

Steven Krichbaum, PhD

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USDA Forest Service

ATTN: Responsible Official – Mary Yonce, District Ranger

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<https://cara.ecosystem-management.org/Public//CommentInput?Project=50342>

re: proposed North Shenandoah Restoration and Management Project

Dear Ranger Yonce,

Please accept these further comments on the proposed North Shenandoah project and the draft EA.

“Substantive comments provide factual information, professional opinion, or informed judgment that is relevant to the action being proposed. Substantive comments are specific, comparative, or solution oriented. A substantive comment provides the reasons why and goes beyond just expressing an opinion. While all comments will be considered, substantive comments related to the alternatives are the most useful.”

It is obvious that understory vegetation diversity results from far more than just the amount of canopy openness at a site. Small openings in the forest canopy provide sites for Wood Turtles and other fauna to bask, as well as provide small sun blotches or flecks important for understory plants; see “Sunflecks and Their Importance to Forest Understorey Plants” by R. Chazdon 1988. These microsite differences in light availability occur throughout the mature forests at this project area, thereby temporally and spatially affecting various biotic distributions and ecological processes.

The proposed Short-leaf Pine “restoration” must be maintained/accomplished with more make-work projects, *i.e.*, ongoing or perpetual burning. This burning of places over and over and over will foreseeably slaughter untold numbers of vertebrates and invertebrates who are unfortunate enough to have to “share” this planet with us. Burning Wood Turtle sites/habitat also may foreseeably result in significant damage or degradation or death to Turtle habitat, populations, and/or individuals, thereby significantly impacting viability

and distribution on the Forest. This destructive scenario is proposed at the Slate Lick working area. The burning and “restoration” and cutting should not occur within 300 meters of the occupied Wood Turtle streams.

For this proposal the agency claims that Wood Turtle viability and distribution will not be significantly impacted, yet at the Slate Lick and other working areas (as well as other project areas on the GWNF) Wood Turtles may be (and have been) directly, indirectly, or cumulatively negatively impacted, through such harms as direct deaths or injuries and habitat alteration or degradation. Yet in the EA there is not a shred of information on population sizes, monitoring and inventory data for this species on the GWNF, estimates of mortality related to this proposal should it be implemented, or amounts of habitat degraded or destroyed and the effects on Wood Turtle distribution (nor was the BE available for review on line). For the agency to make a valid determination of no significant impact to this Sensitive species it must have this fundamental information and analyses.

I am concerned about the significant uncertainty involving basic demographic and monitoring information on the Wood Turtle populations on the Forest and at this specific site. I am concerned that relevant population and monitoring data are lacking or absent. There is also significant controversy as to the impacts and desirability of intentionally logging and burning Wood Turtle habitat and populations. This is to say nothing of uncertain stochastic impacts (genetic, demographic, environmental) that can erode viability, to which small populations are particularly vulnerable (Lande 1993).

I am also concerned about the significant uncertainty as to the ecological results of the proposed burning, thinning, and even-age logging; at various sites the proposed heavy thinning and other logging could easily result in dense shrub layers that hinder herbaceous growth or overstory tree seedling regeneration (see Barton and Keeton 2018). It is not at all clear that this would improve habitat for Wood Turtles or other flora and fauna species/populations. Yet this is glossed over in the EA as if there is certainty as to the on-the-ground results of said management activities; e.g., burning automatically results in enhanced herbaceous growth. Due to these significant uncertainties, preparation of an EIS is necessary.

Wood Turtles are significant components of the Forest’s diversity and communities (NFMA). Does the Forest Service have fundamental baseline population/demographic/distribution information about the Turtles here? Does the Forest Service have the most basic monitoring information about the Turtles here? There is no disclosure in the EA, nor is it available in the BE. How is it that findings of no significant impact to Wood Turtles are well-reasoned?

I have a deep interest in and want to see this information that you are apparently basing the *fonsi* upon. I am now giving you a heads up with regard to this — I will soon submit a FOIA request for this data.

The Wood Turtle is officially listed under Virginia's endangered species statute as "Threatened". Implementation of this project may clearly result in "take" of Wood Turtles. One would think that government agencies and public servants would want to **recover** threatened species and increase their numbers on the Forest. Yet there is no Forest Service target for maximizing the number of Wood Turtles and actually recover/restore them; in fact, this so called "restoration" project would achieve just the opposite by indirect or direct or cumulative mortality and habitat degradation. Instead, an emphasis is placed on a species so common that people are encouraged to cut them to the ground and kill them (such as through taxpayer subsidized below-cost timber sales) — the Short-leaf Pine.

As I wrote before, for Wood Turtles the terrestrial zones that generally extend out to ca. 300 meters from waterways certainly can be considered "**core habitat**" (*sensu* Semlitsch and Jensen 2001, and Semlitsch and Bodie 2003, Congdon *et al.* 2011) where conservation efforts for this species can be focused (see, *e.g.*, discussion and references at (1)(a) in my comment letter to the USFWS) (this is not to say that other portions of their habitat might not also be considered as core habitat). For instance, Vermont recognizes that "the wood turtle uses streams and rivers for overwintering, and uses adjacent riparian areas up to 300 meters from the water's edge for foraging, breeding, nesting, and dispersal." (Vermont 4 – 68) And New Jersey uses a 322-meter stream buffer to identify Wood Turtle habitat (NJ Landscape Project at <http://www.njfishandwildlife.com/ensp/landscape/index.htm>).

One of the reasons expansive (relative to current stream buffers typically applied on the GWNF) protected zones are needed for the Turtles is not only to address the direct protection of their "core habitat", but also to mitigate, diminish, or prevent "**edge effects**" that may also reduce habitat quality. Timber cuts, roads, development, and other conversion of habitat result in the fabrication of ecological edges with a multitude of deleterious impacts. Edge width or depth/distance of edge influence (DEI) is the result of the penetration distance of various environmental variables and gradients, *e.g.*, soil temperature, air temperature, litter moisture, photosynthetic active radiation effect on vegetation patterns, alien plant species invasion, and ingress by herbivores or predators (Zheng and Chen 2000).

Are there Wood Turtles at Camp Run, Little Camp Run, Lick Run, Buck Lick Run, Little Rough Run (Mitchell Knob/Camp Run WA); Dice Run, Wagner Run, Stony Run (West Side PA – not clear what you are proposing here – diagonal lines); Turner Run, Cross Mountain Run, Black Lick Run, Slate Lick Run, Buck Lick Run, Hogpen Run, Shoemaker River (Slate Lick/Cross Mountain WA); Old Road Hollow, Little Dry Run, Spruce Lick Run, Straight Hollow, Bible Run (Feltz Ridge/Leading Ridge WA) ? Around these streams are proposed burning, thinning, "regeneration harvesting", and/or road construction. I have been to most of these sites and there is certainly suitable habitat for Wood Turtles there. Who surveyed these sites for Wood Turtles, when, and how?

