Virginia Forest Watch
14031 Independence Road, Ashland, VA 23005
804-798-0988
www.VirginiaForestWatch.org

January 2, 2008

George Washington Plan Revision
George Washington & Jefferson National Forests
5162 Valleypointe Parkway
Roanoke, VA 24019

RE: National Forest Planning Process and Wind Plants

Dear Planning Team:

Virginia Forest Watch (VAFW) is a grassroots non-profit organization with members throughout the Commonwealth of Virginia. Our mission is to maintain and restore the natural ecology and biodiversity of woodlands across Virginia through education and citizen participation. Please consider this a formal comment in the process of revising the Land and Resources Management Plan for the George Washington National Forest (GWNF).

We are writing in conjunction with the group letter from the Virginia Sierra Club *et al.* concerning industrial wind development in national forests. VAFW joins the Sierra Club and others in opposing the wind energy development projects that are proposed on the GWNF. We are among the many groups referenced in that letter that find all national forest lands unsuitable for industrial wind turbines. Furthermore, we also oppose widening or other alterations of national forest roads and property to facilitate wind plants on nearby private property. We enclose with this letter a copy of our organization's wind energy development policy statement.

The Multiple-Use Sustained-Yield Act states: "It is the policy of the Congress that the national forests are established and shall be administered for outdoor recreation, range, timber, watershed, and wildlife and fish purposes." Wind plants on national forests threaten every one of these purposes for which national forests are maintained.

Parts of the Great Eastern Trail, established by the dedicated collaboration of many hiking groups over a number of years, would be obliterated by current proposed wind plants on the George Washington National Forest. Outdoor recreation by hunters, fishermen, mountain bikers, horse riders, picnickers, campers and Sunday drivers, all of whom contribute significantly to local economies while using the national forest, would also be highly impacted by the noise, sight, roads and disturbed ground of wind plants along the highest ridges. Current wind plant proposals on the GWNF would also destroy the integrity of several areas that are defined by the Forest Service itself as having unusual wilderness values as well as by The Wilderness Society in the recently published *Virginia's Mountain Treasures*.

With regard to range and timber, Paul State Forest in Rockingham County just east of Shenandoah Mountain provides an excellent example of the most likely ecosystem response to

the extensive clearcutting and extra wide roads necessary for wind plants. Forestry workshop participants there this past July had difficulty finding crop trees to favor due to the invasion of Ailanthus, Japanese joint grass, and other non-native species that are suppressing native tree growth after a clearcut twenty years ago.

Water quality protection is a major concern to communities surrounding the national forests as evidenced by the resolutions, now being passed by many jurisdictions in western Virginia, requesting that the Forest Service better protect the watersheds that supply drinking water to more than 260,000 residents of 22 localities in western Virginia. Water quality in the GWNF is already compromised, as documented in the 2006 Virginia Department of Environmental Quality report that identifies 21 impaired streams in drinking watersheds in the GWNF. The massive roads and ground disturbance necessary in headwater areas for wind plants would compound the erosion and sedimentation of streams that are already occurring in lower areas, impacting native fish species as well as drinking water supplies

For reasons detailed in a twelve-page letter dated November 16, 2007, the U.S. Fish & Wildlife Service recommends strongly against wind turbines on Shenandoah Mountain due to the high likelihood of killing endangered species. The highest numbers of bat and bird kills in the world from wind turbines have been recently documented at wind plants just across the state line in West Virginia. The remote ridges desirable for wind plants are the most undisturbed and the highest, coolest habitat available to uncommon species and species seeking to avoid climate warming by moving to higher ground. The threat to wildlife from wind plants on national forests in Virginia is extreme.

The weight of these arguments should preclude any wind plant development on national forests in Virginia, and such massively destructive commercial projects for private profit should not be allowed in national forests anywhere. We ask that you, in the planning process, define the entirety of the GWNF as unsuitable for industrial wind development. We further request revision of the Jefferson National Forest plan to declare that Forest unsuitable as well.

Thank you for the opportunity to comment.

Sincerely,

Bud Watson

Bud Watson
Executive Director

Lynn Cameron
<camerosl@jmu.edu>

01/05/2009 08:19 AM

To: comments-southern-georgewashington-jefferson@fs.fed.us
cc:
Subject: Friends of Shenandoah Mountain map correction

Dear Planning Team,

Friends of Shenandoah Mountain submitted comments on October 30, 2008, with an accompanying boundary map of the proposed Shenandoah Mountain NSA and Wilderness areas within. We are submitting the attached map as a boundary adjustment to Lynn Hollow Wilderness. We did not mean to include Puffenbarger Pond and its access road in our proposed Wilderness.

Thank you.

Lynn Cameron
Co-Chair
Friends of Shenandoah Mountain
--
Lynn Cameron
Coordinator of Library Instruction
Liaison Librarian for Psychology Carrier Library
James Madison University
Harrisonburg, VA 22807
(540)568-3826

"I only went out for a walk, and finally concluded to stay out till sundown, for going out, I found, was really going in"
- John Muir (1838-1914)

LynnHollowCorrection.jpg

N/A
Lake

Clarke County Board of Supervisors

Supervisors
Millwood Voting District
John Staelin
Chair
(540) 837-1903

Berryville Voting District
J. Michael Hobert
Vice Chair
(540) 955-4720

Buckmarsh Voting District
David Weiss
(540) 955-2151

THE COUNTY OF CLARKE VIRGINIA 1836

www.co.clarke.va.us

Supervisors
White Post Voting District
A.R. Dunning
(540) 837-1719

Russell Voting District
Barbara Byrd
(540) 955-1215

County Administrator
David L. Ash
(540) 955-5100
FAX: (540) 955-4002

January 7, 2009

USDA Forest SVC Southern REG
George Washington Forest
5162 Valleypointe Parkway
Roanoke VA 24019

Lee Ranger District
George Washington Forest
95 Railroad AVE
Edinburg VA 22824

Re: Resolution Supporting George Washington National Forest Management Plan 08-27R

Enclosed, please find the executed resolution referenced above. The Clarke County Board of Supervisors unanimously approved this resolution at their regular meeting held Tuesday, December 16, 2008.

Regards,

Lora B. Walburn
Deputy Clerk to the Board of Supervisors

Enclosure

Clarke County Board of Supervisors

Supervisors
Millwood Voting District
John Staelin
Chair
(540) 837-1903

Berryville Voting District
J. Michael Hobert
Vice Chair
(540) 955-4720

Buckmarsh Voting District
David Weiss
(540) 955-2151

www.clarkecounty.gov

Supervisors
White Post Voting District
A.R. Dunning
(540) 837-1719

Russell Voting District
Barbara Byrd
(540) 955-1215

County Administrator
David L. Ash
(540) 955-5100
FAX: (540) 955-4002

RESOLUTION SUPPORTING
GEORGE WASHINGTON NATIONAL FOREST MANAGEMENT PLAN
No. 08-27R

WHEREAS, the U.S. Forest Service is in the process of revising its 1993 Land and Resource Management Plan for the George Washington National Forest.

WHEREAS, the U.S. Forest Service's agency-wide strategic plan seeks to achieve six goals, including "Improve watershed condition."

WHEREAS, the provision of clean safe drinking water is one of the primary benefits that the George Washington National Forest provides to the communities that surround it.

WHEREAS, it has been estimated that approximately 44 percent of the land in the George Washington National Forest lies within watersheds that provide public drinking water to more than 260,000 Virginia residents in 22 adjacent communities, by means of reservoirs and surface waters.

WHEREAS, the watersheds of surface waters that flow from the George Washington National Forest, such as the North River and the North and South Forks of the Shenandoah River, provide drinking water to an additional 165,000 people in communities including Bridgewater, Broadway, Front Royal, Harrisonburg, Middletown, Strasburg, Winchester and Berryville.

WHEREAS, under the 1993 George Washington National Forest Management Plan most of the land in drinking water reservoirs watersheds (72 percent) is managed without ground disturbing activities and U.S. Forest Service data appears to indicate that water quality in the reservoir watersheds is substantially better than in surface watersheds in other parts of the George Washington National Forest.

WHEREAS, the 1993 George Washington National Forest Management Plan permits ground disturbing activities on most of the land (64 percent) in surface watersheds that provide drinking water through river intakes.

NOW, THEREFORE, BE IT RESOLVED, that the undersigned hereby support the following revisions to the George Washington National Forest Management Plan to ensure the quality and quantity of drinking water sources within the forest boundaries:

- The U.S. Forest Service shall formally identify all the drinking watersheds serving reservoir and surface water resources within the George Washington National Forest.

- The U.S. Forest Service shall establish management objectives that encompass the health of the entire drinking watershed, in order to ensure that conditions within the watershed will maintain, protect and enhance drinking water quality.

- The U.S. Forest Service shall continuously gather the information required to assess its performance against its watershed objectives and send summaries of the performance data to all affected localities on at least an annual basis.

ADOPTED this 16th day of December 2008

CERTIFICATION I hereby certify that this is a true and correct Resolution approved by the Clarke County Board of Supervisors.

David L Ash, Clerk
Clarke County Board of Supervisors

"steven krichbaum" <lokitoad@gmail.com >

01/09/2009 11:23 AM

To: comments-southern-georgewashington-jefferson@fs.fed.us
cc: mhyzer@fs.fed.us, klandgraf@fs.fed.us
Subject: plan revision comments

happy new year, hope you are all well - attached are comments pertaining to wildlife and vegetation management - please let me know asap if you cannot open this; have sent same document twice, one with .doc extension - thank you - steve krichaum

Rev. com. SK Jan. 2009 Rev. com. SK Jan. 09.doc

Steven Krichbaum
412 Carter St.
Staunton, VA 24401
540-886-1584
Lokitoad@gmail.com
January 8, 2009

George Washington National Forest - Supervisor's Office
5162 Valleypointe Pkwy.
Roanoke, VA 24019
888-265-0019
540-265-5173
comments-southern-georgewashington-jefferson@fs.fed.us

to: Supervisor Maureen Hyzer, Kenneth Landgraf, Karen Overcash, Russ MacFarlane, and all whom this concerns
re: Comments pertaining to the Draft Comprehensive Evaluation Report ("CER" or "DCER"), Draft Proposed Land Management Plan ("DLMP"), and the revision of the George Washington National Forest Plan - Wildlife management/ Vegetation manipulation

Climate Change

In response to ongoing and potential climate change a priority goal/objective/desired condition for the revised Plan must be to **restore and maintain broad elevational core habitat and corridors** throughout the Forest. **Identification and mapping of patches and corridors of mature and old-growth forest** (contiguous forest containing "core" conditions of mature and/or old-growth forest supplying expansive elevational gradients and anthropogenically unbroken/unfragmented physical links between relatively large patches containing "core" conditions of mature and/or old-growth forest) needs to be accomplished. **The retention and restoration of full altitudinal gradients is of crucial importance in order to accommodate faunal and floral population/community shifts upslope to cooler conditions in response to climate change**. Clear and explicit prescriptions/objectives/guidelines/standards must provide for this. The DCER and DLMP fail to fully and fairly analyse and consider this significant issue.

These cores/corridors must be considered not suitable for logging, road building, drilling, mining, wind turbines, or development. They are priority areas for watershed restoration activities (*e.g.*, decommissioning, recontouring, and revegetating of selected roads). In other words, **we must ensure that there is no loss of or degradation of habitat within the broad elevational "corridors"**. "It is important to stress once again that no evidence supports the proposition that corridors can mitigate the overall loss of habitat (Harrison 1994, Fahrig 1998, Rosenberg et al. 1997)." (Harrison, S. and E. Bruna. 1999. Habitat fragmentation and large-scale conservation: what do we know for sure? Ecography 22: 225-232.) It is crucial that "corridors" not be narrow so as to avoid being overrun with edge effects.

"**Effective area modeling**" of habitat "provides a tool for assessing the value of habitat corridors for a wide range of species, **based on their responses to habitat edges**." Sisk, T.D. and N.M. Haddad. 2002. Incorporating the effects of habitat edges into landscape models: Effective Area Models for cross-boundary management. Pages 208-240 in J. Lui and W. Taylor

(eds.), Integrating Landscape Ecology into Natural Resource Management. Cambridge University Press: Cambridge. 500 pp. (emphasis added) Of course, there is an interplay (often confounded) of area effects, edge effects, and landscape context. “Habitat area and edge are key components of landscape structure, yet these components tend to covary within landscapes. Because habitat area and edge describe different aspects of landscape structure, the importance of each suggests different foci for conservation strategies, making it imperative to understand their unique roles in habitat fragmentation.” Fletcher, Jr., R.J., L. Ries, J. Battin, and A.D. Chalfoun. 2007. The role of habitat area and edge in fragmented landscapes: definitively distinct or inevitably intertwined? Canadian Journal of Zoology 85: 1017–1030
□□□□□□□

********* The DCER fails to fully and fairly consider, evaluate, and disclose **effects of climate change upon Brook Trout**. Increasingly warm temperatures may significantly diminish Trout populations, habitat, and/or distribution. See Flebbe, P.A., L.D. Roghair, and J.L. Bruggink. 2006. Spatial modeling to project Southern Appalachian Brook Trout distribution in a warmer climate. Transactions of the American Fisheries Society 135: 1371-1382 (lead author is FS researcher based in Virginia).

Effects of climate shift may include not only temperature change, but also increasing aridity and concomitant drying out of or lowering of water levels in streams. “Long-term, non-periodic trends, such as global warming, for example, may increase drought frequency (LeBlanc and Foster 1992) and alter species distributions (Iverson et al. 1999).” Rentch, J.S. 2006. “Structure and Functioning of Terrestrial Ecosystems in the Eastern Rivers and Mountains Network: Conceptual Models and Vital Signs Monitoring”. Technical Report NPS/NER/NRR-2006/007. National Park Service: Philadelphia, PA available at http://www.nps.gov/nero/science/.

The **cumulative impacts of actions within control of the FS** in conjunction with climate change effects are of great concern.

********* The DCER fails to fully and fairly consider, evaluate, and disclose **effects of climate change upon Wood Turtles, herpetofauna, and other vulnerable species (such as those at the southern limits of their ranges)**. Increasingly warm temperatures may significantly diminish Turtle populations, habitat, and/or distribution. Effects may include not only temperature change, but also increasing aridity and concomitant drying out of or lowering of water levels in streams used by the Turtles. “Impacts of global climate change, atmospheric deposition, and air pollution would most likely be apparent in herptofaunal communities before they would in other sectors of the terrestrial ecosystem.” (Rentch, J.S. 2006 *id*.) I am particularly concerned about the cumulative impacts of management actions allowed in the DLMP (*e.g*., logging, burning, and road construction/reconstruction/maintenance) in conjunction with the effects of climate change.

***** The FS planners must also fully and fairly consider **the potential affect of the warming and drying associated with climate change that can advantage oaks** more so than other tree species. The DCER and DLMP do not reflect this consideration.

See, *e.g*., “Swapping forests (Or how we'll lose the beech and learn to love the Southern pine)” by Kevin Mayhood, Tuesday, July 8, 2008, THE COLUMBUS DISPATCH:

“Chiang and Brown built their work on a tree atlas of the eastern United States that Iverson and three colleagues built. The atlas shows possible changes in range for 134 tree species.

“Trees might not die off completely here, but the range in which they thrive could shift 250 to 500 miles to the northeast, depending on how hot it gets and how much carbon dioxide is added to the atmosphere, said Matthew Peters, one of the atlas creators.

"The Ohio atlas suggests a decline in the American beech, and the disappearance of the bigtooth aspen and sugar maple in the next 60 to 100 years."

<http://www.columbusdispatch.com/live/content/science/stories/2008/07/08/sci_hot_forest.ART_ART_07-08-08_B4_1HAL6NH.html?sid=101>

***** I am particularly concerned about the **cumulative impacts of management actions allowed in the DLMP (*e.g.*, logging and road construction/reconstruction/maintenance) in conjunction with the potential harmful effects of climate change as well as acidic deposition, deposition of other air pollutants, ultraviolet radiation, and ozone**. For example, the loss of Hemlocks due to the Wooly Adelgid is another factor affecting Trout and other aquatic populations. □□□□

The supposition (or even fact) that sedimentation in and of itself may not significantly harm aquatic biota does not allay concerns. This is not sufficient consideration. The additional stress, even if insignificant of itself, may in conjunction with other impacts be very significant.

The **sufficiency of BMPs** and their narrowly proscribed stream buffer zones for dealing with these aggregating or accumulating impacts is the concern/issue that needs to be fully addressed.

Herbaceous Flora

In addition to salamanders (see previous S. Krichbaum comment letters of August 8, October 24, and October 30, 2008), **herbaceous flora of the interiors of mature and/or old growth forest** are also of significant import in any discussion of management on the GWNF. See, *e.g.*, Gilliam, F.S. 2007. The ecological significance of the herbaceous layer in temperate forest ecoystems. BioScience 57(10): 845-858.

Some **species/communities may take centuries to re-establish** after severe site alteration (such as even-age logging); see Honnay, O., H. Jacquemyn, B. Bossuyt, and M. Hermy. 2005. Forest fragmentation effects on patch occupancy and population viability of herbaceous plant species. New Phytologist 166: 723–736; Vellend, M. 2004. "Metapopulation dynamics following habitat loss and recovery: forest herbs in ancient and recent forests", pp. 163-177 in O. Honnay, K. Verhayen, B. Bossuyt, and M. Hermy (eds.), Forest Biodiversity: Lessons from History for Conservation,. CABI Publishing, Wallingford, UK. 285 pp.; Duffy, D.C. and A.J. Meier. 1992. Do Appalachian herbaceous understories ever recover from clearcutting ? Conservation Biology 6:196-201; and Meier, A.J., S.P. Bratton, and D.C. Duffy. 1995. Possible ecological mechanisms for loss of vernal-herb diversity in logged eastern deciduous forests. Ecological Applications 5:935-946.

