consequences for numerous imperiled amphibian species, such as salamanders. The FEIS does not analyze the impacts of having no streamside zones for ephemeral streams nor does it identify the basis for the Forest Service's decision not to have these protections (FEIS at 3-74-3-75). However, the best available science, which the Forest Service must base its decisions on under the 2012 Planning Rules, supports the need for buffers for ephemeral streams.[285] This includes recommendations from the EPA.[286]

In an apparent effort to downplay the significance of not having buffers in place for ephemeral streams, the Forest Service contends that "plan language was added in Alternative E to recognize that ephemerally flowing streams support an abundance of aquatic life and other beneficial uses of water and are often headwater channels connecting to a network of streams" (FEIS at 3-75; Forest Plan at 47). The Plan goes on to say that "ephemeral water bodies are managed to retain their ability to filter sediment from upslope soil disturbances" (Forest Plan at 47). While it is nice to see that the Forest Service recognizes the importance of ephemeral streams, this language is not included in any standards or guidelines. Therefore, nothing requires the Forest Service to protect these streams in recognition of these values.

The FEIS goes on to say that "Alternative E adds a desired condition that clarifies the role of ephemeral streams in sediment transport and adds plan management approaches to manage ephemeral stream channels and their areas of impact to reduce the risk of erosion and sedimentation by minimizing disturbance during management" (FEIS at 3-75). Again, however, the management approach that the Forest Service appears to be referring to on page 49 of the Forest Plan does not actually require the Forest Service to take any action to protect ephemeral streams. Simply put, it is not a standard or guideline. As the Forest Service points out in several places in the Plan and FEIS, these statements are not plan components and they merely provide background material, explanations, or descriptions of management approaches (Final Plan at 25). The management approach is also vague as it does not explain how temporary roads, skid trail crossings, and soil disturbance in these areas would be "minimized" and how vegetation would be retained for slope stability.

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[284] *See* George Washington National Forest LRMP at 11-018, 11-020, 11-022; Cherokee National Forest Plan, Prescription 11, Riparian Corridors: Streams, Lakes, Wetlands, at 160; Chattahoochee-Oconee National Forest Plan (2004), Table 3-12 (Riparian Corridor Widths for Intermittent Streams).

[285] *See* S. Wegner for UGA Institute of Ecology, A Review of the Scientific Literature on Riparian Buffer Width, Extent and Vegetation (1999)(noting that the literature demonstrated "10-30 m (35-100 ft) native forested riparian buffers should be preserved or restored along all streams" and buffers should extend to ephemeral channels).

[286] *See* USEPA, National Management Measures to Control Nonpoint Source Pollution from Forestry Draft, 3B: Streamside Management Areas ("Areas such as intermittent channels, ephemeral channels, and depressions need to be given special consideration when determining Streamside Management Area boundaries").

To the extent that the Forest Service later suggests that it will turn to BMPs to minimize impacts to these resources, this argument is also unavailing. There is no discussion in the FEIS as to why the lack of buffers will not further contribute to these continued declines in water quality and not cause harm to listed species even if BMPs are otherwise implemented. The FEIS does not explain how even if BMPs are stringently followed or "satisfactory mitigation measures have been designed" (see Standard SZ-S-02) sedimentation would not occur from operations located directly within an ephemeral stream where no buffer is in place. It is inconceivable in these instances that no sedimentation would occur because there would be no buffer zone in which to implement BMPs or other mitigation measures. The construction and operation activities would literally be within the stream.

BMPs are cited as a solution, but their effectiveness changes with site conditions, they can be overwhelmed during storm events, and they are known to fail. In a summary of a Forest Service in-house audit of more than a hundred road evaluations, Carlson et al. (2015) found that almost half of the road BMPs were scored as either "marginally effective" or "not effective."[287] Edwards et al. (2016) also found that while several studies have found some road BMPs are effective at reducing delivery of sediment to streams, the degree of each treatment has not been rigorously evaluated under a variety of conditions and much more research is needed to determine the site-specific suitability of different BMPs.[288] BMPs may also not be up to the task to handle the effects of more-intense storm events driven by climate change.[289]

In many instances BMPs are not even fully implemented on National Forest lands. Carlson et al. (2015) noted that only about one third of the road BMPs were found to be fully implemented in an evaluation of more than hundred road evaluations.[290] It is also not clear from the Final EIS if BMPs will be installed before logging units close and skid trails and temporary roads are no longer in use. If not, these BMPs would not mitigate adverse impacts incurred while timber units are open, which can last for several months.