How easy is it for sub-populations of WTs to disperse through the landscape? How permeable is the GWNF and off-GWNF matrix so that populations are not isolated and

can mix and gene flow be accomplished? These are essential considerations for adaptive evolution, metapopulation dynamics, maintaining viability and distribution, and recovering threatened populations.

Because of population biology concerns of **elasticity/sensitivity** for the Wood Turtle, the loss of a relatively small number of individual adults can nonetheless have severe impacts to population persistence.

Cumulative impacts to the Wood Turtle's viability on the Forest are a particular concern as these proposed North Shenandoah working areas are not the only place the Forest Service has or is (or proposing to) degrading or destroying or fragmenting suitable habitat, and perhaps directly killing Wood Turtles; other examples include the Maybe, Sours Supin, Slate, Sandy, Great Little, Paddy, Laurel Road, Breakneck, and Molly's Hill timber sales. I have a profound interest in Wood Turtles and would be significantly harmed by implementation of this proposal.

Cumulative impacts are also accruing from the recent proposals to burn at Turner Run (Turner Run area), Slate Lick Branch and Buck Lick Run (Slate Lick Ridge and Slate Lick Fields areas), and Hogpen Run (Hogpen area) on the North River RD and the Waterfall Mtn. (with Duncan Hollow) and Falls Ridge (with Laurel Run) burns on the Lee RD.

Cumulative impacts from the roads on the Forest and their associated traffic are also a concern.

Proposed are cutting and road building at Shoemaker River and at Slate Lick Branch and Buck Lick Run and elsewhere, even permanent road building at Shoemaker River.

This gigantic logging project needs 19 miles of road reconstruction, some "major" (EA-42) and 2.15 miles of new permanent system road, including Little Shoemaker Rd. and "temporary" road in Wood Turtle habitat. Also, system and "temporary" road construction are proposed in the Hogpen VMT.

This proposal as currently configured is a perfect example of why the Wood Turtle needs to be listed under the federal ESA – neither the states nor the federal agencies are affording it reasonable protection. See **“(2) The factors that are the basis for making a listing: (a) The present or threatened destruction, modification, or curtailment of its habitat or range (Factor A) ... (d) The inadequacy of existing regulatory mechanisms (Factor D)”** in Krichbaum comments to the USFWS (attached). As they are all relevant, I incorporate all the narrative, tables, figures, and argument in this document into the comments for this draft EA.

I wanted to read the details regarding your site-specific analyses for this project in the Biological Evaluation, but it was not available on the agency website. And when I contacted the agency by email to get a copy of it sent to me, Christopher Brown responded that it was not available; “We are currently consulting with the US Fish and Wildlife Service about this project; we will post the final version of the Biological

Evaluation to the website when consultation is concluded.” The BE is basic information about a proposed project. Without it in hand it is difficult to submit “substantive” comments or for anyone to make reasonably informed judgments/decisions.

I still do not understand the “ecological departure” rationale. Where do these numbers and percentages come from and how derived? This remains unintelligible gibberish and is utterly inadequate for reasoned decision-making and meaningful public participation. It is as if numbers somehow generated by someone in some unknown way are driving the entire project. The extremely sparse canopy said to be desired and targeted for “restoration” is not congruent with the information found in standard scientific references – Eastern Old Growth: Prospects for Rediscovery and Recovery, edited by Mary Byrd Davis 1996 Island Press, Ecology and Recovery of Eastern Old-Growth Forests, edited Andrew Barton and William Keeton 2018 Island Press, and Deciduous Forests of Eastern North America by Braun, E.L. 1950, The Blakiston Company: Philadelphia, PA (incorporated by reference). Neither does my personal examination of remnant old growth in the Central Appalachians support the sparse canopy thesis. In the absence of clear support, I can only conclude that this project is not actual restoration of natural conditions.

This focus on Short-leaf Pine is NOT restoration. The agency is proposing plantations that demand cultural inputs of energy. Plantations are NOT forests. The agency is proposing tree farms on the GWNF. To call this “restoration” is unreasonable disinformation. And then to add injury to insult, to accomplish this nonsense, the agency may foreseeably harm a “Threatened” species.

The so-called “restoration” of “savannah habitat” is another infliction of a cultural disturbance regime, first intensive cutting and then “periodically maintained with fire”. The way it reads now, this is just an unnecessary and unnatural make-work program.

If any cutting is actually needed for “restoration” at this project area, it should be accomplished through “**structural complexity enhancement**” (SCE) treatments. See chapter 13 in Ecology and Recovery of Eastern Old-Growth Forests, edited by Andrew Barton and William Keeton 2018 Island Press, as well as Keeton, W.S. 2006. Managing for late-successional/old-growth characteristics in northern hardwood-conifer forests. *Forest Ecology and Management* 235: 129–142, and Keeton, W.S. and A.R. Troy. 2006. “Balancing ecological and economic objectives while managing for old-growth forest characteristics”, pp. 21-33 in L. Zahowska (ed.), Ecologisation of economy as a key prerequisite for sustainable development. Proceedings of the international conference, Sept. 22-23, 2005, Ukrainian National Forestry University, L’viv, Ukraine (incorporated by reference).

Such restoration involving cutting that facilitates the development of natural old-growth forest conditions could be examined in an **alternative** and it’s various benefits and results compared to and weighed against other alternatives. The reason for not fully and fairly examining and considering the SCE option is not clear.

Of course, such cutting is not without its drawbacks. As Dr. Joan Maloof recently wrote in her review of Barton and Keeton's 2018 OG book: "The chapter on silviculture would be stronger if it also discussed the drawbacks to active management. Do we really need to mimic natural disturbance processes when they are still at work? Does the introduction of humans with chain saws (for creating snags and coarse woody debris) and heavy equipment (for tipping over trees) have any negative consequences for other forest organisms (such as herbaceous plants, snails, and turtles)? The introduction of nonnative invasive plants is a huge risk associated with any sort of active management these days. A chapter by John Gunn and David Orwig spells out the impact of this growing threat, along with all the rest of the invaders from the emerald ash borer to beech bark disease."

The proposal to reintroduce **American Chestnut** to the GWNF is an excellent idea.

Logging in a "**potential Wilderness Area**" – the reasons for why this must be done to the land at this stage (the site has already been identified) are not apparent. What it does is indicate that extremism is operating here. Out of a RD that is 400,000 acres in size, this agency cannot even stay out of a PWA that you yourselves identified, that is in itself but a paltry fraction of what could be so designated (it's just a portion of a 15,000 acre VMT). This treatment of the land and Americans provides a perfect example of why the legislation under which this agency operates must be drastically overhauled.