Regarding herbaceous plants, Matlack (1994) concluded: "A Piedmont forest reserve designed to protect interior habitat from vegetational changes at forest edges should include points further than 92 m from the nearest edge, and should be comprised of forest more than 100 years old." Matlack, G.R. 1994. Vegetation dynamics of the forest edge - trends in space and successional time. Journal of Ecology 82(1): 113-123.

The protection of **mature interior forest conditions for herbaceous plants** is a significant issue for the analysis and evaluation of vegetation manipulation, **edge effects (**in the example cited above, these penetrate at least **92 meters)**, and fragmentation ("temporary" and otherwise) on the Forest. The DCER and DLMP do not sufficiently or fairly consider and make disclosure on this issue.

Baseline amounts and distribution of mature interior forest conditions and edge effects must be calculated, mapped, and analysed so as to properly and adequately inform the public and decision-makers. In this way we can develop conservation

strategies/tactics and management guidelines/standards/objectives/prescriptions aimed at reducing the negative effects of forest fragmentation, fracturization, and/or edges.

ESH Birds/Edge Habitat

It is also important to calculate, map, analyse, and disclose the amount of "edge" habitat on the Forest because bird species that are considered to affiliate with early successional habitat commonly use "edge" habitat (□I□m□b□e□a□u□,□ □L□.□,□ □D□r□a□p□e□a□u□,□ □P□.□ □a□n□d□ □M. M□o□n□k□k□o□n□e□n□.□ □2□0□0□3□.□ □A□r□e□ □f□o□r□e□s□t□ □b□i□r□d□s□ □c□a□t□e□g□o□r□i□s□e□d□ □a□s□ "e□d□g□e□ □s□p□e□c□i□e□s" □s□t□r□i□c□t□l□y□ □a□s□s□o□c□i□a□t□e□d□ □w□i□t□h□ □e□d□g□e□s□?□ □E□c□o□g□r□a□p□h□y□ □2□6□:□ □5□1□4-5□2□0□). So there is a lot more habitat available to "early successional" birds on the Forest than just the amount usually considered to exist (*e.g.*, forest tracts logged 0-10 years ago). This is an example of edge effects having a positive impact upon populations of some species.

Effects to/from the Deer Population

That the agency may refer to the "even-age management" of mature forest as **managing for Black Bear or Golden-winged Warbler or Ruffed Grouse or Turkey or other species does not make the effects of such management upon another species (*viz*., White-tailed Deer) go away**.

***** The Forest Service intends to manipulate the Forest so as to fabricate tens-of-thousands of acres of esh during the life of the revised Plan. Call it what you will, this "management" will benefit Deer.

However, there are already excessive Deer numbers as regards ecological health; for instance, Deer populations such as are found at the current density on the Forest are considered harmful by Maryland state biologists and others; see, *e.g.*, 15-20/sq. mi. in Marquis, D. A., and M. J. Twery. 1992. Decision-making for natural regeneration in the northern forest ecosystem. Pp. 156-173 in: Proc.: Oak Regeneration: Serious Problems, Practical Recommendations, D. L. Loftis and C. E. McGee (eds.). USDA, Forest Service Gen. Tech. Rep. SE-84.

Fabrication of esh will facilitate Deer reproduction/survivability and lead to sustained or increased ecological/economic problems. The FS fails to reasonably analyze and disclose the effects of this foreseeable scenario. Reference is made to population stabilization. "Stabilize" at what level? How was the level determined? The DCER and DLMP fail to reasonably and fairly consider and disclose the quantity, quality, and distribution of the harmful ecological effects of the current Deer population on the Forest (baseline data and existing situation). Nor do the DCER and DLMP adequately and reasonably analyse and disclose the quantity, quality, and distribution of the harmful ecological effects of the Deer population on the Forest projected under the DLMP were it to be implemented.

The negative effects (direct, indirect, cumulative) of the current and projected Deer populations upon the diversity and sustained yield of various ecological aspects of the Forest (*e.g.*, herbaceous plants, turtles, understory nesting birds, tree regeneration, invertebrates) are not fully and fairly considered and evaluated in the DCER and DLMP.

**** At pg. 46 of the DCER the FS expresses concern about "increasing deer damage to plant communities". Unfortunately however, the response is "increased management to enhance deer forage on the GWNF".

The FS proposed response is to maintain and even increase Deer numbers (enhanced Deer forage will serve to enhance or benefit Deer population numbers that are already high at 31/sq. mi.). **However, Deer are already a significant ecologic and economic problem and source of property damage. More "management" (more fabricated esh) will lead to more Deer (or sustained high numbers) and more problems**. The DCER and DLMP fail to fully and fairly assess and disclose the foreseeable effects of Forest management.

Of further concern are the cumulative impacts to herbaceous flora and forest floor litter and associated organisms from alien earthworms in conjunction with Deer browsing.

See Côté, S.D., T.P. Rooney, J-P. Tremblay, C. Dussault, and D.M. Waller. 2004. Ecological impacts of deer overabundance. Annual Review of Ecology, Evolution, and Systematics 35:113–147; and Hale, C.M, L.E. Frelich, P.B. Reich, and J. Pastor. 2005. Effects of European earthworm invasion on soil characteristics in northern hardwood forests of Minnesota, USA. Ecosystems 8: 911–927.

At the November 12, 2008 Verona public meeting one WVDNR employee was concerned about what he called the "jungle effect" on the Forest (referring to understory vegetation). This concern was not disputed or responded to by Mr. MacFarlane or any other FS employee. It is as if dense understories of "escape habitat" (not fabricated as a result of the application of chainsaws) are not considered to supply beneficial conditions.

Further, I heard not one FS or WVDNR employee said anything about **the expansive areas of open understory on the Forest and the health of such areas, as well as their relationship to the impacts of Deer browsing. The DCER and DLMP likewise fail to forthrightly deal with this issue and situation**.

In fact, White-tailed Deer herbivory is one of the factors identified as causing the apparent poor regeneration of oaks in the East; see Healy, W. M. 1997. Influence of deer on the structure and composition of oak forests in central Massachusetts. Pp. 249-266 in: The Science of Overabundance: Deer Ecology and Population Management, W. J. McShea, H. B. Underwood and J. H. Rappole, eds. Smithsonian Institution Press: Washington, DC.

Effects to/from Predators

At the November 12, 2008 Verona public meeting some individuals at the "wildlife management" table represented/claimed **Raccoons** are not a problem in the Forest, that Raccoons occur in suburbs and around human habitation, but do not regularly penetrate into the Forest, or even if they do are not a problem. It is not clear what information and analysis support these contentions. The DCER and DLMP do not thoroughly and reasonably consider, evaluate, and disclose effects from predation and the Forest and the effects of management actions upon predators in the Forest.

I oftentimes see Raccoons or Raccoon sign (tracks) in the Forest, including at sites where rare species such as Wood Turtles occur.

What Raccoon population monitoring has been performed on the Forest? What are their numbers and distribution now and when the current Plan was adopted? What numbers and distribution are expected when the revised Plan is adopted and during its lifetime? How far do Raccoons penetrate into the Forest? What are their effects? What are the extent and intensity of effects? What information is the FS using to assess Raccoon effects?

The propensity of Raccoons' and other meso-predators' for traveling along stream corridors is well known (see, *e.g.*, Spackman, S. C. and J. W. Hughes 1995 *op cit*.). Their attraction to and use of roads and logging areas and edges are also well known. Multiple conditions and management actions facilitate habitat permeability and Forest ingress by

Raccoons. Between their use of streams and anthropogenic disturbances and edges such as roads, a great deal of the Forest can be penetrated by them and foreseeably be open to their use and influence. For instance, a significant and very large proportion of the GWNF is within 800 meters of roads. Further, there is a lot of overlap of different edges on the Forest. Therefore, **Raccoons may penetrate a lot of so-called "interior forest" and much other Forest habitat**.

A small number of Raccoons can have devastating predatory impacts upon wildlife such as turtles (see, *e.g*., Engeman, R.M. *et al*. 2003 and Engeman, R.M. *et al*. 2005 [full citation in Wood Turtle section]). Researchers concluded that "□□□□□□□□□□□□□□□□□□□□□□□□□□□even modest increases in predation pressure from mesopredators, in conjunction with other fragmentation effects, may quickly drive native prey species, especially rare ones to extinction." (Crooks, K.R. and M.E. Soule. 1999. Mesopredator release and avifaunal extinctions in a fragmented system. Nature 400 (5 August 1999): 563-566.)

GWNF Raccoon populations need to be monitored; the species is a good candidate for being a MIS or focal species.

Most of GWNF may not be "interior" in so far as predation impacts are concerned. Knowledge of specific predator behavior and populations (which are often not measured) and their landscape context are essential factors for well-informed Forest management.

In many cases on the GWNF it is not Cowbird parasitism that is a problem with forest fragmentation/fracturization and edge effects resulting from management, but predation from meso-predators such as Raccoons. So the use of Cowbirds as an indicator of management impacts can be highly misleading.

"Interior" Species/Edge

The DCER does not clearly assess and disclose how much of a habitat mosaic would be provided for **Ovenbirds** without "current levels of timber harvest", but instead at levels of 0, 5, and 10% of what it is now.

"Significant edge avoidance by birds could also reflect edge effects on microclimate, vegetation structure, prey abundance, and their interactions. Studies have shown edge-to-interior gradients in microclimate (e.g. wind velocity, soil and air moisture; Chen et al. 1993), vegetation structure (Ranhey et al. 1981, Chen et al. 1992), and plant species composition (Fraver 1994), which in turn could influence the abundance and species composition of arthropods (Shure and Phillips 1991). True forest-interior species might feed mainly on moisture-dependent arthropods, as suggested by Gibbs and Faaborg (1990) for Ovenbirds (*Seiurus aurocapillus*)." Villard, M-A. 1998. On forest-interior species, edge avoidance, area sensitivity and dogmas in avian conservation. The Auk 115(3): 801-805.

In an extensively forested area in Vermont, Ovenbird "[t]erritory densities on seven study plots were 40% lower within edge areas (0 to 150 m from unpaved roads) than within interior areas (150 to 300 m from roads). . . . We conclude that **habitat quality for Ovenbirds may be lower within 150 m of unpaved roads in extensive forested landscapes**, affecting territory density and possibly reproductive success. . . .

"Invertebrates in leaf litter, the main food source of Ovenbirds (Hann 1937), may be less abundant within forest edges because of altered microclimates (e.g. decreased litter moisture and increased litter temperature; Matlack 1993, Villard et al. 1993, Burke and Nol 1998). Litter fauna adjacent to unpaved roads could also be sensitive to accumulation of dust particles and heavy metals (Lagerwerff and Specht 1970, Forman and Godron 1986)." (emphasis added)

Ortega, Y.K. and D.E. Capen. 1999. Effects of forest roads on habitat quality for Ovenbirds in a forested landscape. The Auk 116(4): 937-946.

A study using GIS data sets showed that "forest interior species and specialists are selecting landscapes with no edges or low-contrast edges, lower number of patch types per unit area, and a greater number of core areas." Villard, M. and B. Maurer. 1996. Geostatistics as a tool for examining hypothesized declines in migratory songbirds. Ecology 77(1): 63.

What species is/are the FS using to indicate that more esh must be fabricated (through timber sales) on the Forest? What is their current carrying capacity? What are their current estimated population numbers on the Forest? It is not at all clear how the FS determined that early seral habitat must continue to be fabricated by timber harvest on the Forest. What population numbers, monitoring and inventory of habitat, and modeling are used that substantiate that more esh must be fabricated on top of amounts resulting from natural disturbances and ecological processes?

Surrogate Habitat Monitoring

The FS uses MIS and amounts of various species' "habitat" to gauge impacts of forest management activities. However, **simple measures of habitat quality and amounts can be a poor surrogate for gauging population persistence** (see Lawler, J.J. and N.H. Schumaker. 2004. Evaluating habitat as a surrogate for population viability using a spatially explicit population model. Environmental Monitoring and Assessment 94: 85–100; this study examined Red-shouldered Hawk and Goshawk habitat and populations, including on the GWNF). The FS typically calculates **amounts of habitat available to MIS based on "age classes" and crude "forest types"**. **But the patterns and distribution of habitat must be considered as well as patterns/mechanisms that diminish or alter habitat quality, amounts, and distribution (*e.g.*, edge effects).**

"However, because population dynamics are clearly influenced by habitat pattern, as well as type (Hansson et al., 1995), assessments based on simple measures of habitat quality that do not take the effects of landscape pattern into account are unlikely to provide accurate estimates of population persistence for many species. The spatial configuration of habitat has the potential to influence dispersal, survival, and reproduction (Hansson et al., 1995). . . . Thus, as our results demonstrate, measures of habitat quality that do not take landscape pattern into account will likely be poor surrogates for population persistence for some species (Schumaker et al., in press)." (*id*.)

For example, in the Lawler – Schmaker study, by merely looking at "habitat quality" and not distribution, "the areas that were observed to be strong sinks were not necessarily predicted to be strong sinks." (*id*.) It is imperative that the GWNF planners thoroughly and adequately analyse the distribution and pattern of interior habitat, edge effects, and habitat fragmentation and fracturization on the Forest (spatially explicit models). With this information "conservation planning can integrate population persistence estimates for a small set of focal species of particular interest or whose habitat requirements are assumed to be representative of the wildlife in the region (Carroll et al., 2003)." (*id*.)

With few exceptions (such as Forest-wide or regional bird counts), the FS does not use actual population monitoring numbers for wildlife populations, particularly at the project level of analysis. Instead of actual population data, instead the agency typically uses amounts of habitat (age classes and forest types) to analyse and monitor wildlife on the Forest.

However, as the above cited study indicates, the use of habitat as a surrogate must explicitly take into account not just amounts, but distributional patterns (a

reflection/consideration of fragmentation, fracturization, edge, connectivity, context). This underscores the necessity of the FS to thoroughly estimate, measure, quantify, and analyse edge effects and the amounts and distributional patterns of edge habitat and/or edge influence in order to meaningfully gauge the amounts and distribution of habitat available to populations of surrogate, focal, or indicator species.

It is not even clear what species the Forest Service intends to monitor on the Forest. So what will indicate the impacts on management upon wildlife? How will impacts to wildlife be analysed, evaluated, and disclosed? The discussion in the DCER and DLMP imply that MIS are not going to be used. See Rentch, J.S. 2006 (*op cit*.) for an in-depth discussion of monitoring options.

Effects to/from Invasives

***** The invasive Asian Long-horned Beetle is deadly to maples, Tulip Poplar, and magnolias. The arrival of this insect could then serve to benefit oaks. See Oct. 22, 2008 article at www.nytimes.com/aponline/us/AP-Beetle-Battle.html?_r=1&ei=5070&emc=eta1&oref=slogin. The Emerald Ash Borer may likewise serve to benefit oak numbers or proportions. The GWNF planners must fully and properly consider these relevant factors. The agency's rationale as regards concern for a purported loss of oaks is not clearly disclosed and supported in the DCER and DLMP.

***** The agency's vegetation manipulations demonstrably facilitate the spread of alien invasive plant species on the Forest. **The DLMP if implemented would allow for the substantial and significant spread and/or exacerbation of alien invasives. This is at odds with the attainment of a FS strategic goal.**

However, **invasive species are inadequately addressed in the DCER and DLMP**. This is one of the major threats identified by the FS (see Goals at pg. 4 of DCER) yet this is barely evaluated anywhere (see, *e.g*., the DCER sections on "Fragmentation", "Forest Access", "Vegetation Manipulation", "Fire", and "Wind Energy Development"). This is a glaring omission and short-coming that must be corrected for a well-informed decision.

To counter the ongoing invasion of the Forest by invasives the FS needs to greatly decrease "timber harvest" and road building (which increase "edge" in the Forest), as well as remove and revegetate and/or allow for the reforestation of various roads and openings. The values and benefits of this option/alternative must be fully evaluated.

"Finally, edge effects may also enhance the invasion of the forest by species not normally occurring, or naturally occurring only at low densities in forest edges. Microclimate changes which are typical for edges often give extra competitive advantages to these invasive species over the naturally occurring forest plant species. Yates et al. (2004) found significantly higher abundances of the exotics *Rosa multiflora* and *Lonicera japonica* in forest edges." Honnay, O. *et al*. 2005 *op cit*. Also see With, K. A. 2002. The landscape ecology of invasive spread. Conservation Biology 16(5): 1192-1203.

In addition to Multiflora Rose, Garlic Mustard, Tree-of-Heaven, and Japanese Honeysuckle, I see more and more Japanese Stiltgrass on the Forest. Yet the impacts to these invasives from management actions and the effects from this species are not adequately or reasonably addressed (in fact scarcely mentioned) in the DCER.

"Spread of the annual, Japanese stilt grass (*Microstegium vimineum*), into natural areas after disturbance may result in monospecific understory stands that impede tree regeneration.