Further, the Forest Service cannot deflect attention away from this important issue by pointing to what is occurring outside Forest boundaries. While we agree that activities outside of Forest Service jurisdiction are having a substantial impact on the quality of local watersheds (i.e., activities occurring on private lands) (Forest Plan at 3-76, 3-95-3-97), the Forest Service still manages 42 % of these watersheds (*id*. at 3-75), and commercial logging and associated infrastructure (e.g., roads) are the leading cause of sedimentation. Therefore, even if it may have little influence over what is occurring off-site, it has a responsibility under NFMA and the 2012 Planning Rule to protect the resources as best as it can on Forest Lands.

In this instance, it has failed to meet its responsibilities, and absent compelling, site-specific reasons, the Final Plan should contain buffers in streamside zones for ephemeral streams that meet or exceed those found on other Forests within the region. The Forest Service's failure to

[287] Carlson, J.P. Edwards, T. Ellsworth, and M. Eberle. 2015. National best management practices monitoring summary report. Program Phase-In Period Fiscal Years 2013-2014. USDA Forest Service. Washington, D.C.
[288] Edwards, P.J., F. Wood, and R.L. Quinlivan. 2016. Effectiveness of best management practices that have application to forest roads: a literature synthesis. General Technical Report NRS-163. Parsons, W.V.: U.S. Department of Agriculture, Forest Service, Northern Research Station. 171 p.
[289] *Id*.
[290] Carlson, et al. 2015.

explain its position not to include buffers is inconsistent with the basic tenants of informed decision-making under NEPA and the APA. The Forest Service is required to "examine the relevant data and articulate a satisfactory explanation for its action including a rational connection between the facts found and the choice made." *Motor Vehicle Mfrs. Ass'n*, at 43.

2. The Forest Plan Will Not Ensure the Viability of Vulnerable Wildlife and Contribute to the Recovery of ESA-Listed Species Without Adequate Sedimentation Controls for Activities Occurring on Steep Slopes.

In addition to the lack of adequate buffers to minimize impacts to listed aquatic species, the Final Plan does not adequately protect these species from the effects of logging on steep slopes to minimize erosion and sedimentation.[291]

The FEIS notes that within the Interface MA and Matrix, passive management would occur where actions are "limited by" steep slopes, riparian areas, the designated old growth network or accessibility (FEIS at 3-115). But it is far from clear whether this is indeed the case, and to what extent, as the Forest Plan provides considerable discretion when it comes to logging on steep slopes. Standard ECO-S-06 calls for "a site-specific review to determine the appropriate logging systems for management on sustained slopes (>200 ft) over 40% slope" (Forest Plan at 92). The Plan also calls for the avoidance of "stacking" multiple skid roads on steep slopes and "to *consider* obliterating legacy skid roads on steep slopes where soil or water quality is a concern" (Forest Plan at 93) (emphasis added). Aside from these standards, the rest of the Plan provides a general description of management approaches, not standards or guidelines, that could or should be taken when logging on steep slopes. For example, on slope gradients of 40 percent or more, the design of cut and fill slopes of road, log landings, or other excavations *may* include a debris hazard and risk assessment (Forest Plan at 34). Ditch and culvert maintenance should also be "emphasized" (but not required) to prevent blockages diverting surface flows onto fill slopes. *Id.*

Logging and road construction on steep slopes pose a significant risk to watersheds from erosion and sedimentation. A "very severe" and "severe" hazard rating exists for a total of 74 percent of the area in these management areas if activities such as timber harvest and prescribed fire expose bare soil (FEIS at 3-43). Eighty-one percent (81%) of existing roads on the transportation system occur within soils having a "Severe" hazard rating (FEIS at 3-48). This leads the Forest Service to conclude that the "application and maintenance of erosion control mitigation measures are essential to reducing erosion and maintaining soil quality." (FEIS at 3-48).

Nearly one-third of all road construction and reconstruction occurs on slopes more than 40 percent (FEIS at 24). Debris flows can be a project-induced hazard caused by the failure of fill slopes such as those constructed for roads or log landings (FEIS at 3-36). Ground disturbance in these areas has the potential to result in project-induced landslides. *Id*. Acid-producing rocks can adversely affect the stability of slopes, particularly if untreated material is used in the construction of road fill slopes or log landings or if acid-producing rock weathers in road cut slopes. *Id*. The FEIS recognizes that "activities with the greatest long-term potential impact to soils are associated with the construction of roads, log landings, primary skid roads, and timber

[291] For species like the Hiawassee Headwaters Crayfish, there is no discussion of the impacts to sedimentation, only vague references to plan components to reduce or eliminate the threat. (FEIS at 3-339).

harvest on steep slopes using conventional equipment…Rehabilitation of disturbed sites can decrease the duration of the recovery period for soils and lessen the potential for cumulative degradation of soil conditions." *Id.* at 3-53. The FEIS noted that miles of unauthorized roads and trails within priority watersheds and Inventoried Roadless Areas often contribute to erosion, sedimentation into adjacent waters, and landsides on unstable roads; and decommissioning these roads would improve ecological conditions by returning the area to its native state (FEIS at 464).