I am also concerned about the mounting cumulative impacts to GWNF Virginia Mountain Treasures. I have visited and intend to again visit (*i.e.*, "use") all these areas. This project and others schedule ground disturbing activities in VMTs that significantly impact their character and the ecological, recreational, and spiritual values that they supply to me and many others and thus harm me. For instance, for the Barb TS, all cutting units, except maybe 4 & 5, were within the Church Mountain Virginia Mountain Treasure area. Now, this project is severely altering Mountain Treasures such as Beech Lick Knob and Hogpen.

I am very concerned about the cumulative impacts accruing on the GWNF that facilitate the spread of invasive species.

Burning can promote the spread of invasive plant species (Glasgow, L.S. and G.R. Matlack 2007b). On the GWNF in Virginia, sites that have been burned repeatedly are overrun with invasives (pers. obs. Krichbaum, S. 2007; see, *e.g.*, areas adjacent to the Shenandoah River on the Lee RD).

Invasion by organisms abundant in the matrix is also frequently implicated as the cause of ecological change in fragmented/fractured habitats. "Fragmentation of forests may lead to changes in ecological processes, reduction in biological diversity and the spread of invasive species from disturbed edges. Even small openings may introduce these impacts deeper into the forest. . . . About half the fragmentation consisted of small (less than 7.3 hectares) perforations in interior forest areas." (Tkacz, B. *et al.* 2008) Also see With, K.A. 2002.

"The regional-scale loss of interior forest in Appalachia is of global significance because of the worldwide rarity of spatially extensive temperate deciduous forest (Riitters *et al.* 2000)." (Wickham, J.D. *et al.* 2007)

“The integrity of rare native plant communities are protected from non-native invasive plant species such as ailanthus (tree of heaven), kudzu, multiflora rose, and autumn olive. Nonnative invasive plants are not a demonstrable threat to the integrity of major natural plant communities.” (GWNF DLRMP at 14)

It is not at all clear how this project will positively address this “Desired Condition”. How, where, and to what extent does the FS intend to protect the integrity of rare native plant communities? How, where, and to what extent does the FS intend to ensure that nonnative invasive plants are not a demonstrable threat to the integrity of major natural plant communities?

The **spread of invasive species** such as Asian Stiltgrass, Garlic Mustard, Multi-flora Rose and Ailanthus is occurring throughout the Forest. These plants may reduce the abundance, species richness, and/or diversity of native flora, fauna, and fungi. These impacts in turn can have cascading negative effects upon native species of biota. The direct, indirect, and cumulative impacts upon native flora and fauna from these invasives may be or become significant.

Logging, road building, burning, and other development facilitate the spread of invasives (S. Krichbaum, pers. obs., also see, e.g., Glasgow, L.S. and G.R. Matlack 2007a & 2007b).

The planners must fully and fairly address, evaluate, and disclose these issues (such as, e.g., cumulative impacts, and the sustained yield of areas not impacted) involving invasive species. And **the current LRMP and this proposal if implemented would allow for the substantial and significant spread and/or exacerbation of alien invasives.**

Asian Stiltgrass (*Microstigeum vimineum*) is increasingly problematic in the Eastern United States; recently it has invaded numerous sites on the GWNF (Krichbaum, S., personal observation). It rapidly invades after canopy disturbance, frequently at moist forests and stream banks (habitat for species such as the Wood Turtle), and displaces native vegetation (see Oswalt, C.M. *et al.* 2007).

Also of concern are the **impacts of prescribed fires on invasive plant species**; burning may significantly contribute to the spread and/or persistence of such species. Areas on the Forest that have been burned repeatedly are overrun with invasives (such as at the Shenandoah River on the Lee RD, as observed by Krichbaum, S. 2007). Studies found the alien herb Garlic Mustard (*Alliaria petiolata*) persisted and had greater abundance in burned plots (Bowles, M.L. *et al.* 2007).

ATVs/Poaching

One of the worse aspects of this proposal is the idea to “improve” and construct roads. That some of the roads are labeled “temporary” does not nullify their harmful effects.

Most of the project area is allocated to Management Area 13 by the Forest Plan. The proposed roading would not only result in forest fragmentation with ecologically harmful edge effects and degraded visual and recreational qualities, it will also provide an access route for illegal motorized activity and other human disturbance. Even if “closed” or

“temporary”, these roads facilitate harmful and undesirable motorized access (such as from ATVs) into the area, with consequent harmful and undesirable disturbance and impacts to wildlife. Such illegal motorized access is already known to occur in this Ranger District; we have seen the evidence first hand. We and other members of the public have notified you of these problems.

The decision to build more road mileage into this area and facilitate more motorized access is not consistent with the Plan condition desired for this area of Forest.

The agency typically glosses over impacts from the clear potential that a project has for increasing illegal motorized use, such as from ATVs, and associated criminal activity such as poaching. The agency dismisses and misleads regarding such potentially significant harms with inaccurate and unsubstantiated claims regarding the ability to “control” such activity. This foreseeable illegal activity would further harm remoteness, habitat security, and freedom from disturbance.

The cumulative impacts of all this may be significant. The analysis and disclosure must clearly analyse and disclose the cumulative **impacts to remote habitat, interior habitat, and disturbance-sensitive species** in MAs 13.

The agency must fully analyse and disclose the impacts from the clear potential that the project has for increasing illegal motorized use, such as from ATVs operating on 19 additional miles of constructed road. This foreseeable illegal activity would further harm remoteness, wildlife and habitat security, and freedom from disturbance. Construction techniques (e.g., dozers) that result in wide routes, will easily facilitate illegal ATV use and make it even more difficult for law enforcement officers to control. There is clearly a potential for significant harm to remote habitat and disturbance-sensitive wildlife.

The agency must fully and fairly consider the proposed project’s potential to foreseeably increase illegal motorized use (especially ATVs).

There is clearly a potential for significant harm to remote habitat, disturbance-sensitive wildlife, roadless area values and character, feelings of solitude, serenity, and remoteness, and to wildlife security.

The project area fits the profile for such illegal use. It has the “hidden, out-of-the-way places” said to fit the profile, as well as “adjacent private land” (see GWNF 2005 AHTS at EA-63, incorporated by reference).

The Forest Service has made the specious claim that gating/blocking techniques and law enforcement can control illegal ATV use (see, e.g., GWNF 2005 AHTS EA-64). This is refuted time-and-time again by observations on-the-ground in the GWNF. I have witnessed innumerable evidence of trespass on blocked and gated roads, such as at Crawford Mountain RA, Big Schloss, Paddy Run, Sours Run, Hawk Run, and Maple Flats special biological area. Signs, blocks, and gates definitely do not stop ATV trespass and the agency knows this.