During the growing season, forest floors dominated by this flammable grass are increasingly prone to fire, while during the dormant season, bare ground is increasingly subject to soil erosion from winter rains (Hunt and Zaremba 1992)." Rentch, J. 2006 *op cit*.

If implemented the DLMP and its allowed/forecasted "vegetation manipulation" and road construction/maintenance/reconstruction would facilitate still more Stiltgrass and other invasives on the Forest. The agency's decision-making rationale is not supported by reason or disclosure.

What are the impacts of invasive plant species upon rare species (*e.g*., federally and state listed "endangered" and "threatened", "species of concern", "Sensitive" species) that occur on the Forest? "Of the federally threatened and endangered species listed in the United States, 42% are threatened by nonnative species (TNC 1996; Pimentel 1999), and alien species were the second-ranked threat after habitat degradation (Wilcove et al. 1998)." Rentch, J. 2006 *op cit*.

Also see Wilcove, D. S., D. Rothstein, J. Dubow, A. Phillips, and E. Losos. 1998. Quantifying threats to imperiled species in the United States: assessing the relative importance of habitat destruction, alien species, pollution, overexploitation, and disease. BioScience 48: 607– 615.

Fragmentation/Roads/Connectivity/Logging/Fracturization/Edge Effects/Interior Habitat

***** In short, thus far the GWNF planners have not dealt with the issue of fragmentation fully, fairly, reasonably, sufficiently, and/or properly.

It is widely accepted that connectivity is an important aspect/goal/objective for conservation. See, *e.g*., P. Vogt et al. (2007): "an important principle of landscape planning for biodiversity is to maintain landscape permeability with corridors, linkages, and stepping stones (eg., Dale et al., 2000; Freemark et al., 2002). . . . In this paper, we present an approach to identify and map corridors as physical links between relatively large patches containing 'core' conditions (Freemark et al., 2002) on land cover maps." Vogt, P., K.H. Riitters, *et al*. 2007. Mapping landscape corridors. Ecological Indicators 7: 481-488. Their study area was approximately 350,000 acres in size.

"To overcome existing confusion, we differentiate between three types of connectivity (Fig. 5).

"1 Habitat connectivity is the connectedness between patches of suitable habitat for a given individual species. It may be defined at the patch scale (e.g. Moilanen & Hanski 2001) or at the landscape scale (e.g. Hanski & Ovaskainen 2000; Tischendorf & Fahrig 2000). The term is chosen to include the word 'habitat' to emphasize its species-specific nature.

"2 Landscape connectivity is a human perspective of the connectedness of native vegetation cover in a given landscape. It may be expressed using various buffer- or distance-based metrics that can be calculated from maps of human-defined land cover (e.g. Gustafson 1998; Moilanen & Nieminen 2002). The term is chosen to include the word 'landscape' to emphasize its anthropocentric nature — the concept of a landscape is a human construct (Table 1).

"3 Ecological connectivity is the connectedness of ecological processes across multiple scales, including trophic relationships, disturbance processes and hydroecological flows. The measurement of ecological connectivity is not straightforward and depends on which aspect of ecological connectivity is to be estimated. Despite this difficulty, ecological connectivity is an important concept that is not adequately captured by existing definitions of connectivity. The term is based on a discussion by Soulé et al. (2004)." Fischer, J. and D. B. Lindenmayer. 2007. Landscape modification and habitat fragmentation: a synthesis. Global Ecology and Biogeography16: 265–280.

The Forest Service must fully and explicitly consider, analyse, and incorporate all these types of connectivity as part of the Plan revision.

The FS planners have attempted to improperly dismiss/avoid the issue of fragmentation with semantics (see ". . . rather than temporary change within a forest as they are managed silviculturally." - DCER). Alright, if the FS stance is that the **habitat alteration/effects resulting from logging** is not "fragmentation" then call it something else, such as "**fracturization**" of mature forest habitat or "**area of edge influence**" or **"depth of edge"** or **"effective habitat area** (for edge avoiders)" or "**mature interior forest core area**". And **measure, analyse, and disclose it**. **Regardless of the label, and regardless of how purportedly "temporary" it is, it still results in an ecological footprint and impacts that must be examined and addressed. <u>This involves not just the direct loss and/or alteration of mature or old growth forest habitat/communities at the sites actually logged (i.e., "cutting units"), but also edge effects extending out from the directly altered site, even if only "temporary"</u>.**

Edge width is the result of the penetration distance of various environmental variables and gradients (*e.g*., soil temperature, air temperature, litter moisture, and photosynthetic active radiation affect vegetation patterns and alien plant species invasion). This depth/distance of edge influence (DEI) should be assessed at different quantities (spatially and temporally) on the Forest in recognition also of the fact that the depth of edge effects varies with different fauna and flora species, populations, and communities.

See Fletcher, R.J., Jr. 2006. Multiple edge effects and their implications in fragmented landscapes. Journal of Animal Ecology 74: 342–352, and Zheng, D. & J. Chen. 2000. Edge effects in fragmented landscapes: a generic model for delineating area of edge influences (D-AEI). Ecological Modelling 132: 175–190, and Sisk, T.D., Haddad, N.M., and P.R. Ehrlich. 1997. Bird assemblages in patchy woodlands: modeling the effects of edge and matrix habitats. Ecological Applications 7: 1170 –1180, and Fernández, C., Acosta, J.F., Abellá, G., López, F. and M. Díaz. 2002. Complex edge effect fields as additive processes in patches of ecological systems. Ecological Modelling 149: 273–283, and Honnay, O., K. Verheyen, and M. Hermy. 2002. Permeability of ancient forest edges for weedy plant species invasion. Forest Ecology and Management 161: 109-122, and Harper, K.A. 2005. Edge influence on forest structure and composition in fragmented landscapes. Conservation Biology 19(3): 768-782, and Sisk, T.D. and N.M. Haddad 2002 *op cit*., and Riedel, T.D. Sisk. 2004. Applied edge ecology: 85: 2917-2926. doi: 10.1890/03-8021, and Matlack, R.M. 1993. Microenvironment variation within and among forest edge sites in the eastern United States. Biological Conservation 66: 185–194. Also see the discussion and references cited in the "Fragmentation" and "Riparian Areas" sections at pp. 1-9 in the previous Krichbaum comment letter of October 24, 2008 as well as my letters of August 8, 2008 and October 30, 2008.

For example: "The configuration of edges is largely determined by human-induced disturbances including timber harvesting, agricultural expansion, and urbanization. . . . In all these landscapes [including the Chequamegon NF], the area of edge influence has the potential to be a dominant component of the landscape." (Harper, K.A. *et al*. 2005 *op cit*.)

Even if the spurious "temporary" label is used to dismiss the effects of logging, the GWNF is certainly fragmented by roads, agriculture, utility corridors, home sites, and other "permanent" development. A look at aerial photographs and/or a NF ownership map and/or a groundcover map obviously illustrate this fact, as do on-the-ground observations. The GWNF exists as patches of various sizes that are influenced by edge effects of various magnitudes and distances. It is part of a fragmented landscape. "Different fragmentation patterns can result in varying amounts of edge in the landscape. About 70-81% of these landscapes [including the

Chequamegon NF] are still described as forest, but the amount of forested area falling within 60 m of edges is 34, 24, 33, and 56%, respectively. . . . Additive effects from two or more edges may influence the core area (Table 1) in fragmented landscapes and therefore be particularly important for conservation." (Harper, K.A. *et al*. 2005 *op cit*.) **In addition to that resulting from "timber harvesting", the GWNF Plan revision analysis must also fully and fairly measure, analyse, and disclose the fragmentation/area of edge/loss of forest interior resulting from all the roads, agriculture, utility corridors, home sites, maintained openings, and other "permanent" development on the Forest**.

Reduction of "interior forest" results not just from loss at a site that is directly altered. For instance, the FS regularly finds that nesting area for the MIS Ovenbird would be reduced at a project area merely by the number of acres cut by regeneration harvesting methods (see *e.g*. GWNF NRRD 2005 Schoolhouse Road project EA-48). This is far from accurate and does not meet the standards of accuracy and scientific integrity required by the NEPA. The harmful impacts are far more extensive than just the "acres cut". The deleterious effects of the proposal extend far beyond the sites of actual cutting or road building. Harmful edge effects may extend a significant distance and result in a significant loss of interior forest even though the forest per se is not lost.

For example: "Our analyses show that interior forest loss was 1.75-5.0 times greater than the direct forest loss attributable to mountaintop mining. Mountaintop mining in the southern Appalachians has reduced forest interior area more extensively than the reduction that would be expected based on changes in overall forest area alone." Wickham, J.D., K.H. Riitters, T.G. Wade, M. Coan, and C. Homer. 2007. The effect of Appalachian mountaintop mining on interior forest. Landscape Ecology 22: 179-187.

For another example 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. The authors quantified fragmentation due to roads was 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 clearcuts 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 clearcuts. Taking these factors into account, the authors calculated that together, **clearcuts and roads affected 2.5 to 3.5 times more of the landscape than the area occupied by the actual clearcuts and roads themselves**.

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., B. Moody, J. Villa Castillo, and M.E. Fenn. 2008. Forest health conditions in North America. Environmental Pollution 155: 409-425. Also see With, K.A. 2002 *op cit*.

As touched on above, associated with the issues of fragmentation, fracturization, etc. are **edge effects**. These effects include changes in the physical environment such as alteration of the microclimate (radiation, wind, water flux, etc.). For instance, at one study site higher temperature and wind speeds and lower humidity prevailed at distances up to 60 m into interiors, and led to higher rates of treefall. "The penetration depth of edge effects can vary widely from tens of metres for variables like soil moisture (Laurance et al., 1997) to several

kilometres in the case of recruitment failure of Dipterocarpaceae in Gunung Palung National Park in western Borneo (Curran et al. , 1999)." (Fischer, J. and D. B. Lindenmayer 2007 *op cit*.) Such altered conditions often facilitate exotic invasive species (Harper, K.A. *et al*. 2005 *op cit*.).

"Some potential mechanisms for edges influencing bird distributions include changes in habitat structure, food availability and species interactions near edges (Fletcher & Koford 2003a; Ries et al. 2004), some of which could potentially be exacerbated near multiple edges." (Fletcher, R.J. 2006 *op cit*.) For example, in hardwood forests of Wisconsin's Nicolet NF and a state forest, **edge effects on Ovenbird nest success and clutch size extended 300 m** into intact forest from recent clearcuts <6 years old (Flaspohler, D.J., S.A. Temple, and R.N. Rosenfield. 2001. Effects of forest edges on Ovenbird demography in a managed forest landscape. Conservation Biology 15(1): 173-183).

It would be difficult to overstate the influence of **microclimatic conditions** as a determinant of patterns in plant and animal communities and wildlife habitat selection (see Chen, J., S.C. Saunders, T.R. Crow, R.J. Naiman, K.D. Brosofske, G.D. Mroz, B.L. Brookshire, and J.F. Franklin. 1999 Microclimate in forest ecosystem and landscape ecology: Variations in local climate can be used to monitor and compare the effects of different management regimes. BioScience 49(4): 288-297). "These high soil and surface temperatures (more than 50 °C) can limit dispersal of insects and herpetofauna across the landscape. Similarly, strong winds near abrupt edges can be the primary cause of tree mortality, through windthrow (Chen et al. 1992) and desiccation (Essen 1994). Low humidity near edges can reduce production of biomass and recruitment for many moisture-limited species (e.g., herbaceous understory plants, Frost 1997; hypogeous fungi, Clark1994). . . . Across space, microclimate responds at the stand level to canopy structure (Reifsnyder et al. 1971, Chen and Franklin 1997), varies distinctly among patch types (Geiger 1965, Hungerford and Babbitt 1987, Chen et al. 1993b), changes gradually among patches through transitional zones or ecotones (e.g., riparian zones and forest-open edges), and forms a temporally dynamic pattern across the entire landscape. . . . microclimate and its dynamics are directly related to all components of the landscape, including patches (defined in this article by vegetation), corridors (e.g., streams, roads, and power lines), and transitional zones between patches (e.g., edges between forests and openings; Forman 1995, Chen et al. 1996)." (*id*.)

"Forest management practices must consider depth of edge in determining the appropriate width of riparian buffers that would be necessary to sustain biodiversity and associated values at the land/water interface. . . . Strong near-ground microclimatic changes due to harvesting was evident in this study. The upland forest conditions in buffers, especially within 10 m of the clearcut edge, were markedly different from that of the undisturbed sites, with higher PAR transmittance and air temperature and lower relative humidity and VPD. Several other studies have found similar patterns in microclimatic response across clearcut or pasture edges (Raynor 1971, Williams-Linera 1990, Chen et al. 1993, 1995, 1999, Matlack 1993, Young and Mitchell 1994, Jose et al. 1996, Cadenasso et al. 1997). . . .

"Hylander et al. (2005) reported a significant decrease of bryophyte richness and cover in clearcut and riparian buffers. In our study bryophyte growth and vitality followed a similar pattern to the alteration of microclimatic gradients at buffer sites, with a strong negative response across the clearcut edge and slight increases at the riparian–upland ecotone (*H. splendens*) and stream edge (*P. commune*). Changes in microclimate in buffer strips have been demonstrated by previous studies. However, to our knowledge no study has compared the direct response of acrocarpous and pleurocarpous bryophytes to microclimate in clearcut, cut edge, buffer, and stream edge. Our data show that on the buffer sites 20 m away from the clearcut edge, air temperature remain lower, relative humidity higher, and VPD lower compared to the clearcut, and this provided a better microclimatic condition for the bryophytes. In this respect the buffer has provided good protection for the bryophytes. Studies from northern Sweden also suggest that buffers as narrow as 20 m can provide protection to bryophytes and

snails; however, some red-listed species (bryophytes and snails) require wider buffers (Hylander et al. 2002, 2004, 2005).” (Stewart, K.J. and A.U. Mallik. 2006. Bryophyte responses to microclimatic edge effects across riparian buffer. Ecological Applications16(4): 1474–1486.)

Many of the management actions implemented, promoted, or allowed by the FS (*e.g.*, logging cuts, roads, firelines, utility developments) result in the fabrication of edges and edge effects on the Forest. However, “[t]he hypothesis that increasing edge habitat increases species diversity and abundance may be among the most widely accepted and broadly applied guidelines in wildlife management that has not been rigorously tested or evaluated.” (Sisk and Haddad 2002 *op cit*.)

The failure by the GWNF planners thus far to sufficiently deal with edge effects on the Forest (see DCER and DLMP) is particularly unreasonable given that numerous researchers point to the significance of such impacts.

“The configuration of edges is largely determined by human-induced disturbances including timber harvesting, agricultural expansion, and urbanization. . . . In all these landscapes [including the Chequamegon NF], the area of edge influence has the potential to be a dominant component of the landscape.” (Harper, K.A. *et al*. 2005 *op cit*.)

“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 *op cit*.

“Physical edge effects appear to be predominant, at least in forests, where increased light and wind penetration, increased treefalls, and decreased humidity have been shown to directly and indirectly affect much of the biotic community. Such effects may render fragments hundreds of hectares in size virtually all edge; Laurance and Yensen (1991) have proposed a simple, data-motivated model that estimates the amount of core area from empirical measurements of edge effects. . . . Theory portrays fragmentation as a spatial problem and focuses on dispersal among fragments, while empirical studies tend to suggest that fragmentation is more a matter of habitat degradation in which fragments undergoing changes in species composition for mainly edge-related reasons. Existing evidence suggests that spatial configuration is important mainly because of edge effects.” Harrison, S. and E. Bruna. 1999. Habitat fragmentation and large-scale conservation: what do we know for sure? Ecography 22: 225-232

“Harrison & Bruna (1999) suggested recently that most effects arising from habitat fragmentation were driven by edge effects. Thus, understanding the effects of habitat fragmentation will require understanding edge effects, which will ultimately require understanding how multiple edges influence edge responses.” Fletcher 2006 *op cit*.

“Therefore, the importance of the determination of the forest core area is a very important conservation issue. The area of a forest patch that is unaffected by edge effects not only depends on the penetration distance of the edge effect, and on the patch area but also on the shape of the patch (Laurence and Yensen, 1991).” Honnay, O. *et al*. 2002 *op cit*.

“It has been suggested that the effects of habitat fragmentation through edge effects may be more important than area and isolation effects per se (Turner et al., 1996; Harrison & Bruna, 1999). Edge effects may affect forest plant dynamics such as regeneration and interspecies competition and, as described above, also plant–animal interactions (predation, seed dispersal and pollination) (Murcia, 1995). The changed microclimate at the forest edge, characterized by increased light penetration, increased air and soil temperature, decreased air humidity and an increased level of agro-nutrients in the soil, directly affects population dynamics of the occurring plant species. . . .

“In temperate forests, most authors report a transient zone between the landscape matrix and the unaffected core area of the forest of between 20 and 50 m, depending on the aspect of the edge (in the northern hemisphere, edge effects are much more pronounced along

south- than along north-facing edges) (e.g. Palik & Murphy, 1990; Matlack, 1993; Williams-Linera et al., 1998; Honnay et al., 2002b; and many others). . . .

"The remaining unaffected core area can be calculated given the shape of the forest fragment, the area, and the average penetration distances of the edge effects (Laurance & Yensen, 1991)." Honnay, O. *et al*. 2005 *op cit*. The forest fragment(s) of concern in our case are the numerous contiguous areas/patches that make up the GWNF.