Despite the numerous risks associated with logging and road construction/operation on steep slopes, the Plan does not require debris hazard risk assessments, the obliteration of skid roads, ditches and culverts to be maintained, and the maintenance backlog to be addressed before miles of new roads are built. There are also no standards or guidelines when comes to the type of equipment that must be used on slopes greater than 40% to protect against erosion and landslides. These measures are critical to reducing the threats of erosion and it is therefore essential that the Forest Service provide a reasoned explanation for not making them mandatory requirements. *See Earth Island Inst. v. U.S. Forest Service*, 442 F.3d 1147, 1160 (9th Cir. 2006)(finding that an agency has acted arbitrarily and capriciously when it fails to make a reasoned decision based on an evaluation of evidence).

Absent compelling evidence to the contrary, it is imperative that Standard ECO-S-07 specifically require debris hazard assessments where activities are planned on slopes greater than 40%, obliterate skid roads and temporary roads and return to the area to grade upon completion of a logging project, and require ditches and culverts to be maintained. Further, the Forest Service must not just establish road decommissioning standards for *unauthorized* roads (Final Plan at 107), but also include specific standards that require maintenance of permanent roads, require the decommissioning of temporary roads when they are no longer needed for the purpose for which they were constructed, and require the Forest Service to reduce the maintenance backlog for the road system as a whole before new roads are constructed.

3. The Forest Plan Should Include Specific Standards and Guidelines to Protect Listed Species.

The Final Plan falls short of ensuring viability of vulnerable wildlife and contributing to species recovery because it contains many desired conditions that conflict with species recovery while simultaneously failing to include standards and guidelines that adequate to address the recovery needs of these species.

"Desired conditions are the foundation of forest plan development. They describe the goals and outcomes of forest management and the ecological, social and economic attributes that a forest can achieve over time." (Forest Plan at 5). These conditions guide the development of future projects and activities and establish a means for determining the consistency of projects with forest plans. *Id.*

Throughout the Final Plan, desired conditions call for the creation of more open forest types and early seral conditions. In many instances, the Forest Service identifies the need for more young forest to restore habitat for listed species, including bats and pollinators. Desired Condition ECO-DC-26 calls for woodlands and other open forest types across all elevations to enhance foraging opportunities for many species including bats and pollinators (in addition to deer and

elk) (Final Plan at 71). Desired Condition MAT-DC-03 similarly calls for providing more edge habitats to support species bats and pollinators that the Forest Service describes as depending on grass and shrub habitat (Final Plan at 205).

The inclusion of bats in the same breath as common game species such as white-tailed deer and ruffed grouse is extremely concerning and entirely misplaced. First, it isn't clear why additional edge habitat and grass and shrub habitats is even needed for these listed bat species, much less how a nearly four-fold increase in the amount of young forest (by way of commercial logging) would specifically contribute to their recovery. The Forest Service has provided no data or other information suggesting that this type of habitat is limited and that this amount of annual timber harvesting is needed to improve foraging habitat for bats. Forest Plans must be based on the best available scientific information. 36 C.F.R. § 219.3. Given that the recovery plans for the NLEB and Indiana bat underscore the importance of preserving mature forests, it is puzzling why the Forest Service describes one of the objectives of creating young forests and open forest conditions is to provide roosting habitat for bats (Final Plan at 65-66).

Moreover, these desired conditions could provide the Forest Service with unfettered discretion to log mature forests—which bats depend on as part of their reproductive cycles—if doing would yield any modicum of foraging habitat. Because there are few restrictions on where these cuts may occur based on the location, quality, and structural diversity of existing stands, critically important summer maternity roosting habitat could be destroyed to provide a small amount of marginal foraging habitat for bats and other imperiled species. This could occur throughout the Forests as Desired Condition WLF-DC-01 envisions: "young forests with seedlings and saplings are distributed across all ecozones and elevations but specially in higher elevation montane oak ecosystems for species such as ruffed grouse, golden-winged warbler, white-tailed deer, and elk" (Final Plan at 65). Desired Condition MAT-DC-02 contemplates the greatest concentration will occur in the Matrix as it states that "young forests, across all ecozones, occur at a higher frequency in Matrix compared to other management areas" (Final Plan at 214). There is also great concern for bats to be severely impacted in existing old growth areas that are outside the designated old growth network. In addition to the NLEB and Indiana bat, this includes Rafinesque's big-eared bat, which faces the considerable potential for loss and degradation of roosting and foraging habitats by commercial logging practices in preferred habitat.[292]