Further, the Law Enforcement Officers on the Forest have also notified the agency repeatedly that they cannot control illegal ATV trespass. In fact, the GWNF’s head LEO, Mr. Woody Lipps, even stated that “the number 1 threat on the Forest is illegal ATV use.” Wildlife poaching is a primary associate of this. See ATV declaration of Steven Krichbaum

(previously submitted to the Forest Service, incorporated by reference). In a letter to Virginia Forest Watch dated July 1, 2004, Officer Lipps stated, "so far this year, cross-country motor vehicle operation is the most reported violation occurring on the GW/Jeff." Foisting off the problem as a "law enforcement issue" (as was done in previous GWNF EAs) is irresponsible and improper. The claim that 'law enforcement will handle the problems' that planners of this project help create and make worse is utterly without basis in fact.

The Forest Service must fully and fairly consider the direct, indirect, and cumulative impacts of the proposed action from facilitated OHV use and poaching.

Special habitat components

Protection of sensitive and /or special habitat components is a significant issue here. These places include very steep slopes, rocky outcrops, rocky/boulder slopes and hollows, rocky ground floors, ponds, and moist/wet areas (e.g., hollows, seeps, and drainage channels).

Significant rocky outcrops and rocky areas exist at sites proposed for intensive logging. Rocky slopes also exist at sites.

There may be springs/seeps in the proposed cutting sites. There are certainly streams and drainages. And very steep slopes exist.

All these areas are themselves important components of biodiversity and also are important habitats and refugia for various biota such as salamanders and mammals. They need to be strictly protected and buffered through alternative development and mitigation measures.

"Harvesting" activities must be avoided in the rocky areas. Through avoidance or mitigation measures the FS must protect the rock outcrops, rocky hollows, and rocky slopes in project areas. These are salient features in or immediately adjacent to numerous cutting sites.

Such sites have been called "key wildlife areas" (GWNF Dry River RD Maybe TS EA-5). Just as do riparian areas, these sites provide special habitat conditions unlike the general forest area (e.g., microclimates). They are themselves important components of biodiversity and also are important habitats and refugia for various biota, such as reptiles, amphibians, invertebrates, and lichens. For instance, mesic and rocky hollows, slopes, and drainages are very important localized habitats for salamanders.

Emergent rocks are important for "microsite moisture retention, refugia, and feeding substrate for woodland salamanders" and may serve as "primary long-term refugia and colonization sources" following logging (Ford, W.M. *et al.* 2002. Stand age and habitat influences on salamanders in Appalachian cove hardwood forests. *Forest Ecology and Management* 155: 131-141).

In addition to serving as refugia for salamanders and other fauna, rock outcrops are also important refugia for herbaceous plants and provide source populations for recolonization; see, e.g., Bellemare, J., G. Motzkin and D.R. Foster. 2002. Legacies of the

agricultural past in the forested present: an assessment of historical land-use effects on rich mesic forests. *Journal of Biogeography* 29: 1401–1420).

But merely not performing actions within the outcrops, hollows, and slopes themselves does not avoid impacts to these unique areas. Without proper buffer zones (such as extending out at least two tree heights or approximately 280-300 feet) the habitat conditions and populations within the outcrops would not be protected. The mitigation and alternatives must meaningfully and explicitly avoid impacts to these areas and protect the Forest's diversity.

Seeps and springs are a component of landscape diversity and are very important for maintaining the population viability and distribution of salamanders, frogs, crayfish, Box Turtles, Turkeys, and other species (see JNF Hagan Hall TS EA-43, 44, 46; incorporated by reference). Removal of their canopy cover impedes and disrupts the natural ecological succession of these areas. Implementation of the proposed alternative/mitigation is not compliant with the DFC for these microhabitats. These areas should be absolutely off-limits to cutting and removal and vehicles; and the no-disturbance zone should be more than just the "immediate" wet area due to hydrological, shade, and drying concerns.

From the letter dated June 28, 1998 of Dr. Joseph Mitchell to JNF Glenwood District Ranger Egan (previously submitted to the Forest Service and incorporated by reference): "I am also concerned about removal of trees around, not just within, seepage areas, which as you know are important habitats for salamanders. The integrity of this habitat type comes into question." See also Mitchell, J.C. *et al.* 1997. Factors influencing amphibian and small mammal assemblages in central Appalachian forests. *Forest Ecology and Management* 96: 65-76.

The springs and seeps need a protective no-disturbance buffer around them. This buffer should be at least two tree-heights in extent so as to protect their integrity (e.g., protect them from increased temperatures).

See also Seth Wenger, 1999, "A Review of the Scientific Literature on Riparian Buffer Width, Extent and Vegetation", Institute of Ecology, University of Georgia, 59 pp. (incorporated by reference).

It is crucial to recognize and address the fact that terrestrial riparian or stream/spring/seep protection zones are not just buffers for aquatic habitat, but are themselves *core habitat* for various taxa. So, the riparian zones/core habitat areas themselves need to be buffered from, for example, edge effects or recreation or roads. See Semlitsch, R.D. and J.B. Jensen. 2001. Core habitat, not buffer zone. *National Wetlands Newsletter* 23: 5-11. The upper watershed or upslope habitat can be just as important as the defined or so-called "riparian" habitat. This is a cogent reason for making the strictly protected riparian zones or aquatic buffer areas as wide as possible (such as, e.g., at least 127 or 290 meters from the stream bank).

Also see Crawford, J.A. and R.D. Semlitsch. 2007. Estimation of core terrestrial habitat for stream-breeding salamanders and delineation of riparian buffers for protection of biodiversity. *Conservation Biology* 21(1): 159–167.

Also see Petranka, J.W. and C.K. Smith. 2005. A functional analysis of streamside habitat use by southern Appalachian salamanders: Implications for riparian forest management. *Forest Ecology and Management* 210: 443–454: “The appropriate management of streamside forests and use of riparian strips is poorly resolved for many systems because of a lack of understanding of the extent to which riparian forests function as environmental buffers for aquatic species versus core (essential) habitat for semi-aquatic and terrestrial species. . . . Because of the vulnerability of plethodontid salamanders to edge effects, effective management of southern Appalachian streamside habitats may require the addition of a terrestrial buffer to protect terrestrial core habitat that immediately adjoins streams and seeps.”

“Current U.S. Forest Service guidelines for southern Appalachian streams require only an ~9 m (30 feet) buffer for headwater through second-order streams and an ~30 m (100 feet) buffer for streams third-order and above. Crawford and Semlitsch (2007) found that stream salamander assemblages require a core terrestrial habitat of 42.6 m and recommended a total buffer zone of 92.6 m (core terrestrial habitat plus a 50 m buffer to mitigate edge effects). While current USFS regulations are not adequate to protect stream salamander populations in clearcuts, these larger buffer zones would likely decrease the impact of timber harvesting on microhabitats within riparian areas of streams and help prevent local population declines.” Crawford, J.A. and R.D. Semlitsch. 2008. Abiotic factors influencing abundance and microhabitat use of stream salamanders in southern Appalachian forests. *Forest Ecology and Management* 255: 1841–1847.