In the analysis of edge effects, the Forest Service should use a range of various spacial scales (*e.g*., 10-, 30-, 60-, 100-, 200-, 300-, 500-, 800-meters) in order to assess the quality and quantity of edge effects on the Forest; this will reflect/represent varying edge penetration distances and the differing sensitivity of different taxa. See Didham, R.K. 2007. The effect of fragment shape and species sensitivity to habitat edges on animal population size. Conservation Biology 2194): 926-936, and the above cited Fletcher 2006, Zheng & Chen 2000, Sisk, Haddad, & Ehrlich 1997, Fernández, Acosta, Abellá, López, & Díaz 2002, Honnay *et al*. 2002 & 2005, Sisk and Haddad 2002, Harper *et al*. 2005, Fischer and Lindenmayer 2007, and Matlack 1993 references, as well as the citations regarding Bears, Ovenbirds, Wood Turtles, salamanders and other herpetofauna, mosses, herbaceous plants, macroinvertebrates, and other biota and ecological conditions in this and my previous letters.

"Our multi-scale analysis accounts for variability in the penetrating distance of the different edge effects reported in the literature." (Wickham, J.D. *et al*. 2007 *op cit*.) For example, orientation or aspect influence microclimatic variables within forest edge (Matlack, R.M. 1993 *op cit*.). Also see Schlaepfer and Gavin (2001) who contend that abiotic and biotic conditions are unlikely to be consistent among forest edges because variation as a function of distance and magnitude likely is affected by landscape variables (Schlaepfer, M. A. and T.A. Gavin. 2001. Edge effects on lizards and frogs in tropical forest fragments. Conservation Biology 15: 1079–1090).

In addition, "boundaries defined by microclimatic criteria are not always the same as edges defined by structural criteria (Chen et al. 1996). . . . The depth-of-edge influence, or edge width, associated with microclimatic zones across abrupt edges in a landscape can result in broad areas-of-edge influence, which can constitute a significant portion of a fragmented landscape. The depth-of-edge influence, although it varies over time and with edge characteristics, can extend four to six tree heights into the forest from a recent clearcut forest edge, equivalent to approximately 60 m in eastern red pine (*Pinus resinosa*) and white pine (*Pinus strobus*) forests (Raynor 1971) and over 400 m in Pacific Northwest Douglas-fir forests (Figure 6; Chen et al. 1995). Edge width for some variables, such as air movement, can extend up to 15 tree heights into the clearcut (Rosenberg et al. 1983). When these numbers are translated to an area-of-edge influence, it becomes clear that the percentage of area-of-edge influence in a typical checkerboard clearcut landscape of the Pacific Northwest, for example, is much higher than the percentage in either forested or harvested areas alone (Chen et al. 1996).

". . . interior conditions delineated by microclimate often differ in extent from interior zones delineated by vegetative cover (e.g., Chen et al. 1996). However, at the local (i.e., stand) scale, the impact of a management unit - for example, a clearcut - on microclimatic conditions will be similar at different locations. However, characteristics of adjacent stands will influence climatic conditions at the landscape scale. Roads and other landscape features can also influence microclimate at broad scales (i.e., at more than 100 m resolution), depending on the vegetation and topography of the patch types that they border (Saunders et al. 1998)." (Chen, J. *et al.* 1999 *op cit*.)

"Linkages between the D-AEI [delineating area of edge influences] model and other landscape models (e.g. Li et al. (1993), Gustafson and Crow (1996), Mladenoff et al. (1996)) can readily be made to further explore and enhance our current efforts to understand pattern–process relationships and future management of the landscape. For example, a timber harvest

allocation model (HARVEST) was developed to predict the potential effects of different arrangements of harvesting units in the landscape on forest interior environment (Gustafson and Crow, 1994, 1996). Using a constant IA value the authors demonstrated that the core area (i.e. interior forest) differed significantly when different allocation scenarios were applied. Linking D-AEI to HARVEST would not only allow us to produce asymmetric core areas, but also address the importance of multiple edge effects during fragmentation." (Zheng, D. & J. Chen 2000 *op cit*.)

Regarding Central Appalachian salamanders: "Because of high moisture levels, salamander populations may be less sensitive to habitat alteration in mesic forests relative to more xeric forest types (Petranka et al. 1993; Petranka et al. 1994; Ford et al. 2002b). Similarly, our modeling efforts suggest that edge effect magnitude is influenced most by landform attributes associated with moisture, particularly aspect. . . . because of diverse topography throughout the Appalachian Mountain region, forest edge effect magnitude may be exacerbated when located on southwesterly slopes." Moseley, K.R., W.M. Ford & J.W. Edwards. 2008. Local and landscape scale factors influencing edge effects on woodland salamanders. Environmental Monitoring and Assessment. DOI 10.1007/s10661-008-0286-6.

A study of mixed-mesophytic deciduous woodlands in Illinois found that aspect and adjacent community type play important roles in determining the extent of microclimatic edge effects (that may penetrate 40-175 meters) and vegetation response (G□e□h□l□h□a□u□s□e□n□, S.M.□,□ □M□.W□.□ □S□c□h□w□a□r□t□z□□, and□ □C□.K□.□ □A□u□g□s□p□u□r□g□e□r. 2000. V□e□g□e□t□a□t□i□o□n□ □a□n□d□ □m□i□c□r□o□c□l□i□m□a□t□i□c□ □e□d□g□e□ □e□f□f□e□c□t□s□ □i□n□ □t□w□o□ □m□i□x□e□d□-□m□e□s□o□p□h□y□t□i□c□ □f□o□r□e□s□t□ □f□r□a□g□m□e□n□t□s□. P□l□a□n□t□ □E□c□o□l□o□g□y□ □1□4□7□:□ □2□1-□3□5)□□.□

Also see Gustafson, E.J. and T.R. Crow. 1994. Modeling the effects of forest harvesting on landscape structure and the spatial distribution of cowbird brood parasitism. Landscape Ecology 9: 237–248, and Gustafson, E.J. and T.R. Crow. 1996. Simulating the effects of alternative forest management strategies on landscape structure. Journal of Environmental Management 46: 77–94.

Roads and their edge effects associated with vegetation manipulation may have significant harmful direct, indirect, and cumulative impacts upon salamanders, turtles, Black Bears, birds, herbaceous flora, and other taxa and communities.

This translates into habitat degraded or lost (a road effect zone or ecological footprint). This may have a disproportionate effect depending on where these roads and their zones occur since animal home ranges are clumped, which is linked to the clumped spatial distribution of food resources as well as habitat use by others of the same or different species.

Another factor not properly or adequately considered is that even if the logging results in patches of temporarily improved habitat (*e.g.*, a short-term flush of soft mast growth), **Black Bears may avoid using this habitat and others since it is associated with roads** (Reynolds-Hogland, M.J. and M.S. Mitchell. 2007. Effects of roads on habitat quality for bears in the southern Appalachians: a long-term study. Journal of Mammalogy 88(4): 1050–1061).

Black Bears have been found to avoid relatively low traffic volume gravel roads (many such roads are on the GWNF); the negative effects of gravel roads on habitat quality occurred over a large spatial extent. This avoidance zone varied with sex, age, and season, but "Overall, bears avoided areas within 800 m of gravel roads." (*id*.) Reynolds-Hogland, M.J. and M.S. Mitchell 2007 *op cit*. A significant and very large proportion of the GWNF is within **800 meters** of roads.

For **Ovenbirds**, a "ubiquitous distribution of roads through forested areas potentially represents a significant cumulative reduction in abundance of the species (Rich et al. 1994). **If edge effects extend 150 m from roads and other human-made openings, 40% of the**

forested area in the northern half of the GMNF may represent lower-quality habitat for Ovenbirds. Roads themselves account for more than 50% of the edge area in the region. . . . diminished productivity would limit the forest's capacity to function as a population source for forest fragments outside the GMNF that are population sinks (Pulliam 1988). As private lands become increasingly susceptible to subdivision and development, public lands such as the Green Mountain National Forest will become more important sources of contiguous forest habitat needed to sustain populations of forest-interior species (Askins 1994). Our study suggests that even narrow forest roads should be viewed as sources of habitat fragmentation that exert negative effects on the quality of habitat for forest-interior species such as the Ovenbird." Ortega, Y.K. and D.E. Capen 1999 *op cit*. (emphasis added)

"I took soil samples along transects leading away from the edges of unpaved roads in the Cherokee National Forest in the Southern Appalachian mountains of the United States. Roads significantly depressed both the abundance and the richness of the **macroinvertebrate** soil fauna. Roads also significantly reduced the depth of the leaf-litter layer. These **effects persisted up to 100 m into the forest**." (emphasis added) Haskell, D.G. 2000. Effects of forest roads on macroinvertebrate soil fauna of the Southern Appalachian Mountains. Conservation Biology 14(1): 57-63.

Roads also affect **salamanders**. See *e.g*. Marsh, D. M. 2007. Edge effects of gated and ungated roads on terrestrial salamanders. Journal of Wildlife Management 71: 389–394.

These relevant factors involving roads and the negative effects on habitat quality and quantity over a relatively large spatial extent (<u>current baseline and potential</u>) have not been fully and fairly considered and disclosed by the GWNF planners (see the DCER and DLMP), which threatens a violation of the NEPA and NFMA.

Multiple edges from a multitude of sources currently exist on the Forest; they result from roads, utility corridors, gas lines, maintained openings, developed campsites, adjacent agriculture and residential development, and other sources. The **additive and cumulative impacts of these overlapping (in time and space) sources** need to be analysed and disclosed by the Forest Service.

"□[M]□u□l□t□i□p□l□e□ □e□d□g□e□s□ □c□o□u□l□d□ □i□n□f□l□u□e□n□c□e□ □n□o□t□ □o□n□l□y□ □t□h□e□ □m□a□g□n□i□t□u□d□e□ □b□u□t□ □a□l□s□o□ □t□h□e□ □e□x□t□e□n□t□ □o□f□ □e□d□g□e□ □e□f□f□e□c□t□s□ □(□i□.□e□.□ □t□h□e□ □d□i□s□t□a□n□c□e□/□d□e□p□t□h□ □o□f□ □e□d□g□e□ □i□n□f□l□u□e□n□c□e□,□ □D□E□I□;□ □H□a□r□p□e□r□ □&□ □M□a□c□D□o□n□a□l□d□ □2□0□0□1□)□.□ □U□n□t□a□n□g□l□i□n□g□ □h□o□w□ □m□u□l□t□i□p□l□e□ □e□d□g□e□s□ □i□n□f□l□u□e□n□c□e□ □e□d□g□e□ □e□f□f□e□c□t□s□ □i□s□ □p□a□r□t□i□c□u□l□a□r□l□y□ □i□m□p□o□r□t□a□n□t□ □w□h□e□n□ □e□x□t□r□a□p□o□l□a□t□i□n□g□ □e□d□g□e□ □e□f□f□e□c□t□s□ □t□o□ □d□i□f□f□e□r□e□n□t□ □p□a□t□c□h□e□s□ □a□n□d□ □l□a□n□d□s□c□a□p□e□s□ □(□L□a□u□r□a□n□c□e□ □&□ □Y□e□n□s□e□n□ □1□9□9□1□;□ □M□a□l□c□o□l□m□ □2□0□0□1□)□,□ □a□n□d□ □i□t□ □w□i□l□l□ □b□e□ □c□r□i□t□i□c□a□l□ □f□o□r□ □d□e□t□e□r□m□i□n□i□n□g□ □i□f□ □e□d□g□e□ □e□f□f□e□c□t□s□ □o□p□e□r□a□t□e□ □a□t□ □l□a□r□g□e□ □s□p□a□t□i□a□l□ □s□c□a□l□e□s□ □(□L□a□u□r□a□n□c□e□ □2□0□0□0□)□.□ □I□n□ □f□a□c□t□,□ □a□ □r□e□c□e□n□t□ □s□y□n□t□h□e□s□i□s□ □o□n□ □e□d□g□e□ □e□f□f□e□c□t□s□ □s□u□g□g□e□s□t□e□d□ □t□h□a□t□ □m□u□l□t□i□p□l□e□ □e□d□g□e□ □e□f□f□e□c□t□s□ □w□e□r□e□ □a□ □p□r□i□m□a□r□y□ □i□s□s□u□e□ □l□i□m□i□t□i□n□g□ □e□x□t□r□a□p□o□l□a□t□i□o□n□ □o□f□ □e□d□g□e□ □r□e□s□p□o□n□s□e□s□ □a□n□d□ □i□d□e□n□t□i□f□i□e□d□ □n□o□ □e□m□p□i□r□i□c□a□l□ □d□a□t□a□ □o□n□

□h□o□w□ □m□u□l□t□i□p□l□e□ □e□d□g□e□s□ □i□n□f□l□u□e□n□c□e□ □a□n□i□m□a□l□s□ □(□R□i□e□s□ □ □e□t□ □a□l□□.□ □2□0□0□4□)□.□ . . .

"Edge effects can be intensified when multiple edges converge and these effects could have strong impacts on bird distributions in highly fragmented landscapes. I documented that multiple edges increased both the magnitude and extent of the edge effect on bobolink distributions. While my results were confined to a single bird species, multiple edge effects probably operate on any species influenced by habitat edges (Fletcher 2003)." Fletcher R. 2006 *op cit*.

Edge effects impact all levels of ecological organization and may occur over <u>large spatial scales</u>. <u>A significant proportion of the Forest can thus be affected</u>. See Laurance, W.F. 2000. Do edge effects occur over large spatial scales? Trends in Ecology and Evolution 15(3):134–135, and Ickes, K. and Williamson, G.B. 2000. Edge effects and ecological processes – are they on the same scale? Trends Ecol. Evol. 15(9): 373, and Sisk, T.D. and N.M. Haddad 2002 *op cit*., and Wickham, J.D *et al.* 2007 *op cit*.

If the Forest Service does not fully and fairly deal with these issues and concerns related to fragmentation (and/or fracturization, etc.), edge effects, core habitat, interior habitat, and buffers during the Plan revision then the agency will not be able to adequately and reasonably:

- Determine status and trends of the condition of Forest ecosystems to allow managers to make well-informed decisions and to work more effectively with other agencies and the public.
- Provide early warning of abnormal or unhealthy conditions to help develop effective mitigation measures and reduce costs of management.
- Provide data to better understand the dynamic nature and condition of Forest ecosystems and to provide reference points/benchmarks for comparisons with other altered environments.
- Provide baseline and inventory data to meet certain legal and Congressional mandates (*e.g*., sustained yield) related to protection of the natural world and public benefits.
- Provide for the protection and sustainability of diversity, communities, natural forest conditions, ecosystems, and viable populations.
- Provide a means of measuring and monitoring progress toward goals, objectives, guidelines, and desired conditions..

See Rentch, J.S. 2006 *op cit*.

Baseline amounts and distribution of mature interior forest conditions and edge effects must be calculated, mapped, and analysed so as to properly and adequately inform the public and decision-makers. Without this fundamental information it will not be possible to make well-informed and valid decisions regarding allocation of the Forest to various management areas/prescriptions, suitability determinations, and objectives, guidelines, and desired conditions.

<u>Until this fundamental baseline information and analyses regarding one of the most important issues in contemporary conservation gathered, calculated, analysed, and disclosed I formally request a strict moratorium on all road construction/reconstruction and logging projects</u>.

It is proper and reasonable for the GWNF to emphasize mature forest interior habitat given the global significance of its loss in Appalachia (Wickham, J.D. *et al*. 2007 *op cit*.) It is further proper and rational as such conditions can certainly be expected to be more rare in the landscape outside the Forest that is more fragmented and/or contains smaller contiguous patches of forest. It is there that much edge habitat and/or esh can be found. For instance, the proportion of edge tends to increase with declining patch size (Fletcher, R.J *et al*. 2007 *op cit*.). **The proposed "suitability" determinations for the Forest (see the DCER and DLMP as**

regards edge fabricating activities such as logging, roads, and mineral/wind development) need a major reexamination and thorough revision, redistribution, and reduction.

"The relationship between the proportion of edge-preferring species and fragment size is, logically, a negative one: the smaller the fragment, the more significant are the edge species in the fauna. Their species richness or their density (Bender *et al*., 1998) can increase. . . . A forest patch needs to be of a minimum size to create conditions characteristic for forest interior, and this is not possible below a certain size. This minimum required size can vary depending on geographic location, habitat structure or the age of the fragment. Actual figures for ground beetles can be 0.5 ha (Mader, 1984) to tens of hectares (Niemelä, 2001). In our study the smallest fragment was 41 ha (Magura *et al*., 2001a), sufficient for forest interior habitat to exist." (Lövei, G.L, T. Magura, B. Tóthmérész, and V. Ködöböcz. 2006. The influence of matrix and edges on species richness patterns of ground beetles (Coleoptera: Carabidae) in habitat islands. Global Ecology and Biogeography 15: 283–289.)

Riparian Areas/Core Habitat/Buffer Zones

At the table devoted to "vegetation manipulation" at the November 12, 2008 Verona public meeting I raised the issue/concern about expanded riparian areas and buffer zones and core habitat at sites on the Forest, and the significance of the above factors in conjunction with logging impacts, mitigation, and rationale.

These relevant issues/concerns did not seem to be taken very seriously by Mr. MacFarlane. It was as if the decades of concern and scientific research do not exist. It appeared as if the Forest Service is still of the opinion that narrow buffer zones are sufficient and seems to regard buffer zones as applying only to the maintenance of aquatic habitat.

