October 13, 2020

Lauren Stull
District Ranger
George Washington and Jefferson National Forests
Glenwood/Pedlar Ranger Districts
Pedlar River North Project Scoping Comments
27 Ranger Lane
Natural Bridge Station, VA 24579

RE: Pedlar River North Vegetation Project Scoping Comments

Dear Ms. Stull,

On behalf of the Center for Biological Diversity, I am offering the following scoping comments on the proposed Pedlar River North Vegetation project.

The Center for Biological Diversity is a nonprofit, public interest environmental organization dedicated to the protection of imperiled species and the habitat and climate they need to survive through science, policy, law and creative media. The Center works to secure a future for all species, great or small, hovering on the brink of extinction.

We have several concerns regarding the proposed project, including the purported need for increased logging to create early successional habitat, the project's impacts to listed species, and the project's effects on dispersal-limited species, such as salamanders and other amphibians.

I. The Forest Service Must Establish a Clear Purpose and Need for More Early Successional Forest.

National Environmental Policy Act (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.[1] The manner in which an agency defines the project's purpose "sets the contours for its exploration of available alternatives."[2] 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."[3]

[1] 40 C.F.R. § 1502.13.
[2] *Wyoming v. United States Dep't of Agric*., 661 F.3d 1209, 1244 (10th Cir. 2011).
[3] *Citizens Against Burlington, Inc. v. Busey*, 938 F.2d 190, 196 (D.C. Cir. 1991).

The Forest Service must clearly explain the purpose and need for more early successional forest. As explained below, the southeastern United States and its national forests are experiencing more frequent and more intense natural disturbances, including hurricanes, fires, and insect outbreaks. These natural disturbances (amplified by climate change) are playing an increasingly larger role in the creation of early seral forests.

In addition, much of the broader, regional landscape is already dominated by young forests, particularly those occurring on private lands. These private lands often support healthy populations of game species identified in the scoping letter including, white-tailed deer, wild turkey, and ruffed grouse.

It is also not always appropriate to use regeneration harvests to create young forests, particularly in areas of high biodiversity or those located adjacent to sensitive water resources.

Accordingly, the Forest Service should thoroughly consider these factors and prepare a purpose and need statement that allows for a wide range of reasonable alternatives to the proposed project.

A. The Forest Service Must Examine the Role of Natural Disturbances, Invasive Pests, and Climate Change Stressors in the Creation of Early Successional Forests.

The Forest Service must rigorously examine the role of natural disturbances and climate change stressors and their relationship to active management approaches in the creation of early successional forests. These factors need to be considered by the Forest Service as it assesses the purpose and need for this project and reasonable alternatives under NEPA. Adequate safeguards must also be incorporated to ensure that the Forest remains resilient to climate change.

Natural disturbances can be abiotic (e.g., fire, drought, wind, snow and ice) and biotic (e.g., insects and pathogens).[4] 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.[5]

Disturbance regimes have changed profoundly in many forests in recent years, with climate being a prominent driver of disturbance change.[6] Climate change is altering the frequency,

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[4] 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).
[5] *Id.*
[6] *Id.*

intensity, duration, and timing of disturbances.[7] Disturbance change is expected to be among the most profound impacts that climate change will have on forest ecosystems in the future.[8] Warmer and drier conditions facilitate fire, drought and insect disturbances, while warmer and wetter conditions increase disturbances from wind and pathogens.[9]

Fire is a common forest disturbance. 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.[10] Temperature increases across the South would contribute to increased fire frequency and intensity, total burned area and longer fire seasons.[11]

Windthrows caused by large hurricanes and other intense storms can have significant impacts on forest structure, species composition, successional development, and carbon storage and emissions.[12]

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. 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. These disturbance agents can affect forests at varying scales and intensity from small groups of trees (gaps) to larger sizes and scales.

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 different 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.