The buffers advised by Crawford and Semlitsch should be applied here.

The past and current state of biotic populations and water quality of perennial streams, and intermittent and ephemeral tributaries, even if a "fishery" may be absent, must be disclosed. Total amounts of sediment estimated to enter these streams from the proposed cutting or roading must be meaningfully analysed. Precisely what monitoring information has been gathered here on the effects to intermittent stream populations and water quality from previous cutting? Exceeding the threshold levels for certain site-specific intermittent tributary "resources" may be at risk as a result of impacts from the proposed logging and roading.

Impacts to Salamanders

I am concerned about the harmful impacts the project would have to the distribution and viability of salamander populations. Of particular concern are the Shenandoah Mountain Salamander (*Plethodon virginia*) and the Cow Knob Salamander (*P. punctatus*). The proposed action would log tracts of old deciduous forest with the more mesic site conditions preferred by amphibians.

The proposed cutting may significantly harm salamanders and/or their habitat. Salamanders may be directly or indirectly killed or taken. Amongst others, the Cow Knob and Shenandoah Mountain Salamanders (*Plethodon punctatus* and *virginia* respectively) may occur here.

This project area, including specifically the upper moist drainages and slopes is within the known range of the SM Salamander (*P.v.*) and contains suitable habitat for this rare species. This species is vulnerable in part due to its naturally limited range.

This project area includes habitat that is within this species' range. It is known to occur at various elevations, aspects and slopes. And it is known to occur in late successional or old-growth hardwood sites; which are the forest types and ages found here.

Sites proposed for burning also contain rocky ground floor areas. The Cow Knob Salamander, a terrestrial salamander MIS on the GWNF, is associated with an abundance of surface rocks, CWD and other cover material (see pg. 2 of Mitchell, J.C. 1994. Habitat Conservation Assessment for the Cow Knob Salamander (*Plethodon punctatus*) in the George Washington National Forest. U.S. Fish and Wildlife Service, Annapolis, MD. 16 pp.) The SMS as well as other salamander species can be expected to also be associated with such cover material.

Cumulative impacts to the Salamanders are a concern. The Forest Service has in the past and continues to implement projects with intense ground disturbance in areas within the Salamander's range and habitat. There are impacts of acid precipitation that need to be considered. In addition, the FS promotes OHV routes in the Salamander's habitat. Now the agency is proposing to incinerate their habitat. All these factors and more (e.g., gypsy moth spraying) combine to impact the species, their populations, and their viability on the Forest.

Implementation of this proposal as currently configured would not be consistent with the 1994 Conservation Assessment for the Cow Knob Salamander (see Joseph Mitchell 1994). The CKS is not confined to the Shenandoah Crest SIA, nor are the proposed burns confined to drier sites with fire-dependent rare plants. Mesic sites, including drainages, north slopes, and riparian areas, and sites with ground cover used by salamanders are proposed for burning (see maps). The agency must also fully and fairly consider and survey for the Shenandoah Mountain Salamander (*Plethodon virginia*).

Regarding "populations [that] occur outside of the SMC – SIA" the 1994 "Conservation Assessment – Management Measures" for the Cow Knob Salamander states: "These populations are crucial to the long-term survival of this species. . . . Full species conservation requires the protection of all populations. Thus as noted in more detail in Appendix 1, additional distributional surveys are needed to identify populations . . . to locate areas that should be managed for this sensitive species." These same concepts and concerns apply to the Shenandoah Mountain Salamander.

The Salamander's distribution is not confined to the Shenandoah Crest SIA. See for example "Middle Mountain SIA" write-up in Smith, L.R., editor. 1991. Biological Diversity Protection on the George Washington National Forest: Site Reports for Proposed Research Natural Areas and Special Interest Areas; Technical Report 91-1. Virginia Department of

Conservation and Recreation, Division of Natural Heritage, Richmond, VA. 151 pp plus maps; the W. Flint thesis in the FS' possession; and the Lee RD 2007 prescribed burn project file; all incorporated by reference.

Populations at the periphery of the species' range are critical to their long-term viability (see, e.g., pg. 12 of the 1997 GW-JNF "Habitat Conservation Assessment for the Peaks of Otter Salamander" written by Dr. Joseph Mitchell, also the author of the CKS conservation plan for the Forest; incorporated by reference). Peripheral populations are vital for genetic diversity.

The FS must meaningfully, fully, and fairly consider and protect such populations. The failure to do so here is a violation of the CKS Conservation Agreement. "The areas surrounding the SMC-SIA will be subject to activities that may be detrimental to salamanders or their habitat, and where appropriate, surveys will be conducted to determine the presence of salamanders. If salamanders are found in these areas, they will be subject to the same management measures as the SMC-SIA." (January 25, 1994 Conservation Agreement for the Cow Knob Salamander) It is certainly appropriate to conduct surveys here.

According to the 1994 "Conservation Assessment – Management Measures": "The Cow Knob salamander must be actively protected against taking and killing by humans, except for specified scientific purposes."

Mesic sites, including drainages, north slopes, and riparian areas, and sites with ground cover suitable for use by salamanders are proposed for cutting (see maps). This is neither desirable nor necessary. To do so is not consistent with the 1994 Conservation Assessment for the CKS.

In addition, sites with salamanders may be subject to intense ground disturbance by machinery such as skidders and dozers. Such activities may directly kill salamanders, destroy habitat, create additional habitat fragmentation, and increase forest edge.

Implementation of this project may significantly diminish the Salamanders' distribution or otherwise significantly affect them.

Cumulative impacts to this species, and especially to vulnerable peripheral populations, are a significant issue and concern that have not been addressed by the planners here. This is a particularly relevant factor since the FS in the recent past decided to cut more suitable habitat for the Salamanders at the Dice Run, Canbe, Maybe, and Coyote timber sale project areas. Implementation of the proposal would harm the Salamanders' habitat and/or potentially harm or kill Salamanders if they are present. The distribution of the species and therefore its viability and the Forest's diversity may be significantly affected by project implementation. This pertinent issue must be fully and fairly analysed by the agency.

A decision would violate the LRMP, NEPA, NFMA, MUSYA, and APA if the FS did not properly consider and analyze this species, did not gather sufficient monitoring and survey information, did not properly provide for habitat and interactions, did not ensure population distribution and viability and sustained yield and productivity, did not protect

the Forest's diversity, did not comply with a Plan Standard, and disregarded available science.

Salamanders also serve as indicator species or monitoring proxies for a host of other site-sensitive low-mobility taxa of the forest floor (see Welsh, H. H., and S. Droege, 2001, A case for using plethodontid salamanders for monitoring biodiversity and ecosystem integrity of North American forests, *Conservation Biology* 15: 558-569; incorporated by reference). Implementation of the proposal could significantly harm the viability or distribution of salamanders or these other species.