However there is much more to consider than just mitigating for some aquatic characteristics or populations. For example, the narrow stream buffer zones proposed in the DLMP (for ephemeral and intermittent streams as well as perennial) are insufficient for the full provision of LWD loadings into the streams (see, *e.g*., "Research indicates that one-third of biomass of litter in a stream comes from distances beyond 100 ft." at DCER - 30-31).

As proposed, the **narrow "protected" zones may be mostly "edge" habitat and lack sufficient "interior core" areas** where terrestrial microclimates would be adequately ameliorated and stabilized. See Laurance, W. F. and E. Yensen. 1991. Predicting the impacts of edge effects in fragmented habitats. Biological Conservation 55: 77-92, and Harper, K.A. and S.E. MacDonald. 2001. Structure and composition of riparian boreal forest: new methods for analyzing edge influence. Ecology 82: 649–659, and Chen, J. *et al*. 1999 *op cit*.

***** "Welsch *et al* (2000) recommend **riparian forest buffer widths equal to at least two tree lengths**." (DCER – 31)

At Vermont third and fourth order streams, **a minimum buffer width required to include 90% of bird species was 75-175 m**, while Veery and Pileated Woodpecker required **150-m buffers** (Spackman, S. C., and J. W. Hughes. 1995. Assessment of Minimum Stream Corridor Width for Biological Conservation - Species Richness and Distribution Along Mid-Order Streams in Vermont, USA. Biological Conservation 71: 325-332). "In Georgia, Hodges and Krementz (1996) surveyed riparian buffers of different widths along a river and found that species richness and the abundance of 3 of 6 focal species increased with increasing corridor width. Based on their observations, the authors suggested that buffer widths of 100 m would be necessary to maintain these species. In bottomland forest, the Barred Owl required buffers >500 m wide and several species required buffers >100 m (Pileated Woodpecker, Downy

Woodpecker, and Northern Parula; Kilgo et al. 1998)." (Staicer, C. 2005. "The Role of Riparian Buffers in Forest Bird Conservation". Final Report to the Nova Forest Alliance 2004-2005, RES04-09.) Also see Hodges, M.F. and D.G. Krementz. 1996. Neotropical migratory breeding bird communities in riparian forests of different widths along the Altamaha River, Georgia. Wilson Bulletin 108:496-506; and Kilgo, J. C., R. A. Sargent, B. R. Chapman, and K. V. Miller. 1998. Effect of stand width and adjacent habitat on breeding bird communities in bottomland hardwoods. Journal of Wildlife Management 62: 72-83.

Semlitsch (1998) and Semlitsch and Bodie (2003) suggest **core zones up to 218 meters for pond breeding amphibians and up to 290 meters for amphibians in general**. Semlitsch and Bodie (2003) suggest **127–289 m terrestrial core zones for reptiles**. See Semlitsch, R. D., and J. R. Bodie. 2003. Biological criteria for buffer zones around wetlands and riparian habitats for amphibians and reptiles. Conservation Biology 17:1219–1228; and Semlitsch, R.D.1998. Critical elements for biologically based recovery plans of aquatic-breeding amphibians. Conservation Biology 12(3): 619–629.

However, these dimensions may not be sufficient for some species. For instance, "data suggest that to encompass 95% of subadults [of the California Tiger Salamander, *Ambystoma tigrinum*] an upland area on the order of 630 m wide would be required." See Trenham, P.C. and H.B. Shaffer. 2005. Amphibian upland habitat use and its consequences for population viability. Ecological Applications 15(4): 1158–1168.

Of course, conditions of topography (such as slope and aspect) are site-specific factors to be used in determining core/buffer zone dimensions. "Variables which affect how the stream interfaces with the terrestrial landscape (e.g. elevation above stream, streambank slope) may be better predictors of minimum corridor dimensions." (Spackman, S. C. and J. W. Hughes 1995 *op cit*.)

What are the Forest Service's reasons for not implementing substantially expanded protected buffer areas on the Forest? Such adoption is reasonable and feasible, in addition to being necessary for the actual protection of the Forest's diversity and communities. The DCER and DLMP fail to disclose the rational for not adopting these above-referenced buffers or other significantly expanded buffers on the Forest.

******* It is crucial to recognize and address the fact that riparian or stream 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 affects 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).

See the above references in this section and 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 (2008): 1841–1847.

Aside from the above salamander and bird examples a further species to consider regarding this issue is the **Spotted Turtle** (*Clemmys guttata*). It is known from the Pedlar RD and may exist on the North River and/or Lee RDs as well. This is a wetland species that can make lengthy forays into terrestrial habitat (50-250 meters away from water) in order to forage or nest (Ernst, C.H., J.E. Lovich and R.W. Barbour. 1994. Turtles of the United States and Canada. Smithsonian Institution Press: Washington D.C. 578 pp.)

Another species to consider is the **Northern Red-bellied Cooter** (*Pseudemys rubriventris*). Virginia is currently the southern limit of its global range. The northern part of the GWNF is within its range and suitable habitat exists (moderate gradient rivers and associated wetland and terrestrial habitat). This species' nest site is generally "10-250 m from the water's edge" (Ernst, C.H. *et al*. 1994 *id*.).

For additional relevant explication of buffer zones and conservation see Burke, V.J. and J.W. Gibbons. 1995. Terrestrial buffer zones and wetland conservation: a case study of freshwater turtles in a Carolina bay. Conservation Biology 9(4): 1365-1369. Also see Gregory, S.V., F.J. Swanson, W.A. McKee, and K.W. Cummins. 1991. An ecosystem perspective of riparian zones. BioScience 41(8): 540-551.

******* The strictly protected stream buffer zones and riparian areas and their buffers need to be significantly expanded on the GWNF** (beyond the extents in the current Plan and DLMP). The DLMP is deficient and improper in this regard. If implemented it would not properly protect and sustain the Forest's ecological conditions and would violate the NFMA and MUSYA. The above research and concerns regarding riparian areas/core habitat/buffers must be fully and fairly considered; this is not apparent in the DCER.

***** In the current Forest Plan, most of the attention given to water resources focuses on riparian areas. This is not sufficient. **Management must address entire watersheds (at multiple scales/orders), not just riparian areas**. The Forest Service is supposed to be engaged with "ecosystem management"; for planning purposes this entails the use of ecological units at scales that incorporate watersheds. The GWNF revised Plan must do much more in order to meet a major goal of the Forest Service Strategic Plan: "Improve watershed condition" (USDA Forest Service 2004).

This is necessitated not just by concerns for human drinking water quality, but also by other significant ecological concerns as well. For instance: "Our data suggest that in small stream ecosystems, a simple buffer zone of forested habitat is insufficient to maintain the stream conditions that support high salamander abundances. Instead, we found that salamander abundance was most closely related to the amount and type of disturbed habitat within the entire watershed." Willson J.D. and M.E. Dorcas. 2003. Effects of habitat disturbance on stream salamanders: implications for buffer zones and watershed management. Conservation Biology 17: 763–71.

***** In fact, **it may be that the width of the buffer zones for the smaller headwater streams on the Forest, including the intermittent and epehemeral channels (which are usually higher up and associated with steeper slopes), should actually be *wider* than the mitigation zones for the lower larger channels**. This must be fully considered by the GWNF planners. This approach is consistent with the "ecosystem management" that the Forest Service is supposed to be employing. If this approach is not adopted, what is the clear justification for not doing so? The DCER and DLMP fail to disclose the rational for not adopting significantly expanded buffers on the Forest in response to the above concern/issue. It appears that the agency has an unscientific bias towards "fisheries" (particularly Trout fisheries); this is not consistent with "ecosystem management". However, other riparian and aquatic biota and conditions (*e.g*., ephemeral or subsurface flow) are significant and just as important for "watershed condition". For example, some invertebrates exist in intermittent streams, but not perennial ones.

As the FS states, "the importance of allochthonous matter increases as stream size decreases." (GWNF Monitoring & Inventory Report 2004-2007). "Research indicates that one-third of biomass of litter in a stream comes from distances beyond 100 ft." (DCER - 30-31) This is a significant amount, especially considering that the great majority of streams surveyed on the GWNF are impoverished of debris: "Approximately 81% of the streams surveyed [942 miles] did not meet the desired future conditions of 78 to 186 pieces of large woody debris per kilometer." (GWNF Monitoring & Inventory Report 2004-2007 at pg. 5). And an important consideration is that "one-third" is an average, but these quantities vary with the size, gradient, and topography of the stream.

The arguments, rationale, and findings of Welsh *et al*. (1998) are relevant to the GWNF:

"The CDF system fails to recognize that a stream ecosystem and its vital processes are a functional continuum (Fig. 2). The CDF system establishes differential protection measures along the stream continuum based upon two factors, permanence of surface water and the presence of fish and other aquatic life. In reality, the presence of surface water has become the functional equivalent for the presence of aquatic life. Because headwater areas may have ephemeral surface flow, though perennial subsurface flow, and are not fish-bearing, these regions receive the least protection in terms of canopy retention, buffer zone width, and LWD retention. Perennial fish-bearing streams or rivers, under the CDF system, have the highest standards for canopy and LWD retention and buffer zone width. The lack of recognition of the importance of headwater and other small streams for temperature amelioration, LWD recruitment, etc., renders the CDF system ineffective for maintenance of ecosystem processes. There is no basis in science for their different buffer width designations. Rather it reflects a bias in human valuation for game fishes over other riparian and aquatic biota, and an ignorance of the stream continuum and the requirements of a healthy functioning stream ecosystem upon which these fish depend. If the appropriate science were considered, the formulation for buffer widths would in fact be reversed. That is, wider buffers would be provided on headwaters (CDF Class II & III or 1st - 3rd order streams [Strahler 1957]), because they (1): tend to be transport reaches that provide important structural components such as LWD, (2): contribute a mixture of sorted coarse sediments of varying sizes downstream, and (3): are generally the source of the coldest waters. These headwater channels are also potentially the greatest source of fine sediments that can congest streambed interstices. Sediment-free interstices downstream are required for successful spawning by salmonid fishes, and shelter the early life stages of both stream macroinvertebrates and several species of stream amphibians. Consequently, headwater channels need wider buffer widths than exist under current CDF rules or than are proposed in the HCP/SYP, to filter out fine sediment run-off from the generally steeper terrain in which these channels are typically embedded.

"From the perspective of some of the stream biota, the headwaters are important areas where selected organisms thrive in the absence of fish predators. Some of these species

appear to require areas with little or no predation in order to maintain viable populations on the landscape (e.g., see torrent salamander section below). Among such life forms are several amphibians species which require both aquatic and terrestrial environments in which to carry out their complex biphasic (aquatic & terrestrial) life histories. Their requirement for equitable terrestrial environments means they need cool, moist, stable microclimates in riparian forests alongside streams, where the adult life stages hide, forage, and seek mates. As currently proposed, the 10 foot (interim) to 30 foot 'no harvest' zone alongside Class II streams (Vol. IV, Part D, p. 30-41), may be mostly 'edge' habitat (Laurance and Yensen 1990), and lacks sufficient 'interior core' areas where terrestrial microclimates would be adequately ameliorated and stabilized (Yahner 1988, Saunders et al. 1991, Brosofske et al. 1997). Based on recent research, no-harvest buffers of 30 - 60 meters (~ 90 - 180 feet) would be required to maintain suitable streamside and aquatic conditions for several cold-temperate adapted amphibian species (Brosofske et al. 1997, Ledwith 1996, Welsh and Hodgson, unpubl data).

"By ignoring these ecological processes and functions, the CDF system establishes and maintains a negative feedback situation whereby downstream habitats can be progressively and continuously degraded due to unprotected headwaters (Class III channels) upstream. The Mattole River Basin, and many other severely degraded watersheds on the North Coast, attest to this process of serial magnification of negative cumulative impacts due to poor timber harvest practices (Mattole Sensitive Watershed Group 1996, MRC 1989). The result is a cascading disaster for aquatic and riparian resources where even portions of the stream that may initially support fish (Class I stream reaches) shrink and retreat with each harvest re-entry in a watershed, as streams are changed from Class I to II and II to III, until there are fewer and shorter portions of a stream system that can support cold-water adapted fish or amphibians. . . .

"The majority of LWD in a healthy system comes into the system in the headwaters and upper tributaries of the stream network, with less contributed along the larger, lower stream reaches (Maser et al. 1988)." Welsh, Jr., H.M., A.J. Lind, L.M. Ollivier, G.R. Hodgson and N.E. Karraker. 1998. Comments on the PALCO HCP/SYP and EIS/EIR with regard to the maintenance of riparian, aquatic, and late seral ecosystems and their associated amphibian and reptile species. Unpublished report dated November 16, 1998 from the Herpetology Research Group of the USDA Forest Service, Pacific Southwest Research Station, Redwood Sciences Laboratory, Arcata, California (available on the world-wide-web).

Larger downstream channels receive some degree of **debris inputs** from the smaller upstream channels. So it is important to provide for full upstream inputs by expansive no-harvest buffers.

It is additionally important because at sites with small channels LWD recruitment is largely dependant on the sources present at the sites, not from upstream. See, *e.g.*, Wallace, J.B., J.W. Grumbaugh, and M.R. Whiles. 1996. "Influences of coarse woody debris on stream habitats and invertebrate biodiversity" and Dolloff, C.A. 1996. "Large woody debris, fish habitat, and historical land use", both in USDA FS SRS Gen. Tech. Report SE-94. These papers disclose that LWD generally stay where it falls or move very little downstream in mountain sites. Shallow, narrow channels with low stream unit power enhance the retention of woody debris in the form of debris dams on site (Wallace *id*. at pg.120). This is especially true at the upper elevation headwaters: "Wallace (1982) and others showed the frequency of debris dams decreased with increasing stream size along a first- through third-order stream gradient in Western North Carolina." (Wallace *id*.) So the fact that LWD is not being directly removed from the small streams or that debris sources are not being logged elsewhere along the stream does not necessarily protect the conditions or potential loadings where logging actually takes place. Removing potential sources of LWD recruitment at the logging site will impact and impoverish the section of stream where the stream occurs.

See McMinn, J.W., and D.A. Crossley, Jr., editors. 1996. Biodiversity and Coarse Woody Debris in Southern Forests. General Technical Report SE-94. USDA FS Southeast Research Station, Asheville, NC.

The agency apparently takes a position that wide buffers are not significant in providing LWD loadings in streams.

"Furthermore, the wider buffer strips required under the Conservation Plan are not likely to substantially increase the pools and LWD metrics that are of concern – at least not along perennial streams. Assume a 110' to 120' tree falls precisely perpendicular to the stream at the very edge of the buffer strip. Under the current Streamside Management Zone (SMZ) standard (66 feet), the top 40-50% would fall in or across the stream. Under the Conservation Plan SMZ (100 feet) the portion of that top becomes reduced as one moves from 66' to the outer limit until 10-15% of that tree falls in or across the stream. Thus a smaller and smaller portion and size of a tree top is potentially added to LWD as the SMZ becomes wider. The additional width on perennial streams does not result in a substantially large increase in LWD." (DCER - 33).

However, the above finding/perspective is deficient and inaccurate and does not accord with on-the-ground reality in the GWNF. In this light, the FS must reexamine and adjust its rationale and management practices.

Firstly, the FS admits elsewhere that at least **one-third** of biomass of litter in a stream comes from distances beyond 100 feet (GWNF Monitoring & Inventory Report 2004-2007 at pg. 19). This is a not insignificant amount, especially considering that the great majority of streams surveyed on the GWNF are depauperate of debris : "Approximately 81% of the streams surveyed [92 miles] did not meet the desired future conditions of 78 to 186 pieces of large woody debris per kilometer." (GWNF Monitoring & Inventory Report 2004-2007 at pg. 5; see also pp. 17-18).

Beyond this, the agency's rational at DCER - 33 fails to consider/disclose that **large trees oftentimes do not fall by themselves. They often hit other trees. And these other trees in turn fall over and provide LWD to terrestrial and aquatic systems**. A 110' to 120' tree that falls perpendicular to a stream at the edge of or beyond a 100' buffer strip may strike and knock down a tree or trees that are much closer to the stream. And it is these trees that may add substantial LWD into the stream. It is in recognition of this that is partly the reason Welsch *et al*. (2000) recommend riparian forest stream buffer widths equal to at least two tree lengths.

Managing for old growth around streams is an important factor for stream and forest health, especially as regards LWD loadings and pool habitat. Woody debris contributes to habitat complexity, pool formation, fish populations, and invertebrate biomass (Dolloff, C.A. 1996 and Wallace *et al*. 1996 *op cit*.). "When woody debris is removed from a headwater system, a decrease in macroinvertebrate abundance and biomass has been noted (Wallace et al 1999)." (Ogren, S.A. and D.K. King. 2008. The effect of large woody debris on macroinvertebrate communities and epilithon detritus composition in a channelized headwater stream. Journal of Freshwater Ecology 23(1): 65-77)

Various studies have revealed that stream LWD loadings correlate with age of the surrounding forest. For example, Keeton *et al*. (2007) studied "northern hardwood-conifer forests in the Adirondack Mountains of New York . . . In-stream LWD volumes were significantly (alpha = 0.05) greater at old-growth sites (200 m3/ha) compared to mature sites (34 m3/ha) and were strongly related to the basal area of adjacent forests. In-stream large-log densities correlated strongly with debris-dam densities. AIC models that included large-log density, debris-dam density, boulder density, and bankfull width had the most support for predicting pool density. There were higher proportions of LWD-formed pools relative to boulder-formed pools at old-growth sites as compared to mature sites. Old-growth riparian forests provide in-stream

habitat features that have not been widely recognized in eastern North America, representing a potential benefit from late-successional riparian forest management and conservation." Keeton, W.S., Kraft, C.E., and D.R. Warren. 2007. Mature and old-growth riparian forests: structure, dynamics, and effects on Adirondack stream habitats. Ecological Applications 17(3): 852-68.