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,[13] 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

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[7] 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.
[8] *Id.*
[9] *Id.*
[10] 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.
[11] *Id.*
[12] 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.
[13] Seidl, R. et al. 2017.

more vulnerable to climate change.[14] Forests in the Southern United States already have the highest percentage of carbon lost to timber harvest of any region (92%)[15] and an increasing rate of natural disturbances driven by climate change could further diminish current net carbon uptake.[16]

Therefore, the Forest Service needs to closely examine the appropriateness of using this timber project to create early successional forests given the impacts of climate change on natural processes. The Forest Service should not assume that disturbances will have a relatively small and ephemeral impact on the Forest and that active management is always necessary to achieve desired young forest conditions. Logging does not mimic natural disturbance ecology.[17] For example, post-disturbance forests have high loads of coarse woody debris which provides legacy habitat features and complex soil development, while logged canopy gaps are devoid of such complexity.

The Forest Service should proceed in a manner consistent with the precautionary principle, revisit the assumptions made in any models regarding natural disturbance, and factor in the increase in frequency and intensity of climate change induced and amplified disturbances across the Forest. By factoring in more frequent and intense natural disturbances, the Forest Service may find that fewer and smaller regeneration harvests are needed to achieve the desired percentage and acres of early successional cove and oak forests. Moving forward, the Forest Service should also monitor natural disturbances to better inform an adaptive management approach to the creation of young forests.

B. The Forest Service Needs to Consider the Broader Landscape 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. Here, the broader landscape includes non-federal lands outside the national forest boundaries. It is important that the Forest Service include information about the structural classes of private and state-owned forest land across the broader landscape. If much of this land is subject to regular timber harvesting for sawtimber and pulpwood products, managed for game species, or otherwise altered to accommodate predominately human uses, there would likely be a substantial if not disproportionate amount of land already within the young forest age class.

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[14] 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.

[15] Harris, N.L. et al. 2016. Carbon Balance Manage 11:24. DOI 10.1186/s13021-016-0066-5.

[16] United States Global Change Research Program, Second State of the Carbon Cycle Report, Chapter 9, at https://carbon2018.globalchange.gov/chapter/9/.

[17] *See* Palik, B. et al. 2002. Modeling silviculture after natural disturbance to sustain biodiversity in the longleaf pine (Pinus palustris) ecosystem: balancing complexity and implementation. Forest Ecology and Management 155: 347-356.

At this time, we have reason to believe based on the GWNF Revised Land and Resource Management Plan (2014) ("Forest Plan") that early successional habitat is abundant in the region. Based on the Southern Appalachian Assessment that is nearly 25 years old, it appears private industrial lands had 22% in early successional forest and only 4% in late successional forest. It also appears that number has trended upward. Forest Plan at 3-124.

Therefore, when viewed through the lens of the broader landscape of the region, there would be much less need to use regeneration harvests to create additional young forests within national forest boundaries, particularly if many of these existing young forests occur either as inholdings or in proximity to national forest boundaries. The Forest Plan cautions against drawing conclusions regarding cumulative habitat availability from both private and national forest system lands, asserting that private and public lands are managed differently. The Forest Service, however, should provide a current assessment of young forests across the broader landscape and explain how the creation of even more of that habitat within the National Forest would provide benefits otherwise not provided on private lands in the region.

C. The Forest Service Must Consider the Quality of Existing Habitats, Their Location, and Species Diversity When Relying on Regeneration Harvests to Create More Young Forests.

The Forest Service must consider where, when, and why logging is appropriate to achieve the desired condition of creating young forests.

While it may make sense to cut stands with low species and structure diversity such as pine plantations (depending on the location and other factors), it makes far less sense from a cost-benefit standpoint to log more diverse areas, especially stands trending towards old growth. Here, it appears most stands are 90-100 years of age or older, which gives us cause for great concern. 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. The Forest Service must consider the risks and limitations of using regeneration harvests in certain ecozones and provide specificity and direction regarding where it would be an appropriate restoration tool.[18]

Further, the Forest Service must consider the timing of these timber harvests. To re-emphasize our earlier point about natural disturbances, the Forest Service 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 created 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-

[18] Location is an important consideration as the Forest Plan explains that some areas of the Forest more consistently contain a component of early successional forests than others. These include areas that are more susceptible to disturbances, such as south and west facing slopes, sandy or well drained soils, and in fire adapted plant communities. Forest Plan at 3-125.