The Forest Service should alter the proposal and not log the mesic sites, including drainages, north slopes, rocky hollows, and riparian areas.

Thorough & accurate surveys, population data, and viability analysis must be gathered and performed by specialists using proper methodologies. These Salamanders are small, cryptic, fossorial creatures that must be actively searched for, they cannot be reasonably expected to be seen by just meandering through an area. Due to their rarity, sensitivity, and vulnerability, it is essential that such thorough surveys be performed.

Thorough and complete population surveys and inventories of this species were not performed for or part of the GWNF FEIS, nor is such information about this project area in the GWNF Monitoring reports.

There are technically reliable and feasible methods of collecting this information. The data are available, the Forest Service has simply decided not to collect it. Current population inventory and viability analysis are not in the Forest Monitoring Report.

The Cow Knob Salamanders are the MIS for other woodland salamanders (e.g., of the *Plethodon* genus). They are the proxy used to analyse and gauge the impacts to other salamander species, and other site-sensitive genera. Salamanders are important elements of the Forest's "diversity" that the agency is charged with protecting and monitoring.

Are parts of the project area out of this species' range? Are the CKS present? If not, then how will impacts to salamanders and other species for which the CKS serves as a proxy be analysed and monitored here? Impacts to salamanders and other site-sensitive taxa must be fully and fairly considered and disclosed.

Numerous sites in the stands proposed for cutting contain mature deciduous forest with moist ground conditions and rocky groundfloor areas.

Salamanders and other small, cryptic site-sensitive species are important and significant components of the Forest's diversity. They are as important as any large game species. The agency is required by the NFMA to maintain their distribution and viability just as it is for other large mobile species. Yet there may be no MIS present here to use to meaningfully gauge the effect of proposed actions.

The agency must sufficiently examine and consider the potential impacts upon salamanders. This concern is particularly important given the intent to destroy, degrade, or fragment salamander habitat (such as the mature forest and rocky areas), these species low dispersal abilities, and the moister areas (such as in the forest type 53 areas with drainages or cooler aspects) targeted for intensive cutting. Populations could be centered, perhaps

even be only found at, the particular places targeted for intense manipulation. They have very small home ranges with limited abilities of mobility. They are susceptible and vulnerable to site-specific harm from logging operations and subsequent habitat alteration.

Streamside buffers need to be expansive, so as to not only protect the core riparian habitat but also to buffer this habitat. See Crawford, J.A. and R.D. Semlitsch. 2007. Estimation of Core Terrestrial Habitat for Stream-Breeding Salamanders and Delineation of Riparian Buffers for Protection of Biodiversity. *Conservation Biology* 21(1): 152-158; and Semlitsch, R.D. *et al.* 2007. Salamander Abundance along Road Edges and within Abandoned Logging Roads in Appalachian Forests. *Conservation Biology* 21(1): 159–167.

This project analysis must fully and fairly consider widely-shared and relevant scientific information that shows that salamanders and their reproductive success may be significantly impacted by logging such as proposed for here. This involves the significant issue of salamander monitoring and viability and scientific information. This is a particularly salient concern for the moister areas, rocky sites, and tracts with LWD cover objects, proposed to be cut here.

Forest fragmentation, interior forest

Fragmentation is the disruption of habitat continuity and integrity that results from human disturbance, along with the subsequent loss of viable habitat. In tandem with overt habitat destruction, alteration, and conversion, fragmentation is considered a principle threat to biodiversity in our region.¹ Area-sensitive species that have large home ranges or must move between different habitats can be especially harmed by fragmentation.

Fragmentation does not only occur when small islands of habitat are isolated by agriculture and development. It also occurs when a more or less large and intact area is degraded by being disrupted or perforated from within, causing it to lose both area and strength, as when a tapestry is eaten away by moths. Along with external pressures along all of her boundaries, this accumulation of **internal fragmentation** or **perforation** is perhaps the most pervasive and pernicious threat to the vitality and stability of our GWNF.² This type of forest and/or habitat fragmentation would occur should this proposal be implemented. When considering disturbances such as logging and roads that fragment forests, it must be remembered that the harmful consequences are not confined to the sites where the disturbances directly occur (such as these “cutting units”); a relatively small amount of disturbance can fragment a large area.³

Edges occur when distinct habitat boundaries are created by logging and roads. **Edge effects** extend outward into the forest, often resulting in changes of species composition and community structure.⁴ Harmful edge effects include an increase in invasive species, drying of the forest floor, facilitation of edge-associated predators such as

¹ Riitters *et al.* 2002 and Soulé 1986

² Harris & Silva-Lopez 1992, Riitters *et al.* 2002

³ Flamm 1990

⁴ JNF New Castle RD Broad Run EA-24 and 1993 GWNF LRMP 2 - 2.

Raccoons and Skunks, and an increase in nest predators such as Cowbirds. Current scientific knowledge recognizes a potential 600-meter edge effect for predator impacts to bird populations.⁵ Even an 80 meter edge effect can mean that over 40% of a large area of national forest can be degraded or unsuitable habitat for species such as salamanders.⁶

The discussion in EAs usually confines the analysis of fragmentation and affects to Ovenbirds nesting habitat just to "the number of acres cut." But this is not sufficient as current scientific knowledge recognizes **a potential 600 meter edge effect** for bird populations (see Leimgruber *et al. op cit.* and Wilcove, D.S. *et al*, 1986, "Habitat fragmentation in the temperate zone", pp. 237-256 in Soule (ed.) Conservation Biology, Sinauer Press, Sunderland MA; incorporated by reference). This edge effect would extend into the forest from the proposed roads and cutting sites. The inadequacy of the analysis is implied when EAs refer to predation and nesting habitat. The disclosure foresees increased predation occurring not only at the sites of direct disturbance, but elsewhere as well. So the affects are obviously not confined just to the number of acres cut. As the Ovenbirds and other species would no longer expected to be nesting at the cutover sites, the predation would also then be occurring elsewhere.

Roads are a major cause of forest fragmentation because they divide large landscape patches into smaller patches and convert forest interior habitat into edge habitat. Regeneration cuts do the same.

It is pertinent to an accurate affects analysis that edge and fragmentation effects are not considered as being confined to the percentage of an area or the number of acres in an area that are actually logged units; but this is the tact often taken by the planners on this Forest.

How and to what extent is the potential of all management proposals to further fragment the forest and ecosystem and watershed within which the project area exists? What is the impact on (potential) wildlife dispersal corridors? A full disclosure of the detrimental environmental impacts of roads that must be constructed and/or maintained for proposed actions.

Explanations, discussion, and evidence for how and to what extent the proposed intensive site disturbance from even-age industrial logging would disrupt and fragment populations and mature habitat and thus impede interactions of individuals (especially for species of low mobility or limited dispersal capability) in this planning area must be divulged in the EA. 36 CFR 219.19.