Amounts of LWD and pool habitat in streams are important for many species, such as the Wood Turtle. See, *e.g.*, Dolloff, C.A. 1996 and Wallace *et al*. 1996 *op cit*.

Wood Turtle Conservation

Probably the most northern ranging of all North American turtle species, the Wood Turtle (*Glyptemys insculpta*) is sporadically distributed in southeastern Canada and northern states of the USA (see maps in Ernst, Barbour, and Lovich 1994). Now Virginia's Rockingham County and West Virginia's Pendleton County are the southernmost extent of its global range. On the GWNF the Turtle occurs on the Lee and North River Ranger Districts.

In Virginia Akre and Ernst (1996) identified "two main annual periods, hibernation (December-February) and the activity season (March-November), with the latter broken into five distinct periods of activity: 1) emergence (March), 2) prenesting (April – May), 3) nesting (June), 4) postnesting (July – September), and 5) prehibernation (October – November)." They have been observed in different types of forested habitat over the course of the year, perhaps in response to differing availabilities of food, nesting sites, and thermoregulatory opportunities (Akre, T. and C. Ernst 2006, Strang, C.A. 1983, Kaufmann, J.H. 1992, and Compton, B.W. *et al*. 2002).

In eastern North America many freshwater turtle species are experiencing declining populations (see Remsberg *et al*. 2006). The Wood Turtle is considered to be rare, declining, and/or vulnerable in just about every state and province throughout its range. The IUCN Red List classifies the Wood Turtle as a vulnerable species (Hilton-Taylor 2000; www.iucnredlist.org). The Convention on International Trade in Endangered Species of Wild Fauna and Flora regulates import and export of Wood Turtles internationally (the species was listed on Appendix II in June 1992) (see Buhlmann 1993). In addition, the Tortoise and Freshwater Turtle Specialist Group of the IUCN in 2007 listed the Turtle as one of North America's ten most threatened chelonians (see "Turtles in Trouble: North America's Most Endangered Tortoises and Freshwater Turtles – 2007" at http://www.iucn-tftsg.org/trouble/).

In Virginia it is officially listed as "Threatened" under the state's Endangered Species legislation and is considered to be "declining". Both Virginia and West Virginia consider the Turtle to be an S2 species, meaning "very rare and imperiled". And both state wildlife agencies consider it a "Priority Group 1" species in their states' wildlife conservation strategies, meaning it is a "species of greatest conservation need" (see VDGIF 2005 and WVDNR 2005). On the GWNF the Wood Turtle was formerly a "Sensitive Species" (see 1993 LRMP); now it is designated "Locally Rare".

Their populations are threatened by habitat destruction, degradation and fragmentation, as well as road kill, collection for pets, water pollution, climate change, and predation of eggs, young, and adults by high populations of human-subsidized predators such as Raccoons, Opossums, Turkeys, and Skunks.

Many of these factors are interrelated and synergistic in their impact. Diffuse and chronic impacts, rather than acute impacts, may now present the greatest threats to Turtle populations. The life history traits of long-lived organisms such as Wood Turtles severely constrain the ability of populations to respond to chronic disturbances (Congdon, J. *et al*. 1994). The cumulative impacts of these numerous and increasing assaults discussed below are cause for great alarm and may certainly surpass the capability of many Wood Turtle populations to sustain

themselves.

Neither the Draft CER nor the Draft Plan adequately address this “Threatened”, “imperiled”, and “declining” species. **The Revised plan needs to contain Objectives, Guidelines, Desired Conditions, and Standards for the restoration and strict protection of the Turtle’s habitat and populations on the Forest. Meaningful spatial and temporal restrictions on activities in the their habitat need to be implemented.**

Strict precautionary protection measures are particularly needed given the dearth of data pertaining to past and current demographics, mortality, and recruitment and the absence of population viability analyses. With a lack of strong scientific data on the status and trends of their populations on the Forest, it is particularly unreasonable and illegal to continue to inflict management actions upon them that bear the potential for take and/or significant harm.

Wood Turtle populations that are currently in lands allocated to Management Areas 15 and 17 (perhaps others) would significantly benefit from a change to Special Biological Area (“SBA”), Research Natural Area (“RNA”), or Wilderness Area designations.

However, judging from the listings on the Tables in the DCER the FS has not proposed to designate any Wood Turtle SBAs. This is a major failing. **Sites that should be designated as SBAs or RNAs include Paddy/Cove Runs (VA/WV), Riles Run (VA), Harness Run (WV), Sine Run (WV), Hawk Run (WV), Cedar Creek (VA), Waites Run (WV), Sours Run (VA), and Shoemaker River (VA). These are all “special areas” on the Forest that need special attention from the Forest Service.**

Allocation of special protective area status to various Wood Turtle locations is supported and recommended by the Virginia Division of Natural Heritage and the Virginia Department of Game and Inland Fisheries.

Habitat

After America’s three Tortoise and two Box Turtle species, Wood Turtles are the most terrestrial of our nation’s 56 turtle species (see Ernst, Barbour, and Lovich 1994). Certainly Wood Turtles are North America’s most amphibious turtle species, requiring a mosaic of wetland and upland habitats in which to survive and carry out their complex biphasic (aquatic & terrestrial) life history. As a mosaic species that, depending upon seasonal, diel, and weather-related factors, uses a variety of both aquatic and terrestrial habitats, the Turtles regularly move across ecological edges; they do not adhere to nor are they dependant upon them. The Turtles utilize the natural diversity of habitats for foraging, nesting, basking, cover, hibernation, and other needs.

Wood Turtles cannot fly or run away from harm. As small creatures of limited motility they are very vulnerable to on-site impacts. To ensure the Turtles’ viability and distribution, the full protection of all site-specific sub-populations or colonies is necessary. The importance of this is especially significant given the strong site-fidelity (philopatry) that the Turtles express. For example, as was observed in Michigan, “The high incidence of site fidelity in this population, compared to data from other populations of freshwater turtles, makes the preservation of these specific sites important as the turtles are not likely to move to other areas of the river, regardless of the potential the habitat has for supporting turtles.” (Willoughby, J. 2008)

Preservation today is conservation for the future. Full protection of the extant individual populations is important as these potentially may serve as the source populations for future restoration in rehabilitated landscapes.

That Turtles may still occur at and be observed “using” sites that have been anthropogenicly altered in the past does not necessarily mean that that form of human disturbance(s) is good for them in the balance or in the long term. Wood Turtles are known to be

highly philopatric and have small home ranges, so once their habitat is altered it is not surprising that survivors will continue to occupy the site in their attempt to eke out a living. But what were the numbers of Turtles before the sites were disturbed/altered as compared to now? Such basic baseline information is lacking.

It may be that some Turtles presently exist at an altered site in spite of the previous disturbance, not because of it. Some people "tolerate" eating out of dumpsters and sleeping under bridges; that does not mean that such "habitat" is high quality or that it does not negatively affect their reproductive success. A person may be observed "using" the habitat at Death Valley (*e.g*., hiking across it); however that does not mean the habitat is optimal for sustaining viable populations or the even of high enough quality for the survival of individuals. In other words, "the mere occurrence in a habitat, especially in mobile organisms, does not indicate ecological links to that habitat." (Lövei, G.L., *et al*. 2006) We need to develop our understanding of the Turtles, not develop their habitat.

Population viability

Part of the reason for the Turtles' current distribution and threatened and declining situation are actions that occurred in the past. In other words, there is an "**extinction debt**" from past harms, degradations, and diminishments to populations and habitat (see Tilman, D. *et al*. 1994). Perceptions of the distribution and health of populations can be particularly misleading and deceptive for long-lived species, "reflecting the historical landscape configuration rather than the present one." (Honnay, O. *et al*. 2005) Thus "present-day surveys may provide an overly optimistic assessment of the degree to which local forest patches can support biodiversity. On the other hand, the fact that it takes so long for the extinction debt to be paid off indicates that even a century after forest clearance reached a maximum, there is still an opportunity to prevent further local extinctions by increasing forest cover or the spatial structure of forests." (Vellend, M. *et al*. 2006)

For example, the intensive and extensive logging that took place in recent historical times in the East, as well as that which is ongoing, removed a great deal of the material (*viz*., large old trees) that would have become LWD (see Dolloff, C.A. 1996). Consequently there has been a long-term impoverishment of this material, in both aquatic and terrestrial habitats. For instance, 50% of the 392 miles of streams surveyed in the George Washington National Forest from 1995 to 2005 did not meet desired levels of large woody debris deemed necessary for healthy stream systems (see GWNF 2007 Draft Comprehensive Evaluation Report at pg. 26). In many places the aging and recovering eastern forests are only now reaching the state where significant LWD loadings are occurring.

I believe this loss of LWD loadings (in conjunction with of course the multitude of other debilitating effects of habitat alteration, such as the concomitant increase in meso-predators) had a massive and long-term impact on Wood Turtle populations. This may be part of the reason that places that presently appear to be suitable Turtle habitat are apparently not occupied; "patch occupancy reflects the historical distribution of habitat fragments rather than the actual distribution." (Honnay, O. *et al*. 2005) And the ongoing removal, repression, or diminution of these debris sources continues to have immediate, short-, and long-term harmful impacts upon the Turtles.

The inertial time lag of "extinction debt" may take centuries to express; or put another way, "**ghost populations**" that are theoretically inevitably doomed to extinction may take a long time to disappear. "Additionally, turtles have long generation times, and consequently may persist at high abundances despite decreases in reproductive success or increases in mortality of early life stages that could eventually cause population extirpation (Gibbs and Amato, 2000). A population persisting in spite of such long-term inviability is known as a ''ghost population'' (Compton, 1999). . . . This would not be immediately apparent in surveys of adults, due to their high survivorship." (Enneson, J.J. and J.D. Litzgus 2008)

I have found very few juvenile Wood Turtles in my searches and surveys. It may be that some GWNF Turtle populations exist as ghost populations, or will become such without vigorous preservation, protection, and restoration actions.

In general, turtles are unusual among vertebrates in that slight increases in adult mortality or removal can lead to large declines in populations. Removing even a tiny fraction of adults can cause a population to decline or can delay a population recovery (see, *e.g*., Congdon *et al*. 1994, Heppell 1998).

Wood Turtles have life history characteristics that make them especially vulnerable and sensitive to human-caused loss and mortality: slow growth, late maturity, high natural mortality of eggs and juveniles (such as from predators), long lives, and low reproductive potential. Populations cannot sustain heavy adult mortality. After reaching maturity, Turtles must then survive and reproduce for decades more just to replace themselves. It must be remembered that mere presence of individuals is not enough; it is long-term population persistence and reproductive success that are essential.

And because of their long lives, if recruitment is inadequate many years could pass before attrition would become evident in the population. Old adults might be visible for decades while, unbeknownst to observers, the population is slowly dwindling away. "Managers should not be lulled into thinking that because adults are present, the population is doing well. Wood turtles commonly live 30 years or longer. If recruitment is inadequate, many years could pass before attrition would become evident in the population. " (Beuch, R.R. *et al*. 1997) “Our results indicate, however, that even for a highly adaptable species such as painted turtles, population structure may be altered by other human-associated effects, especially dense road networks and abundant predator populations. Simply examining the abundance of turtle populations may be misleading because of a lag in their response to habitat alterations (Reese & Welsh 1998).” (Marchand and Litvaitis 2004a)

A critical question to ask is how much cumulative mortality can a population absorb and still be healthy and viable for the long term? In the absence of detailed site-specific demographic data and analysis this cannot be established. Nonetheless, actions take place on top of Wood Turtle populations, on the Forest and elsewhere, that can and do lead to direct and indirect mortality or take of Turtles.

“We can also use the matrix model approach to examine how life history characteristics (e.g., age at maturity, lifespan, fertility) correlate with the response of population growth rates to perturbations (Heppell et al., 2000; Saether and Bakke, 2000). This may be important for species with too little demographic information to construct even a simple life table.” (Gerber, L.H. and S.S. Heppell 2004)

Enneson and Litzgus (2008) studied the demography and life history of the Spotted Turtle (*Clemmys guttata*), a close relative of the Wood Turtle. Their findings are relevant to our situation: “Elasticity in population growth rate is the proportional change of the rate of population growth in response to a proportional change in a matrix element (de Kroon et al., 1986). It can be calculated analytically, giving the response of the growth rate to very small changes in elements of the matrix (de Kroon et al., 1986). Thus, stage-classified modeling has the potential to determine to what extent changes in vital rates will affect population size, growth rate, and persistence. . . .”

“A high elasticity indicates that small changes in the corresponding element of the projection matrix will cause larger changes in population growth rate. Elasticity was highest for the matrix element which included adult survivorship (P33), followed by the matrix element which included the probability of surviving and remaining in the juvenile age class (P22). Of the four simulated headstarting scenarios, only rearing all eggs to sexual maturity provided a substantial increase in population growth rate (1.151) compared to the observed rate (1.024,

Table 1). Smaller decreases in annual adult survivorship would result in a declining population more so than decreases in survivorship of other stages (Table 2, Fig. 1), or decreases in fecundity (Table 2). . . . The results of our model indicate that population persistence in spotted turtles requires relatively high juvenile survivorship.

"Similarly, results of perturbations to parameters indicate that small changes in adult survivorship result in large changes to population growth rate (Fig. 1, Table 2), unless adult survivorship is already low, and that very small decreases in survivorship could potentially lead to a declining population. The finding of highest elasticity in the adult life stage is nearly ubiquitous in demographic analyses of turtle populations (e.g., Doak et al., 1994; Chaloupka, 2002; Blamires et al., 2005), with the exception of loggerhead sea turtles and desert tortoises, for which juveniles or subadults have the highest elasticity (Crouse et al., 1987; Heppell, 1996, 1998). Similarly, simulations in turtle species with similar life histories to that of the spotted turtle have shown that small increases in adult mortality may cause serious declines in population sizes, or that small decreases in adult mortality can result in reversal of declines (Crouse et al., 1987; Congdon et al., 1993, 1994). This was consistent with our finding that only a 3% decrease in adult survivorship could cause decline in spotted turtles (Table 2). . . ."

"Given similarities in life history, it is likely that our results for spotted turtles can be applied to many other freshwater turtle species, including the numerous species that are considered at risk and in need of recovery action."

Other scientists recently examined the elasticities of North American freshwater and terrestrial turtle species (see Reed and Gibbons 2003). As the research of Drs. Reed and Gibbons shows, of all North American turtle species, Wood Turtles specifically are among the most sensitive in this regard. In other words, population persistence for this species is extremely sensitive to the loss of individuals of either adults or juveniles. The implications of this relevant factor are striking.

It means that if enough adults aren't protected from takings, then populations inevitably collapse. How many can be lost? The loss of a very small number above natural attrition can be devastating, to the point that it is simply not feasible for reproduction to make up for the loss. The Turtles may not reproduce enough or survive long enough to make up for the losses from collection, predation, and being killed on roads or by logging operations.

The precariousness and vulnerability of Wood Turtles are borne out by Dr. Richard Seigel's research on "feasible demography": "The phrase 'feasible demography' refers to a suite of life history characteristics that must exist in a population in order for that population to remain stable through time. . . . As age of maturity goes up, reproductive life span and annual adult survivorship must also rise in order to maintain a stable population. . . . As the age of maturity increases (for example, nine years), the conditions needed to maintain a stable population change dramatically. A species that reaches sexual maturity at nine years requires a greater than 95% adult survivorship rate and a reproductive life span of a minimum of 20 years depending on annual egg production. These high rates of adult survivorship and long reproductive life spans may not exist because of the many human-induced mortality factors now operating in box turtle populations. The impact of increased mortality and general habitat degradation is the gradual decline in the size of a population and a disruption of a 'feasible demography.'" (Seigel, S.A. 2005)

The studies of W. Belzer (2002) on Box Turtles (*Terrapene carolina*) are apropos to the Wood Turtle: "How can adults sustain a population? . . . By staying in the habitat a long time (e.g. 70- 80 yrs) . . . Removing adults strikes at the heart of this population mechanism. . . A female box turtle can produce eggs as long as she lives (Miller, 2001); and probably needs those eight or more decades of egg production to leave an adult replacement in her population.

"The traditional management approach of waiting till adult population declines are obvious before exercising aggressive conservation measures for a species is a dead end

strategy for eastern box turtles and species like it; by the time adult population declines are significant, it is too late. Barry Yoeman (2002) recently highlighted the common disconnect in chelonian management: 'There's a reason wildlife managers haven't thought in those terms: Most of the animals we try to protect such as deer, rabbits, and quail, are relatively short-lived (and produce numerous viable young)'. . . . In long-lived species like *Terrapene*, the key to population stability is retaining aged adults in the habitat for their full, long lives (e.g., Congdon et al., 1993; Crouse, 1999; Musick, 1999; Miller, 2001; Yeoman, 2002)."