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.[19] To proceed with harvesting these areas anyway without concern for maintaining species diversity and the future impacts of climate change, just to satisfy a desired percentage and acreage of young successional forest would be misguided, to say the least.

Moreover, the Forest Service must weigh 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 desired percentage and acreage of young forests. Approximately 746 acres are scheduled for regeneration, yet the EIS for the Forest Plan indicates that early successional patches as small as 2 acres would be beneficial to species like golden-wing warblers, which is listed as a species that would benefit from the project.[20] Golden-wing warblers, however, depend upon disturbance patterns that create patches of regenerating forest dominated by shrubs, small trees, and a grassy herbaceous layer.[21] Although young forest openings are heavily utilized for nesting, breeding adults forage widely in mature deciduous or mixed forest and may even prefer adjacent mature upland forests or northern forested wetlands during the post-fledging period.[22] Thus, smaller cuts coupled with gaps created by natural disturbances distributed across the landscape, and adjacent to more mature stands, may be able to provide the desired benefits without causing significant harm to species that depend on older more mature forests.[23]

A key consideration under NEPA is whether the "selection and discussion of alternatives fosters informed decision-making and informed public participation."[24] 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."[25]

We urge the Forest Service to provide a robust discussion in future NEPA documents of the environmental costs and benefits of using timber harvests to create more young forests. There must also be a range of reasonable alternatives to provide a clear basis for choice among options by the Forest Service and the public.[26]

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[19] 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.
[20] *See* U.S. Forest Service, Environmental Impact Statement for the Revised Land and Resource Management Plan, George Washington National Forest, at 3-124 (Nov. 2014).
[21] Roth, A.M., R.W. Rohrbaugh, T. Wills, S. Barker Swarthout, and D.A. Buehler, editors. 2019. Golden-winged Warbler Status Review and Conservation Plan, 1-5. 2nd Edition. www.gwwa/org.
[22] *Id*.
[23] Researchers have also suggested that given the presence of suitable but unoccupied habitat in nearby counties, habitat may not be a limiting factor for the golden-winged warbler in Virginia. *Id*. at I-60.
[24] *California v. Block*, 690 F.2d 753, 767 (9th Cir. 1982).
[25] *Pacific Marine Conservation Council v. Evans*, 200 F. Supp. 2d 1194 (N.D. Cal. 2002).
[26] 40 C.F.R. § 1502.14.

II. The Forest Service Must Thoroughly Assess the Impacts to Endangered and Threatened Species.

A. The Project May Harm Listed Bat Species.

The use of regeneration harvests could threaten the **northern long-eared bat (NLEB)** and **Indiana bat,** both of which use mature forests for roosting and foraging.

The NLEB is protected under the Endangered Species Act (ESA) and is generally associated with mature forests and interior forest habitat. During summer they roost singly or in colonies underneath bark, in cavities, or in crevices of both lie and dread trees.[27] 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. Most nursing colonies are often 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.[28]

The Indiana bat was listed as endangered under the ESA in 1973. During the summer maternity colonies of more than 100 adult females roost under sloughing bark of dead and partially dead trees of many species, often in forested settings. Forest Plan at 3-153. Reproductive females may require multiple alternate roost trees and adults can forage as far as three miles from occupied maternity roots sites. *Id.* According to the Forest Service staff at the Pisgah-Nantahala National Forest in North Carolina, recent studies have shown that maternity roosts are not found in forests with open canopies (10-30%) or in old fields with less than or equal to 10% canopy cover.[29] Accordingly, 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."[30]