As previously discussed, the reference to pollinators as a group of species that more early seral conditions would benefit, is similarly misguided because creating more young forest is not responsive to the threats facing these species. The decline of these species cannot be attributed with any meaningful weight to the lack of early seral conditions on these Forests. Rather, the decline in pollinators in recent years can largely be attributed to threats such as the meteoric rise in the use of neonicotinoids. Thus, much greater attention needs to be placed on limiting the use of pesticides and herbicides within the Forests.

[292] U.S. Fish and Wildlife Service, Conserving South Carolina's At-Risk Species: Species facing threats to their survival, Rafinesque's Big Eared Bat (corynorhinus rafinesquii), at https://www.fws.gov/charleston/pdf/ARS%20fact%20sheets%20for%20web/rafinesque's%20big-eared%20bat%20fact%20sheet_SC_2017.pdf

The Final Plan is an improvement over the Draft Plan. Under Desired Condition PAD-DC-01 habitats are to be "consistent with recovery plans and Biological Opinions for federally-listed and proposed species in order to contribute to recovery of these species." PAD-G-01 further requires that recovery plans and biological opinions be incorporated into project design and implementation.[293] PAD-S-08 also implements specific recovery plan criteria as it calls for delineating appropriate fall swarming and spring emergency buffers and applying appropriate conservation measures for bats. Further, Table 5 on page 75 does contain a couple of references to species recovery plans (such as the need to "protect summer maternity habitat consistent with the most recent recovery plan or Biological Opinion" for the NLEB and Indiana bat).

However, much more still needs to be done to conserve these species. Having Desired Forest Conditions that say habitats are to be consistent with species recovery plans is not the same as taking actions that affirmatively recover species (FEIS at 3-114) and without standards and guidelines in place to advance specific recovery actions for every species, these DFCs may not be achieved. As the Final Plan points out, text, tables, or figures that do not contain a code do not constitute plan decisions and are instead background material, explanations, or descriptions of management approaches. Therefore, statements in tables do not serve as standards or guidelines. Moreover, for all other species identified in Table 5, the table does not even reference species recovery plans. These "contributions" to species recovery are also limited to determining whether a species is present on the forest, "maintaining species presence within currently occupied habitat," and working with partners to expand the known range on the Forests and within western North Carolina. These is no actual commitment in the Plan to make the contributions in Table 5.

The existing standards and guidelines regarding species protections are not only vague, but they are also insufficient to mitigate the impacts resulting from plan components that are specifically designed to facilitate a significant increase in early seral conditions. They also do not even meet the requirements of the 2012 Planning Rule and ESA, which require the Forest Service to contribute to the species recovery—not simply to maintain its presence.

Moreover, persistence of a species is not the same as recovery. Persistence is related to the standard used for species of conservation concern, for which the Forest Service has a responsibility in planning to "maintain a viable population…within the plan area." 36 C.F.R. § 219.9(b)(1). The Planning Rule defines "viable population" as [a] population of a species that continues to persist over the long term with sufficient distribution to be resilient and adaptable to

[293] The Forest Service must strictly adhere to this requirement in light of recent litigation pertaining to the NLEB. Last year, a federal court remanded the U.S. Fish and Wildlife Service's threatened listing for the NLEB back to USFWS to make a new listing decision. *See Center for Biological Diversity v. Everson*, Case No. 15-477, Memorandum Opinion, (D.D.C. Jan. 28, 2020). The Court found that the USFWS failed to consider the cumulative effects of threats when determining that the species is "threatened" rather than endangered. *Id.* Against the backdrop of WNS, these threats include the loss of forest habitat. *Id.* On March 22, 2022 the U.S. Fish and Wildlife Service proposed to reclassify the species from threatened to endangered. *See* Department of the Interior, Fish and Wildlife Service, Docket No. FWS-R3-ES-2021-0140, Endangered and Threatened Wildlife and Plants; Endangered Species Status for Northern Long-eared bat, Proposed Rule (March 22, 2022). If listed as endangered, the Forest Service must reexamine Plan components that are based upon recommendations from prior Biological Opinions, which are based on the 4(d) rule, such as those establishing certain minimum canopy densities and snag characteristics for the species. There are no 4(d) rules for species listed as endangered.

stressors and likely future environments." 36 C.F.R. § 219.19. On the other hand, recovery is defined by the Fish & Wildlife Service as "improvement in the status of a listed species to the point at which listing is no longer appropriate." To meet this standard, the Forest needs to actually contribute to improving the condition of threatened and endangered species on the Forests. As the Forest Service Handbook explains, "National Forest System habitats and activities" should be "manage[d]…for threatened and endangered species to achieve recovery objectives so that special protection measures provided under the Endangered Species Act are no longer necessary." FSH 2670.21.