The problems for Box Turtles referred to by Dr. Seigel and Belzer are even more acute in Wood Turtle populations. Not only do they exhibit low annual egg production and high mortality of young, they also do not reach sexual maturity until at an even more advanced age than Box Turtles, on average 14-18 years old (see, e.g., Akre, T. 2002 and Brooks, R. *et al*. 1992).

Compton (1999) "built a simple demographic model to estimate the effect of the annual removal of a small number of adults from a hypothetical population of wood turtles. The model indicated that removal of a single adult annually from a stable population of 100 adult turtles would cause a 60% decline in over 100 years, and that removal of two animals annually would extirpate the population in less than 80 years."

Long-term studies show that turtle populations are often most sensitive to decreases in adult survivorship (Brooks, R. *et al*. 1991; Congdon, J. *et al*. 1993, 1994; Heppell, S. 1998). Moreover, chronic reductions in adult survivorship require increases in the already high juvenile survivorship in order to maintain stable populations (Congdon *et al*., 1993; 1994). However, unlike many other animal species, turtles appear to lack such a density-dependent response - meaning increased reproductive output in response to a decreased population density (Brooks *et al*. 1991, and Galbraith, D.A. *et al*. 1997). Exogenous sources (*viz*., of human-induced origin) of adult mortality may inexorably lead to the extirpation of populations.

What density of Wood Turtles is needed for ensuring reproduction and sustaining viability? The "minimum viable population density" is unknown. However, the fewer Turtles, the less the chances of having mating encounters (Belzer, W. 2000). This "negative density dependence can cause sparse populations to continue to decline even after the original cause of decline is removed." (Strayer, D. *et al*. 2004) "The published studies on native populations noted in this paper reveal that densities which many would regard as normal and adequate for long term population stability, have turned out (in hind sight) to be too low to enable rebound from losses, and the time for intervention (to try to slow the population's inevitable demise) was passed decades before." (Belzer, W. 2000)

<u>Timber management</u>

Differences in survival and abundance occur due to variation in predation risk, prey availability, and/or environmental conditions. Differences in relative abundance can occur through such mechanisms as changes in survival and fecundity, direct mortality incurred through management operations such as logging, emigration and immigration, predation, and habitat selection or avoidance. Findings for salamanders are relevant to Wood Turtles: "Reduced habitat quality can manifest in reduced body conditions in animals due to evaporative water loss, low prey abundances, or poor feeding success, which in turn reduce fecundity (Aldridge & Semlitsch 1992)." (Todd, B.D. and K.M Andrews 2008; see also Mitchell, J. and M. Klemens 2000)

One of the reasons expansive (relative to current and proposed stream buffers) protected zones are needed for the Turtles is not only to address the protection of "core habitat", but also to mitigate, diminish, or prevent "edge effects" that may also reduce habitat quality (see previous sections on "Fragmentation/Roads/Connectivity/Logging/Fracturization/Edge Effects/Interior Habitat" and "Riparian Areas/Core Habitat/Buffer Zones" in this comment letter).

The logging projects (which usually include some type of road construction and/or reconstruction) touted and implemented by the Forest Service and other agencies/entities serve to increase edge and facilitate ingress and impacts from meso-predators such as Raccoons, Skunks, and Opossums (see "subsidized predators" in J. Mitchell and M. Klemens 2000). These species are known to predate Wood Turtles (see, *e.g.*, Mitchell, J.C. 1994). The FS admits that forest cutting will facilitate increased predation in project areas by these small predators. See, *e.g.*, "increase predation" and "resulting edge" at EA-44 and "additional woodland edge" at EA-54 of the 2008 GWNF Laurel Road timber sale Environmental Assessment.

Intensive cutting operations generally reduce litter and woody debris and alter soil structure. The availability and distribution of ground cover can change, as can thermal maxima and minima. See, *e.g.*, Todd, B.D. and K.M Andrews 2008 and Chen, J. *et al*. 1999.

Intensive even-age logging operations have moisture and temperature effects. The operations result in drying and/or increasing the temperatures of the ground surface, as well as compaction of soil. This would alter the habitat of, as well as directly destroy, invertebrates living there (as well as vertebrates such as Coal Skinks and salamanders). This is a particular concern for the areas here of use to Wood Turtles. Reduction of prey populations, of creatures with perhaps limited dispersal and recovery capabilities, is not appropriate management for the Turtles.

How long does it take such populations to reestablish and recover after they are suppressed? Are their populations being chronically suppressed due to an accumulation of impacts over time?

The concern is about significant impacts of logging upon the viability and distribution of snails, slugs, millipedes, arthropods, earthworms, salamanders, fungi, and herbaceous plants, and in turn upon Wood Turtles. Food quality and quantity are important considerations (see, *e.g.*, Remsberg *et al* 2006).

Invertebrates that live in the forest floor litter or topsoil or associated with LWD, such as snails, slugs, millipedes, worms, and arthropods, are a significant component of the Forest's diversity. These organisms are also important food for Wood Turtles.

Slug densities and land snails are positively correlated with the presence of coarse woody debris (Kappes, H. 2006 and Caldwell, R. 1996). Loadings of this material on sites can be reduced for many decades after logging.

An apparent Forest Service rationalization for the logging decisions in Wood Turtle habitat is the presumption that the Turtles who survive the logging operations will use the "openings" fabricated by the intensive cutting. However, the cutting sites would not be openings, at least not for very long, but would very soon be thickets. The cutting implemented/proposed/allowed at Wood Turtle sites on the GWNF (*e.g.*, modified shelterwood) is no different from that proposed elsewhere to fabricate high stem-density thickets for the benefit of species such as Ruffed Grouse (such as at the Peterfish timber sale on the GWNF's Lee District).

The cut-over sites are soon so densely shaded that they would be of no value as nesting or basking sites for Turtles. Such cutting sites may function as "openings" for birds or even Deer. But for a creature that basically lives its life four inches off the ground such as do the Turtles these areas do not function as openings in any real sense of the word. This corresponds to the stem exclusion and understory reinitiation stages of stand development (Oliver and Larson 1996).

My experience, as well as mainstream research, indicate that for many decades logged-over sites contain extremely little in the way of a herbal understory or fungal component usable by Wood Turtles, so therefore contain little of value to the Turtles as food. And the logging's negative impact upon slugs, earthworms and macroarthropods that the Turtles are known to feed on has thus far received little consideration from the Forest Service.

In Southern Appalachian forests, macroarthropod abundance and biomass were greater in mature, closed-canopy control sites than in salvage-logged sites; the abundance of the largest class was similar was similar in mature closed-canopy controls and unlogged natural gaps (Greenberg, C.H. and T.G. Forrest 2003). This could be due to cooler, moister microclimates and greater cover and depth of leaf litter in the unlogged sites (*id*.).
□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

"It thus may be expected that slugs, especially the stenoecious forest species, are highly sensitive to climatic fluctuations originating from canopy gaps or from disturbance of the leaf litter layer." (Kappes, H. 2006)

Logging can influence the abundance and species composition of arthropods (Shure and Phillips 1991).□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□ Which arthropod taxa the Turtles feed upon or prefer is not precisely known. Perhaps they feed mainly upon moisture-dependent arthropods.

What evidence is there that logged-over areas are high quality habitat for Wood Turtles? In the short term? And in the long term? I am not aware of the evidence for this. However, the radio-tracking work conducted by Dr. Akre in Virginia indicates that the Turtles tend to avoid recently logged areas (see information in Akre, T. and C. Ernst 2006). The September 2006 FEIS for West Virginia's Monongahela National Forest states: "The commenter states that wood turtles require mature or old growth forest habitat and that recently logged areas are not good habitat for this species. We generally agree with this contention . . ." (MNF FEIS I-126) As another example, in Maine the Turtles are considered to not use regeneration sites of the forest-types they inhabit (see Bryan, R.R. 2007 at pg. 62).

Intensive logging such as often proposed for "wildlife habitat improvement" will make the ground-floor (which is where the Turtles live) conditions at cutover sites hotter, drier and more open and exposed (to sun, wind, and predation). The logging would dry out the very conditions upon which the Forest Service claims the Turtles depend (see "must remain near moist habitats" at GWNF Lee RD 2007 Prescribed Burn DM-8).

The Turtles are often associated with relatively more mesic habitat conditions similar to those preferred by terrestrial woodland salamanders. Wood Turtles have been found to be more vulnerable to evaporative water loss than are Box Turtles (*Terrapene carolina*) (Ernst, C.H. 1968). Like salamanders Wood Turtles are relatively small denizens of the forest floor. And research clearly indicates logging can significantly harm woodland salamanders (see, *e.g*., deMaynadier, P.G., and M.L. Hunter, Jr. 1995). I am not saying that the Wood Turtle, a reptile, is as dependant upon mesic conditions as skin-respiring salamanders, but I am saying that there may be parallels in their use of habitat and their response to habitat alterations.

Again, perhaps a major reason for this deals with the alterations of microclimate resulting from logging and roads (along with, of course, facilitation of predation). "Because microclimatic differences directly determine the distribution of species within patches (i.e., biological diversity) and the movement of species among patches (Forman 1995), there is strong interest in understanding the microclimates of harvested versus naturally disturbed patches, pre- versus post-management patches, and patches versus the surrounding landscape matrix." (Chen, J. *et al*. 1999) Salamander distributions have been found to be correlated with microclimatic moisture gradients and cover objects (*e.g*., woody debris) (Grover, M.C. 1998).

It may be that intensive logging degrades Wood Turtle microhabitat characteristics in a manner similar to that for woodland salamanders; such as, for example, a decrease in plant or animal food items (including salamanders themselves as far as the Turtles are concerned) due to decreases in soil moisture or leaf litter moisture. "In the southern Appalachian Mountains, clear-cutting of forests results in reduced litter dry mass (amount of leaf litter), leaf litter depth, and leaf litter moisture (Ash, 1995). Additionally, Covington (1981) found that 'forest floor

organic matter' declined 55% over the first 15 years after logging. Logging activities have been shown to cause dramatic salamander declines in a number of studies and return of salamander populations to pre-disturbance levels can take up to 70 years (e.g., Petranka et al., 1993; Ash, 1997; Crawford and Semlitsch, unpublished data). This habitat degradation and alteration most likely causes a reduction in the amount of microhabitat available and forces smaller salamanders into a choice of suboptimal microhabitat or increasing predation risk in more suitable microhabitats (Crawford and Semlitsch, 2007). Either of these choices likely results in decreased abundances and salamanders being found closer to streams (Crawford and Semlitsch, 2007; Crawford and Semlitsch, unpublished data)." (Crawford, J.A. and R.D. Semlitsch 2008) Further, forcing the Turtles to spend more time close to streams or in suboptimal habitat may increase their vulnerability to predation from animals such as Raccoons.

See also the information on long-term affects to forest herbs (Turtle food) in Duffy, D.C. and A.J. Meier. 1992. Do Appalachian herbaceous understories ever recover from clearcutting ? Conservation Biology 6:196-201; and Meier, A.J., S.P. Bratton, and D.C. Duffy. 1995. Possible ecological mechanisms for loss of vernal-herb diversity in logged eastern deciduous forests. Ecological Applications 5:935-946. Also see Petranka, R. *et al*. 1993. Effects of Timber Harvesting on Southern Appalachian Salamanders. Conservation Biology 7: 363-370.

The difference in scale of perception of habitat between Turtles and humans may be part of the problem. Perhaps this underlies what I believe to be a common failing in management (not just of Wood Turtles). By this I mean there appears to be a common belief that if a little is good then a lot must be better. I commonly see Wood Turtles in and around tree-fall canopy gaps in mature forest. So then, the reasoning goes, if small canopy gaps are good, then a 5-40-acre logging cut must be even better (*e.g*., more esh and edge habitat are provided). However, evidence and reason do not validate this management trajectory.

Merely finding Turtles in logged-over or altered sites is not evidence that the habitat is high quality. Wood Turtles have been observed traveling relatively long distances, such as 1.0-1.6 km in Virginia (Ernst, C. and J. McBreen 1991). The Turtles generally have limited home ranges, averaging from 2-200 acres (see, *e.g*., Akre, T. and C. Ernst 2006, Remsberg *et al*. 2006, Kaufmann, J. 1995, Tuttle, S. and D. Carroll 2003). And they show strong site fidelity (see, *e.g*., Krichbaum pers. obs., Tuttle and Carroll 2003, Arvisais, M. *et al*. 2002, and Kaufmann, J.H. 1995). So if their home habitat is altered (and they survive the alterations), it is likely they will move through the altered habitat in their wanderings.

The logged-over sites may not contain a significant herbaceous ground flora (of plants suitable for the Turtle) or fungal component or slug population (primary Wood Turtle foods) for years or decades, regardless of any speculated temporary flush of berries or of herbaceous plants "for two years" (GWNF Lee RD Laurel Road EA-34). In addition, the slash left on-site after logging operations may prevent or discourage the Turtle's movements into areas where berries or plants might occur. Features of the terrain have the potential to affect an animal's perception of habitat and food resources; so assessments of habitat use must incorporate the difficulty of travel over rough topography and its high energetic cost (Powell, R.A. and M.S. Mitchell 1998).

As alluded to above, a typical rationale used for GWNF timber sales is the assertion that after cutting the logged sites will have increased **soft mast** production. However, this enhancement is only short-term (3-9 years); then the cutover sites have **a long period (30-60 years) of very low soft mast production** (see Reynolds-Hogland, M.J., M.S. Mitchell, and R.A. Powell 2006). "[A]rea of intermediate aged stands, where soft mast availability is lowest, should be minimized. One way to achieve this goal is to burn or harvest intermediate aged stands. . . . our results suggest managers can maximize both soft mast and hard mast by, at least, minimizing the proportion of the landscape that provides neither soft mast nor hard mast (i.e., stand ages 10–25 years old)." (*id*.) The rationale underlying this current and proposed

continuance of a trade-off in a purported short-term "improvement" for long-term harm is not evaluated and disclosed in the DCER and DLMP. This management trajectory has direct, indirect, and cumulative negative impacts to species such as Wood Turtles.

The GWNF planners must fully and fairly evaluate the option of ceasing to cut mature and/or old-growth sites and instead recut the sites recently logged on the GWNF (*viz*., those 10-40 years old) if site-specific population data verify that early seral wildlife habitat must be fabricated. Such alternatives, objectives, desired conditions, guidelines, standards, and goals must be fully developed, analysed, and evaluated and should be part of the revised Plan.

In Krichbaum's researches on the GW National Forest involving the Turtle, one characteristic is salient: they associate with large-diameter woody debris (LWD), both on land and in the water. Implementation of logging clearly removes sources of LWD and further reduces future inputs of this material (already reduced due to past logging and burning in the area) by removing the boles that would eventually provide the longest-lasting and largest of such material. In project-level analyses the Forest Service has regularly fails to fairly consider, analyse and disclose the direct, indirect, and cumulative effects of the previous and proposed logging on these conditions. Amounts of large woody debris deposition are directly correlated with forest age (see Keeton, W.S. *et al*. 2007, Spetich, M. *et al*. 1999, and Hedman, C.W. 1996).

Prescribed burns

Most of the concerns and issues expressed above for logging apply as well to burning of Turtle habitat (*e.g*., microclimate alteration). Just as with logging, prescribed burning operations may significantly harm Wood Turtles directly, indirectly, and/or cumulatively. As does intensive logging, burning alters the microclimate of the forest floor and alters microhabitat conditions (localized structural and compositional attributes). It serves to simplify niche complexity by removing woody and leafy material from the forest floor. Cover and food used by the Turtles can be destroyed, diminished, or altered. And of course Turtles themselves may be incinerated. I have encountered Wood Turtles at sites previously burned on the GWNF who had rekeratinized shell mutilations suggestive of long term recovery from burns caused by fire (Akre and Ernst 2006 observed similar damage).

Prescribed burns in the past have occurred on the GWNF and the Forest Service intends to greatly expand burning in the future. Expansive burn projects are proposed that include burning of stream-sides, riparian areas, and moist coves. These projects often include the use of heavy machinery and the construction of fire-lines that then provide facilitated avenues for illegal vehicular ingress, invasive species, and predators. Like roads, such lines can also facilitate human ingress and future human-caused wildfire ignitions.

A chief rationale for much of the current and proposed burning is to reduce so-called "hazardous fuels". Much of what is commonly referred to as "fuels", forest ecologists know as "woody debris". This material is the dead and dieing wood and trees that characterize and are essential for healthy forests. "Fuel" also includes the forest floor litter and humus. All this material is also commonly known as "food', "shelter", or "habitat" for wildlife. It is an integral part of the compositional, structural, and functional diversity of forests. Fires consume woody debris (Van Lear, D.H. 1996).

Removal and absence of woody debris, litter, and humus has a dramatic impact on organisms that depend on them for food and shelter, as well as their predators (see McMinn, J.W., and D.A. Crossley 1996). In addition, woody debris contributes to soil fertility and increases moisture retention capacity throughout decomposition. Moisture retaining logs also serve as fire breaks as well as shelter for wildlife should a fire occur. "Also important is the fact that the decay process generally tends to mesify microsites because of incorporation of

humified products into the soil, while fire tends to xerify microsites, at least in the short run, by oxidizing humus from the forest floor and exposing the soil surface to greater insolation." (Van Lear, D.H. 1996).

Because of the past and ongoing intensive logging and other human-caused disturbance that has taken place, there is actually an impoverishment of dead wood ("large woody debris" or "fuels") on the great majority of forest sites in the GWNF and elsewhere in the East (Dolloff, C.A. 1996).