The proposed project calls for extensive regeneration harvests and other even-aged management throughout the project area. Based on the Forest service's scoping letter for the project, it appears that most of these stands are 90-100 years or older. As the Recovery Plan for the Indiana Bat notes, "Research has demonstrated that densities of tree-roosting bats are generally greater in old growth forests of temperate regions, where structural diversity provides more roosting options and important foraging areas for some species."[31] Therefore, even though young forests may benefit certain species, others such as the NLEB and Indiana bat may experience harm, including

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[27] U.S. Fish and Wildlife Service, ECOS Species Profile, Northern Long-Eared Bat (*Myotis septentrionalis*) at https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=A0JE.
[28] *See* U.S. Forest Service, Nantahala and Pisgah National Forests Land Management Plan Draft Environmental Impact Statement, 258 (June 2020).
[29] *See id*. at 259.
[30] U.S. Fish and Wildlife Service, Indiana Bat (Myotis sodalist) Draft Recovery Plan: First Revision, 77 (Apr. 2007).
[31] *Id*.

the loss of foraging and summer roosting habitat, which the Forest Service assumes occurs throughout the entire forest. *See* Forest Plan at 3-160.

The Forest Service needs to closely examine the potential impacts of this project and the agency needs to put in place rigorous measures to protect these species, particularly from April 1-October 15. These measures include retaining snags, shagbark hickory, and hollow trees to protect potential roost sites. *See* Forest Plan at 3-161.[32] We also expect that the Forest Service will initiate consultation with the U.S. Fish & Wildlife Service under section 7 of the ESA.

B. The Project May Have Deleterious Impacts to Freshwater Mussels.

We are also concerned that the project may have adverse effects to several species of freshwater mussels, including the **James spinymussel (*Pleurobema collina*), dwarf wedgemussel (*Alasmidonta heterondon*), Atlantic pigtoe (*Fusconaia masoni*), and green floater (*Lasmigona subviridis*).**

According to the U.S. Fish & Wildlife Service's Recovery Plan, the Pedlar River is one of ten streams in which the endangered James spinymussel is found.[33] Siltation, generated by agricultural and forestry activities and road construction, has been a significant factor contributing to the decline of the species.[34] Siltation is also an important factor in the decline of the endangered dwarf wedgemussel, which may also be found in the Pedlar River.[35] The Atlantic Pigtoe, which FWS has proposed to list as threatened under the ESA, may also occur downstream of the project[36] as well as the green floater, which is currently under review by FWS for listing under the ESA.[37]

Logging, particularly on steep slopes, can result in significant erosion on and the delivery of sediment into nearby rivers and streams. Sediment is frequently transported into these watersheds through roads and the best available science shows that roads cause significant adverse impacts to national forest resources.[38] The construction and presence of forest roads can

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[32] The Forest Service should also reexamine any management guidelines it intends to implement to minimize or mitigate impacts to the NLEB. To date, many of the measures the Forest Service has relied upon are based on the "4(d) Rule" for the NLEB and associated biological opinions. Recently, however, a federal court remanded the U.S. Fish and Wildlife Service's threatened listing for the NLEB back to U.S. Fish & Wildlife Service (FWS) to make a new listing decision. *See Center for Biological Diversity v. Everson*, 435 F. Supp. 3d 69 (D.D.C. 2020).
[33] U.S. Fish and Wildlife Service, James Spinymussel Recovery Plan, 3-4 (1990).
[34] *Id*. at 9.
[35] U.S. Fish and Wildlife Service, Dwarf Wedgemussel Recovery Plan, 12, 24-25 (1993).
[36] *See* U.S. Fish & Wildlife Service. 2019. Species Status Assessment Report for the Atlantic Pigtoe (Fusconaia masoni). Version 1.3, at 15. April, 2019. Atlanta, GA.
[37] *See* NatureServe Explorer, *Lasmigona subviridis*, green floater, at https://explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.107377/Lasmigona_subviridis.
[38] *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.").