Given the threats posed to listed species from logging to create early seral habitat across the forests, the Final Plan needs to contain specific standards and guidelines for recovering these species (in addition to already requiring that recovery plans and biological opinions be incorporated into project design and implementation).[294] These standards and guidelines would provide mandatory constraints on future projects to avoid or mitigate harm to these species. Standards and guidelines should be informed by specific management guidelines from relevant species recovery plans. For example, to protect the Carolina Northern Flying Squirrel, the Forest Plan should follow guidelines found in Appendix A of the Recovery Plan that include: "Potential habitat, particularly old-growth areas, should be maintained intact; while limited selective cutting may be conducted, clearcutting should be avoided.[295] …Any timber rotation schedules should be of a sufficient length to maintain the old growth character of the area."[296] This approach would help ensure that recovery plans are actually being implemented and the most important measures are being undertaken to minimize the impacts of regeneration harvests on these species.

4. Remedies

- Require at least a 25-foot buffer for ephemeral streams.
- Standard ECO-S-07 should specifically require debris hazard assessments where activities are planned on slopes greater than 40%, obliterate skid roads and temporary roads and return to the area to grade upon completion of a logging project, and require ditches and culverts to be maintained.
- Prohibit any logging that is proposed on slopes greater than 40% unless it is reviewed and approved by an interdisciplinary team and the line officer.
- Establish specific standards that require maintenance of permanent roads, require the decommissioning of temporary roads when they are no longer needed for the purpose for which they were constructed, and require the Forest Service to reduce the maintenance backlog for the road system as a whole before new roads are constructed.

[294] We also have reservations about requiring biological plans be incorporated in project design and implementation, to the extent the Forest Service is referring to prior biological opinions that are not project specific or prepared for this Plan. Biological Opinions are prepared to meet the consultation requirements under section 7 of the ESA and are not strictly focused on species recovery but rather to minimize incidental take and avoid jeopardizing the species and adversely modifying its critical habitat. Again, the Forest Service's mandate is to contribute to species recovery not simply provide minimum conditions for the species to tread water.
[295] USFWS. 1990. Appalachian Northern Flying Squirrels, Recovery Plan, Appendix A.
[296] *Id.* The George Washington National Forest for example explicitly directs the Forest to "[f]ollow the USWFS Recovery Plan for the Virginia Northern Flying Squirrel, as amended.

- Provide in the Forest Plan that the Forest Service will contribute to the recovery of every federally listed species (not just maintain their persistence) and establish specific standards and guidelines to protect listed species that would be impacted by regeneration harvests.

V. CONCLUSION

For the reasons stated, the Forest Service's Final Plan is inconsistent with the requirements of NFMA and 2012 Planning Rule and the Final EIS violates NEPA. We urge the Forest Service to substantially reduce the amount of regeneration harvests, implement a rigorous coarse filter and fine filter analysis, halt future road construction until it reduces its maintenance backlog, and establish specific standards and guidelines that truly protect sensitive species and advance the recovery of several federally listed species.

The Forest Service must take specific steps towards protecting the Forest's rich biodiversity, including requiring buffers for ephemeral streams, imposing greater restrictions on logging on steep slopes, protecting all remaining 65,000 acres of Natural Heritage Areas, and preserving all remaining old growth forests, including the 44,000 acres of existing, inventoried old-growth forests currently left out of the old-growth network and placed in the Matrix.

The Forest Service must further ensure that its decisions are based on the best available science and perform more accurate modeling of climate impacts, reanalyze management area allocations that are not based on the fungibility of acreage, and account for species-specific needs in the coarse and fine-filter analyses.

All these measures are necessary for the Forest Service to restore the ecological integrity and diversity of our Forests. The Forest Service must disclose and present this additional analysis and increased forest and species protections in an alternative for the Forest Service and the public to consider.

Pursuant to 36 C.F.R. § 219.57 we request a meeting to discuss the issues raised in our objections and potential resolution. Should you have any questions, please do not hesitate to contact us.

Sincerely,

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