Disclose and specifically analyse amounts and distribution of mature interior forest that will be and have been destroyed, or lost, or harmed due to logging, roads, and edge effects here. This is a significant concern for this project. The absence of clear analysis and full and fair consideration of this factor would be a serious flaw in the analysis.

⁵ Leimgruber *et al.* 2000 and Wilcove 1987

⁶ Semlitsch *et al.* 2007

"Interior" forest is not necessarily equivalent to "mature" forest (see, e.g., "about 80 years" at GWNF Hoover Creek TS EA-59). Such a misrepresentation would be a serious flaw in the analysis (and pg. 14, nor other pages, of the Southern Appalachian Assessment Terrestrial Technical Report absolutely does not state that the terms are "synonymous"). This is not reasonable and is not the high quality science demanded by NEPA.

The site-specific analysis must offer meaningful site-specific spatial analysis and disclosure regarding fragmentation. For instance, it is pertinent to an accurate effects analysis that edge and fragmentation effects are not confined to the percentage of an area or the number of acres in an area that are actually logged units; but this is the tact often taken by the planners on this Forest. The effects are a consequence of the distribution of disruption and of remaining habitat. As the B. Flamm doctoral thesis (cited in the 1993 GWNF FEIS at Reference - 4; incorporated by reference) makes mathematically clear, depending on where it takes place, a tiny percentage of cutting can fragment a large area. And edge effects extend far beyond the boundaries of cutting sites or road construction.

Implementation of the action alternative listed in the SL would significantly fragment the project area and Forest.

I incorporate by reference the paper "Roadside Surveys: Changes in Forest Composition and Avian Communities with Distance from Roads" by Leimgruber *et al* contained at the James River RD office in the Hoover Creek timber sale file. This relevant paper needs to be in the project file.

A full and fair site-specific analysis of the issue of fragmentation/perforation at this project area is needed. The disclosure of direct, indirect, and cumulative effects within the FEIS for the Forest plan is limited to a discussion of effects on a generic Forest-wide basis. Nor does a regional "position statement" address effects here. This disregards the multi-stage reality of NFMA Forest planning and analysis. Addressment of the issue at the landscape level (*i.e.*, "Forest-wide") is insufficient for this project-level analysis. The NEPA requires a hard look at the project-level to support a site-specific decision.

There is widely-shared and relevant scientific information that shows that logging and road building may indeed significantly fragment the forest here, so the issue is not moot (see Noss and Cooperrider, *Saving Nature's Legacy*, 1994; a standard reference on protecting and restoring natural diversity; also Harris, Larry D., and Gilberto Silva-Lopez, 1992, "Forest Fragmentation and the Conservation of Biological Diversity" pp. 197-237 in P. Fiedler and S. Jain, editors, *Conservation Biology: The Theory and Practice of Nature Conservation, Preservation and Management*. New York: Chapman & Hall; incorporated by reference and previously submitted). The FS admits that "[f]ragmentation of late successional habitats [such as are found here] is usually caused by openings in the forest canopy. Edge effects occur when distinct habitat boundaries are created by timber harvest ... Species composition and community structure may change ..." (see JNF Broad Run TS EA-24, incorporated by reference).

Fragmentation is properly dealt with at programmatic Plan AND site-specific planning levels (see Supreme Court Wayne NF decision). Habitat diversity, dispersion, distribution, and fragmentation are significant issues in this MA 15 site.

Fragmentation that may or may not exist elsewhere does not make additional fragmentation resulting from proposed actions here a "moot issue". Cumulative, direct, and indirect impacts still occur. And forest openings resulting from natural processes are not the same as the fragmentation resulting from cutting and roading. It is clear that full and fair consideration of this significant issue must be accomplished.

The proposed action would remove, modify, and disturb mature forest habitat for neotropical migratory birds. See Southern Research Station General Technical Report SE-96; (relevant scientific information incorporated by reference).

Yet the FS EAs usually claim or imply that past and future cutting and roading in conjunction with the present proposal will have no significant effect on fragmentation or neotropical migratory bird requirements.

If such a finding is made here, cite to the site-specific surveys, inventories, monitoring, population censuses, working papers, and viability analyses used to support such a conclusion.

The EA/EIS disclosure must incorporate the recent bird study done on the GWNF in a nearby ranger district. See "Roadside Surveys: Changes in Forest Composition and Avian Communities with Distance from Roads" by P. Leimgruber, W.J. McShea, and G.D. Schnell; incorporated by reference. They should be consulted. See also "Comparison of Birds Detected From Roadside and Off-road Point Counts in the Shenandoah National Park" by C. Keller and M. Fuller, USDA FS Technical Report PSW-GTR-149; incorporated by reference.

Site-specific discussion of the Cerulean Warbler and other area sensitive birds (including NTMBs, deep woods raptors and owls) is necessary, not just reliance on assertions that unsuitable lands and congressionally designated lands off-limits to logging will provide adequate habitat for these birds. Agency documents admit that project implementation such as here has the result of "Forest interior birds would be replaced by birds requiring an earlier successional stage." (GWNF Hoover Creek TS EA-61, incorporated by reference).

Scientific studies determined that cutover sites and roads affected 2.5 to 3.5 times more of the landscape than the surface area occupied by the actual cuts and roads themselves. See, Reed, R. A., J. Johnson-Barnard and W. L. Baker, 1996, Contribution of roads to forest fragmentation in the Rocky Mountains, *Conservation Biology* 10: 1098-1106 (incorporated by reference).

Fragmentation due to roads was quantified in a 30,123-ha area of the Medicine Bow-Routt National Forest in southeastern Wyoming. A geographic information system was used to analyze landscape structure. **Forest patch and edge-related landscape changes** were measured using several indices: the number of patches, mean patch area, mean interior area, mean area of edge influence, mean patch perimeter, total perimeter, and mean patch shape.

Roads contributed to forest fragmentation more than even-age cuts in the study area since they dissected large forest patches into smaller fragments. They also converted

more forest interior habitat into edge habitat. The edge habitat due to roads was 1.54 to 1.98 times the edge habitat created by even-age cuts. Taking these factors into account, the authors calculated that together, cuts and roads affected 2.5 to 3.5 times more of the landscape than the area occupied by the actual cuts and roads themselves.

Negative impacts from Deer

What effect this sale will have on the existing Deer herd is an issue here. The expected effect is well known and obvious. Deer respond positively to actions that fragment forests and fabricate edge. Deer habitat would increase here from the proposed action, with foreseeable concomitant affects on Deer population numbers.

The effect on the herd here (not their habitat) must be disclosed. More deer can be expected to be attracted to the area due to the increase in favorable conditions. With increased habitat and food, ultimately more Deer can be expected.