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.[39] 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.[40] Considering some fish species serve as hosts to young mussels, there could be additional, secondary impacts to freshwater mussels.

The Fish and Wildlife Service has identified several threats posed by sedimentation to freshwater mussels in the Southeast:

> 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 mussel shells. Erosion of the outer shell allows acids to each and corrode underlying layers.[41]

The September 10th scoping letter indicates that 3.1 miles of temporary roads will be constructed and it appears clearcutting will occur in stands that are in close proximity to Little Irish Creek with additional cuts (coppice with reserves and shelterwood with reserves) occurring near the Pedlar River. Thus, there is great potential for these operations to negatively impact freshwater mussels occurring in these waters and waters downstream of the project area. Moreover, any benefits the Forest Service hopes to realize through the stocking of James spinymussels could be quickly negated if its habitat is degraded as a result of sedimentation. The Forest Service must take a "hard look" at these potential impacts[42] and avoid logging within areas that would pose a risk to these and other aquatic species.

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[39] The Wilderness Society, May 2014. Transportation Infrastructure and Access on National Forests and Grasslands: A Literature Review, at 2.
[40] *Id*. at 4.
[41] U.S. Fish and Wildlife Service, Recovery Plan for the Appalachian Elktoe (Alasmidonata raveneliana), 3 (1996).
[42] NEPA requires that federal agencies take a "hard look" at the environmental consequences of their actions and do so while addressing reasonably foreseeable, direct, indirect, and cumulative impacts to the natural and physical environment. *See* 40 C.F.R. §§ 1502.16, 1508.7, 1508.8.

III. The Forest Service Must Closely Examine the Impacts to Other At-Risk Species, Including Salamanders and other Dispersal-Limited Species.

The Forest Service must thoroughly analyze the impacts this project will have on dispersal-limited species, such as salamanders that have experienced significant population declines in the region.

Researchers have documented a widespread destruction, degradation, and fragmentation of imperiled amphibian habitats in the Southeast.[43] Dodd (1997) explains:

> 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.[44]

Habitat loss and degradation obviously negatively affects amphibian populations.[45] 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."[46]

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

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[43] 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.

[44] 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.

[45] *See* LaClaire (1997).

[46] Dodd (1997) at 197.

amphibians in particular.[47] Logging is detrimental for both aquatic and terrestrial amphibian 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.[48] Logging is known to decrease amphibian abundance and reproductive success.[49]

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.[50] Removal of the forest canopy or course woody debris exposes amphibians to

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[47] *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 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.

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

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

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

warmer and drier microclimate conditions[51] eventually reducing leaf litter[52] and food resources.[53] These changes eventually lead to lower survival[54] or higher evacuation of habitats.[55]

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.[56]

Petranka, et al. (1994) examined the effects of timber harvesting on southern Appalachian salamander communities in the Pisgah National Forest.[57] Salamander abundance and species richness were lowest in very young stands and highest in stands more than 120 years old.[58] 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.[59]

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.[60]

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[51] 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.

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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,[61] 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 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.[62]

The harmful effects of clearcuts on amphibians are long lasting with scientists concluding that population recovery requires 50-70 years[63] or even longer.[64]

Other silvicultural practices may also cause lasting reductions of terrestrial salamander populations due to both low population growth rates and changes to habitat.[65] 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.[66]

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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, and can disrupt metapopulation dynamics and lead to population isolation, and light and noise from roads can disrupt breeding and feeding behaviors.[67]

It appears that at least 20 species of salamanders may occur within the project area.[68] These species include:

- Spotted salamander (*Ambystoma maculatum*)
- Marbled salamander (*Ambystoma opacum*)
- Mole salamander (*Ambystoma talpoideum*)
- Northern dusky salamander (*Desmognathus fuscus*)
- Seal salamander (*Desmognathus monticola*)
- Alleghany mountain dusky salamander (*Desmognathus ochrophaeus*)
- Black bellied salamander (*Desmognathus quadramaculatus*)
- Southern two-lined salamander (*Eurycea cirrigera*)
- Three-lined salamander (*Eurycea guttolineata*)
- Eastern long-tailed salamander (*Eurycea longicauda longicauda*)
- Cave salamander (*Eurycea lucifuga*)
- Northern spring salamander (*Gyrinophilus porphyriticus porphyriticus*)
- Four-toed salamander (*Hemidactylium scutatum*)
- Red-spotted newt salamander (*Notophthalmus viridescens viridescens*)
- Eastern red back salamander (*Plethodon cinereus*)
- White-spotted salamander (*Plethodon cylindraceus*)
- Northern slimy salamander (*Plethodon glutinosus*)
- Valley and ridge salamander (*Plethodon hoffmani*)
- Blue Ridge red salamander (*Pseudotriton ruber nitidus*)
- Northern red salamander (*Pseudotriton ruber ruber*)

Many salamanders occur across forests in a very patchy distribution and for many salamander species, they are only found in a very small and isolated geographic area. Some of these areas may have never been surveyed or include old growth patches that have not been inventoried. Many species of salamanders could be at risk if these small, concentrated populations are not protected and regeneration harvests proceed in these areas. New roads, even temporary ones, could divide breeding locations and overwintering sites and further fragment and isolate populations. The use of herbicides before and after timber harvests can also negatively affect

[67] Dodd. 1997.
[68] Virginia Herpetological Society, Salamanders of Virginia, at https://www.virginiaherpetologicalsociety.com/amphibians/salamanders/salamanders_of_virginia.htm

amphibians and other aquatic organisms.[69] Therefore, the Forest Service needs to engage in a rigorous analysis of the potential impacts to these species that pays close attention to their location on the forests.

In addition, 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.[70] 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."[71] Overstory retention adjacent to wetlands can also be critical to maintaining connectivity between reproductive sites and other habitat features.[72] 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.[73]

In addition to avoiding old growth stands, designated "no harvest areas" on the landscape could serve as sources for repopulating nearby harvest units.[74] 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.[75]

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[69] *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.

[70] Petranka et al. (1994).

[71] 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 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.

[72] *Id.*

[73] *Id.*

[74] *Id.*

[75] *Id.*

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.[76] Instead, old growth stands that contain significant amounts of decaying coarse woody debris must be avoided.

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

III. Conclusion

The Forest Service should consider a range of reasonable alternatives that significantly reduce the number of acres that will be logged to create more young forests.[77] Smaller patches adjacent to more mature forests would complement patches already being created by natural disturbances and provide habitat benefits to species in decline like the golden-winged warbler. In areas where regeneration harvests are proposed, thinning could be a more appropriate substitute as thinning is closer to the low-intensity natural disturbance. "No harvest areas" and buffers should also be established to protect vulnerable wildlife, such as dispersal limited species like salamanders. The Forest Service must also protect potential roosting habitat prior to permitting any logging in these areas. The Forest Service must also thoroughly assess the potential impacts of sedimentation on several listed aquatic species.

Thank you for the opportunity to comment on the proposed project. Please make these comments and the attached documents part of the official record for this project. Also, please send us all future notices for this project. We would appreciate the opportunity to further discuss our concerns with you and your staff.

Sincerely,

Jason Totoiu
Senior Attorney
Center for Biological Diversity

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[76] *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).

[77] Even if additional alternatives would not fully achieve the project's purpose and need, NEPA "does not permit the agency to eliminate from discussion or consideration a whole range of alternatives, merely because they would achieve only some of the purposes of a multipurpose project." *Town of Matthews v. U.S. Dep't. of Transp*., 527 F. Supp. 1055 (W.D. N.C. 1981). If a different action alternative "would only partly meet the goals of the project, this may allow the decision maker to conclude that meeting part of the goal with less environmental impact may be worth the tradeoff with a preferred alternative that has greater environmental impact." *North Buckhead Civic Assoc v. Skinner*, 903 F.2d 1533, 1542 (11th Cir. 1990).