Further, the analysis must disclose the effect on the other flora & fauna FROM the deer herd and from the fabrication of conditions favorable to increasing their numbers or density here. "[W]hitetailed deer have reached and sustained densities across much of the eastern, northern, and southern United States sufficient to cause manifold and substantial ecological impacts." (see "The white-tailed deer: a keystone herbivore", 1997, D.M. Waller and W.S. Alverson, Wildlife Society Bulletin 25(2):217-226; incorporated by reference).

It is obvious that previous logging affects species composition and distribution : "a 288 acre regeneration cut in 1968 ... is no longer providing the herbaceous vegetation ..." (see 1998 GWNF Mulligan TS EA-2, incorporated by reference). The planners must disclose length and effects of this 'biological desert' phase (long term effects are significant) here.

The direct, indirect, and cumulative impacts of Deer browsing and/or logging upon habitat degradation, species loss, population distribution, and future old growth must be fully analysed; this involves the public disclosure and hard look at relevant factors demanded by NEPA. The NFMA mandated protection of diversity, productivity, and viability must be assured.

Alternatives

The NEPA commands federal agencies to "study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternate uses of available resources." 42 U.S.C. § 4332(2)(E) (2005). The agency must rigorously explore and objectively evaluate all reasonable alternatives. See 40 C.F.R. § 1502.14. The NEPA regulations also require that:

Federal agencies shall, to the fullest extent possible: [u]se the NEPA process to identify and assess the reasonable alternatives to proposed actions that will avoid or minimize adverse effects of these actions upon the quality of the human environment.

40 C.F.R. § 1500.2(e) (emphasis added).

This statutory requirement to study alternatives is independent of and broader than the requirement to prepare an environmental impact statement. Consideration of a

reasonable range of alternatives in environmental analyses is critical to the goals of NEPA. See 40 C.F.R. § 1508.9(b).

The CEQ's NEPA regulations instruct federal agencies to "[u]se the NEPA process to identify and assess the reasonable alternatives to proposed actions that will avoid or minimize adverse effects of these actions upon the quality of the human environment." 40 C.F.R. § 1500.2(e) (applicable to EAs and EISs). In addition, consideration of alternatives is "the heart of the [EIS]. 40 C.F.R. § 1502.14. Agencies "shall" "rigorously explore and objectively evaluate all reasonable alternatives. . . ." § 1502.14(a).

During scoping, the Forest Service should explore alternatives and their environmental effects, and, with public participation, identify reasonable alternatives that will be considered in environmental documentation. See F.S.H. 1909.15 § 11, § 12.3c, § 14; also see 40 C.F.R. § 1508.25.

Because of concerns for and interests in scenic areas, recreational opportunities, remote habitat, disturbance sensitive species (such as the Wood Turtle), salamanders, special habitat conditions, streams and water, wildlife, mast, and old growth, as well as unresolved conflicts concerning alternate uses of available resources, I request that you develop in detail (and implement) an alternative that does not involve any road construction and/or reconstruction and that withdraws "areas" from cutting that are in or adjacent to an SBA or that involve old growth tracts or old age sites.

Withdrawal of these sites from cutting is a feasible alternative action. Not building the proposed roads is a feasible alternative action. Such alternatives are in compliance with the Standards in the Plan. They respond to significant issues. They also lead to goals, objectives, and desired future conditions for this management area (see LRMP), as well as meet purposes and needs.

If this project moves forward, the Forest Service also needs to examine in detail an alternative(s) that avoids CK Salamander and SM Salamander habitat.

If this project moves forward, the Forest Service also needs to examine in detail an alternative(s) that avoids Virginia Mountain Treasure areas.

If this project moves forward, the Forest Service also needs to examine in detail an alternative that that drops road construction and reconstruction and does not do regeneration logging but instead fabricates a small number of small permanent openings vegetated for wildlife.

Such alternatives are in compliance with the Standards in the Plan. They respond to significant issues. They also lead to goals, objectives, and desired future conditions for this management area (see LRMP), as well as meet purposes and needs.

Such smaller cutting operations would allow smaller operators to bid on sales.

Also, if this project moves forward, the Forest Service needs to examine in detail an alternative that recuts places that were cut 21-30 years ago in order to fabricate new 0-10-years old age class habitat for wildlife (if full and fair analysis shows that such habitat is "needed" by wildlife in this wildlife habitat area (MA 13)).

Such an alternative is a feasible alternative action. It responds to public issues and concerns. Such an alternative is in compliance with the Standards in chapter 3 of the Plan. It responds to significant issues. It also leads to goals, objectives, and desired future conditions for this management area (see LRMP), as well as meets purposes and needs.

Logging of one acre or five acres or ten acres or 20 or 25 acres meet the Plan's goals and desires of managing "suitable land" for "timber production", providing wood "products", "reducing expenses", and "minimiz[ing] adverse effects on wildlife, soil, water, recreation, and visual values in a cost effective manner." Such alternatives need to be analysed in detail.

Such alternatives are feasible, far less controversial and favored by members of the public who use the Forest, may result in impacts that are not significant, comply with Forest Standards and guidelines, address significant issues, and result in desirable conditions.

And, of great significance, is the fact that **an alternative(s) that did not include road building and cutting and burning within 300 meters of occupied Wood Turtle streams was not developed in full and fairly considered.** This ca. 300m buffer delineating the core habitat zone is well known in the published WT literature. With regard to my own studies on the GWNF near this project area involving radio-tracked Wood Turtles, 95% of the ca. 680 occurrence points were within 295m of the permanent streams; some Turtles ventured as far away as ca. 700 meters.

Such an alternative would be easy to map, consider, and designate.

My research indicates that the best thing you can do for Wood Turtles here is to let the forest in their core habitat develop through natural processes and disturbances into its natural old growth state with varying amounts of canopy closure/gaps, all ages of trees, and heterogeneous structural and compositional complexity.

Such a "proforestation" management regime with regard to WT core habitat also applies to the CK Salamander habitat. By allowing these GWNF forests to age and develop under natural processes, a great many benefits will accrue not only to WTs and CKs, but also to numerous other species of fauna and flora, people, and ecological processes. See "Intact Forests in the United States: Proforestation Mitigates Climate Change and Serves the Greatest Good" by Moomaw, Masino, and Faison 2019 (attached).

The agency's continuing to not fully and fairly deal with the significant issue of potential impacts to Wood Turtles from this project, as has happened thus far, leaves no recourse but litigation. Implementation of this proposal in its current incarnation violates or threatens to violate the NFMA, MUSYA, NEPA, and APA.

Due to the potential for significant impacts to a "very rare and imperiled" species an EIS should be prepared.

Thank you for your consideration and please do not hesitate to contact me if you have any questions about my comments or need clarification of them.

Sincerely,

Steven Krichbaum