See the information found in McMinn, J.W. and D.A. Crossley (1996), Biodiversity and Coarse Woody Debris in Southern Forests. This document lists hundreds, if not thousands, of forest species (terrestrial and aquatic) that depend on woody debris for their survival. Woody debris serves as habitat for a wide variety of organisms including vascular and nonvascular plants, invertebrates, vertebrates, bacteria, protists, and fungi. This document shows that coarse woody debris ("CWD"), large woody debris ("LWD"), and snags are a vital component of healthy forests.

It is also clear from research contained in this report that amounts of these elements of forest diversity and health are naturally much higher in wild old growth forests than in many relatively depauperate areas that characterize our landscape. See also Webster, C.R. and M.A. Jenkins 2005 and Webster, C.R. *et al*. 2008.

Various mushroom species are important elements of the Turtle's diet (see, *e.g*., Strang, C.A. 1983 and Kaufmann, J.H. 1992). In addition to log size, macrofungal and myxomycete fungi richness was significantly positively correlated with amounts of CWD at old age oak and mixed mesic forest study sites in Ohio (Rubino, D.L. and B.C. McCarthy 2003).

The leaf litter and humus serve as a reservoir for water. They are important for helping to retain moisture in the soil, and for insulating roots and seeds in winter and from killing frosts. Through its decomposition the humus returns valuable minerals and compounds to the soil to in turn recompose plants and other elements of the ecosystem. The leaf litter and humus serve as food and shelter for myriads of organisms that are the base of, makeup and sustain the trophic complexity and biodiversity found at these sites.

Burning will make sites hotter, drier and more open and exposed (to sun, wind, and predators). Burns dry out the very conditions upon which the Forest Service claims the Turtles depend (see "must remain near moist habitats" at GWNF Lee RD 2007 Burns DM-8). Soil moisture is an important abiotic factor affecting the local diversity of soil fauna, such as snails (Martin, K. and M. Sommer 2004).

The incineration of this material (*viz*., woody debris, litter, humus) not only directly destroys many small creatures, but also significantly alters the site quality for a great many other species, such as Wood Turtles and salamanders. For instance, fire can have a negative impact on important components of habitat, such as leaf litter, thus degrading mesic micro-habitats □□□□□(Ford, W.M. *et al*. 1999).

Invertebrates that live in the forest floor litter, topsoil, and "fuels", such as snails, slugs, millipedes, worms, and arthropods, are a significant component of forest diversity (see, *e.g*., McMinn, J.W. and D.A. Crossley 1996). Snail assemblages and densities are positively correlated with litter composition and depth (Martin, K. and M. Sommer 2004). L□i□t□t□e□r□-□r□e□l□a□t□e□d□ □h□a□b□i□t□a□t□ □c□h□a□r□a□c□t□e□r□i□s□t□i□c□s□ □a□l□s□o□ □i□n□f□l□u□e□n□c□e□ □t□h□e□ □c□o□m□p□o□s□i□t□i□o□n□ □o□f□ □o□t□h□e□r□ □s□o□i□l□ □f□a□u□n□a□l□ □g□r□o□u□p□s□ □i□n□ □f□o□r□e□s□t□s, such as earthworms and carabid beetles (*id*.).

Past experience with burns on the National Forest indicates that a managerial criterion of success for a burn is when a substantial proportion of the duff and leaf litter are incinerated. This would not only burn up their habitat, but can also directly destroy invertebrates living there

(as well as vertebrates such as Coal Skinks and salamanders). This is a particular concern for the mesic slopes and aspects and coves. Reduction of populations, of species with perhaps limited dispersal and recovery capabilities, over wide areas (*e.g.*, 350 acres; and many prescribed burn areas are even larger than this, such as 2400 acres) is in many ways inappropriate and undesirable.

How long does it take such populations to recuperate, reinvade, reestablish, and/or recover after they are suppressed by fire? Does burning on short time periods (*e.g.*, 5 years or 15 years or 25 years) allow them enough time to recover? Are their populations being chronically suppressed due to an accumulation of impacts over time?

The concern is about significant impacts resulting from the burns to the viability and distribution not only of Wood Turtles, but also of to the viability, distribution, abundance, and composition of snails, slugs, millipedes, arthropods, earthworms, toads, tree frogs, lizards, snakes, salamanders, turtles and other species/populations/communities with limited mobility.

Of the sites overrun with <u>invasives</u> that I have encountered on the GWNF perhaps the worst are places that have been burned repeatedly (*viz*., areas along the North Fork Shenandoah River on the Lee RD). There are huge amounts of Multi-flora Rose and Garlic Mustard here.

How does increasing or maintaining invasives affect the Wood Turtles? Cumulative impacts to and from invasive plants must receive a "hard look" from the agency. What are the effects upon the compositional, structural, and functional diversity of the ecosystems at sites where the Turtles occur (is it "at least as great as that which would be expected in a natural forest" [NFMA])? The <u>cascading effects</u> upon Turtles are a significant issue that the FS must consider and evaluate.

The use of prescribed fire is a complex issue with multiple ramifications. The following findings may apply to the Wood Turtle: "Nor could the responses of individual species be readily predicted from life history attributes. Thus, our findings were generally not consistent with predictions from the habitat accommodation model of succession [there should be a predictable sequence of recovery following disturbance which can be linked to the recovery of vegetation structure]. . . . We found that most reptile species responses were much more strongly linked to vegetation type than fire variables, emphasizing a need to understand relationships with vegetation before being able to understand possible fire effects (if and where they exist). We found the disturbance concepts we examined were limited in their ability to accurately predict reptile responses to past fire history or the impacts of a single major fire in 2003. Practical management might be best guided not by disturbance theory, but by carefully setting objectives to meet conservation goals for particular individual species of reptiles." (Lindenmayer, D. *et al*. 2008)

<u>Multiple impacts</u>

These relevant factors discussed above involving roads and logging and burning and their negative effects on habitat quality and quantity over a relatively large spatial extent have not been fully and fairly considered by the planners in the DCER and DLMP, which threatens a violation of the NEPA and NFMA.

The logging and burning projects implemented on the GWNF and elsewhere in and around Wood Turtle habitat also promote increased or high White-tailed Deer populations. Deer feed upon many herbaceous plants and otherwise modify habitat conditions (Rooney, T.P. and D.M. Waller 2003). The deleterious direct and indirect effects of high populations of Deer upon Wood Turtle food and habitat may be significant.

For instance, implementation of "controlled fire" may subsequently draw Deer to the area, resulting in increased browsing pressure. This could seriously negatively impact the

purported increase in oak regeneration and plant growth that the agency is aiming for (see GWNF Lee RD 2007 control burn DM-4-5). This could also harm and degrade the "wildlife habitat" here at "wildlife management areas" (*e.g*., MAs 15 &14) and further indirectly affect Wood Turtles. The cumulative impacts from Deer associated with the DLMP have not been fully and fairly considered and disclosed by the Forest Service.

And the agency fails to consider the invasion of alien plants perhaps facilitated by the logging, burning, and road building foreseeably allowed/proposed by the DLMP. Implementation of logging projects can foreseeably result in facilitating the spread of Asian Stilt-grass, Garlic Mustard, and Tree-of-Heaven. What good are these plants to Wood Turtles? And how and to what extent do they decrease or harm the plants, fungi, and prey animals that the Turtle's utilize for food? The logging/burning/road building can foreseeably harm the Turtles ability to survive and reproduce by reducing the amount of high quality food and habitat available for use; see Remsberg, A. *et al*. 2006.

The potential for **illegal collection** is an ever-present danger. The recent bust in West Virginia of a Wood Turtle poacher underscores this threat (J.D. Kleopfer phone conversation 2008). I have noticed a severe drop in Turtle observations this year at Cove Run in West Virginia. I wonder if poaching might be a reason for this. And of course of grater concern is the effect such take may have on this and other Turtle populations. In addition, a turkey hunter who had been coming to the Hawk Run area for 25 years told me he used to see Wood Turtles "all the time", but now never does. I wonder if collection may be a reason for this; there is a trail running the length of the Run. And this fall I also observed a dozen ATV riders on this trail.

Terrestrial areas of the Forest where the Turtle occurs are subjected to **mowing operations** and other use of heavy equipment. This concern applies not only to agricultural fields or pastures, but also to maintenance of camping areas, wildlife openings, and grassy roadbeds. An egregious recent example occurred in the vicinity of Harness Run when the Turtles are terrestrially active and precisely where I have observed Turtles. Such use of machinery can maim and kill Turtles (Saumure, R.A. *et al*. 2007). Mowing and similar operations should not occur until Turtles have entered aquatic habitat for hibernation (Castellano, C.M. *et al*. 2008).

Another concern involves the use of trucks and other heavy machinery on roadbeds and utility corridors that are otherwise closed to the public. If possible these accessed routes should not be used only when Turtles have entered aquatic habitat for hibernation. I am thinking particularly of the Paddy area. The Forest Service should investigate this option with the electric company and VDGIF. Further, we need to look at ceasing trout stocking operations in the upper reaches of Paddy Run south of Vances Cove. This would eliminate the need to drive fish trucks into the area and also serve to lessen recreational use and disturbance of the stream (and reduce collection potential).

Ongoing soil and water acidification may change habitat conditions, thus leading to cascading trophic effects that harm the Turtles. Ongoing atmospheric deposition of pollutants may change habitat conditions, thus leading to cascading trophic effects that harm the Turtles.

The Wood Turtle inhabits and is dependant upon clean water (VDGIF 2005). Unfortunately, six waterways the Turtle is known to inhabit that occur on the Forest have been designated as "**impaired"** (VDEQ 2006). Unfortunately, some of these streams continue to have additional stresses heaped upon them in the form of management actions (or inaction).

I am concerned about not only the direct and indirect effects of the impaired conditions, but also the cumulative effects in conjunction with management actions (such as logging and/or burning) and other factors (such as acidic deposition). I am additionally concerned about the

sustained yield of populations and habitat under the potential cumulative impacts that could accrue were the DLMP to be implemented. The DCER and DLMP do not reflect the full and fair consideration of this issue (such as determining areas to not be "suitable" for various management activities due to factors involved with impairment).

Additionally, the North and South Forks of the Shenandoah River suffered massive fish kills in 2004 and 2005, and the American Rivers conservation group named her one of the "Most Endangered Rivers of 2006". The impact of the causes of these huge mortality events upon Wood Turtles is unknown.

The Turtles' ecology and life history characteristics place them at risk from the warming and drying associated with contemporary climate change. "Existing nature reserves will be inadequate to preserve current biodiversity because an already fragmented landscape will impede the ability of species to respond to climate/habitat shifts (Halpin 1997). Because of limited dispersal abilities, reptiles and amphibians are especially vulnerable to rapid habitat changes and may suffer many more extinctions than birds as a result of a rapid rate of climate change (Schneider and Root 1998)." (Gibbons, J.W. *et al*. 2000)

Climate change could change Turtle habitat conditions, diminishing their quality and making them warmer and drier; fires (prescribed, accidental, or natural) would exacerbate this undesirable outcome. It is not just the warming that is problematic, but also the drying out of streams and terrestrial habitat. Wood Turtles are cold adapted and also are less able to tolerate drying than Box Turtles (see Ernst, C.H. 1968). Even if the Turtles could proceed northward at a rate commensurate with the warming/alteration of their current habitat, it would be difficult to impossible to do so due to the vast disruption and alteration of their habitat resulting from human development (see Ernst, C.H. 2001b).

The Turtles are extirpated from many of the places where they used to exist at lower elevations and along larger waterways, such as in Virginia's Shenandoah Valley. It seems that here the higher elevation sites or remote areas (such as on and closeby the Forest) are all that is left. If the Turtles are forced to move into higher altitudes in response to warming climate they will rapidly run out of habitat. The upper altitudes are generally drier and may become more so with altered climatic regimes. Many of the upper elevation streams on the within the Turtle's range that I am familiar with are rockier higher gradient streams with lower flow and without deeper pools or generous LWD loadings. Their riparian areas are narrow and the associated forest is without the diversity of habitat conditions, structure and composition found at the lower sites.

Due to edaphic and geological conditions many GWNF streams, particularly at higher elevations, are relatively low fertility and acidic sites simply not conducive to supporting a complexity of aquatic habitat and populations or associated ground-floor diversity in the surrounding forest. They are not the high quality habitat that the Turtles prefer or that are even capable of sustaining healthy population numbers. Further, such higher elevation streams usually have steeper gradients. Turtles overwintering in such places run the risk of being killed, maimed, or swept away by winter and early spring floods.

The Forest Service has in the past rationalized prescribed burning and other habitat alterations of Wood Turtle habitat with the assertion that the species is "adapted to fire" or is somehow "tolerant of disturbance". In the past when populations were much greater and more distributed across the landscape and dispersal was easier then perhaps losses due to fire and local disturbances could be absorbed and recovered. However, the fragmented ("disjunct, isolated" Bowen & Gillingham 2004), reduced, and declining status of contemporary populations makes assertions of adaptation and resiliency appear superficial and misleading.

Here is what else the Turtles were/are adapted to over their evolutionary history: expansive areas of old growth forest with great niche complexity and woody debris, ecosystems

without thousands of miles of roads and millions of cars, much smaller numbers of meso-predators, ecosystems not overrun with Deer and invasive species, waterways running without pollutants and other impairments, ecosystems with numerous Beavers, Wolves, and Cougars, landscapes not overwhelmed with anthropogenic edge effects and fragmentation, landscapes with a high degree of connectivity, clean air and a lack of acidic deposition, habitats without millions or recreationists and people who like to collect or harm turtles, habitats and Turtle populations not destroyed by tens-of-millions of people and our industrial, agricultural, commercial, and residential development, *ad nauseum*.

It is clear that the Turtles present day environment is far different from that which they adapted to over the course of their evolutionary history. In the face of all this, to inflict our remnant populations of Wood Turtles, populations with questionable viability, with actions bearing the potential to bring them direct and indirect harm is not beneficial. To rationalize away concerns for these actions with the expedient that they are "adapted" to them is not just glib, it's misleading and unreasonable.

The Forest's populations of Wood Turtles are in a precarious position. This letter explains some of my reasoning about this situation.

Wood Turtles are associated with both terrestrial and aquatic habitats on the planning area that would be impacted by ground disturbing activities should the proposed draft Plan be implemented. **Of great concern are cumulative impacts associated with Plan implementation along with other stresses upon the Forest's Wood Turtles** (*e.g*., roadkill, collection by visitors to the Forest, predation, drought and climate change, and habitat destruction, degradation and fragmentation).

I have observed Wood Turtles (an adult male and sub-adult female) killed on open roads in the Forest, as have others (Akre and Ernst 2006; also see Gibbs & Steen 2005 and Gibbs & Shriver 2002). Drought and climate change may significantly alter habitat conditions, making them warmer and/or dryer; burns and intensive logging would exacerbate this undesirable outcome. Timber sales and "controlled" burns have occurred in Turtle habitat in the past and the Forest Service intends to keep logging and burning in the future (see DLMP). Recreation use is increasing on the Forest and in the project area (e.g., personal conversations with Frederick county VA and Hampshire county WV Forest visitors; see also the trails constructed in the not too distant past and Forest Service documents dealing with recreational trends and use of the Forest). I have observed evidence of illegal ATV usage in numerous project areas and occupied Turtle sites on the Forest. Biocides that may have harmful direct, indirect, and/or cascading effects on Turtles have been used in the past and may be used in the future (see DLMP and DCER; Harding, J.H. and T.J. Bloomer 1979, and Tangredi, B.P. and R.H. Evans 1997). Further, iridoviruses and upper respiratory tract diseases (Mycoplasmas) are increasingly affecting turtle populations (see Allender 2007, Johnson 2006, and Wendland *et al* 2004). Such pathogens may attack Wood Turtle populations in the future.

"Because of the longevity, delayed maturation, and high juvenile and egg mortality of [this] species, populations cannot sustain heavy adult mortality" (Herman, T.B. 1997). Field studies and statistical analyses clearly show that even modest rates (intentional or incidental) of take of adult turtles can lead to strong declines in populations (Enneson, J.J. and J.D. Litzgus 2008, Gibbs, J.P. and G.D. Amato 2000, Compton, B. 1999, Heppell, S.S. 1998, Congdon, J.D. *et al*. 1994, Congdon, J.D. *et al*. 1993, and Doroff, A.M. and L.B. Keith 1990).

It is true that much relevant information does *not* exist as regards the Turtles, such as site-specific population and demographic data, nesting/hatching success, recruitment, or the numbers that are collected or killed on roads. In the absence of thorough information on the status and trends of Turtle populations on the Forest, it behooves us to be precautionary and provide for and protect populations as stringently as we can.

However, much information *does* exist to help us understand potential effects of management activities on Turtle populations. Information exists on various aspects of their life history, on forest ecology, on the affects of anthropogenic disturbance and management practices on terrestrial and aquatic ecosystems, and on population and spatial modeling. Along with reason and logic these can be used to assess threats to Turtle viability resulting from factors such as road kill, predation, mortality from logging operations, degradation of mature forest habitat, and/or diminishment of food sources. Life history data provides a basis for constructive, defensible, alternative conservation practices to halt, reverse, neutralize, and/or mitigate unfavorable conditions for the Turtles. See, *e.g*., Heppell, S. 1998, Burger & Garber 1995, Lauck, B. 2005, and Enneson, J.J. and J.D. Litzgus 2008.

Human population and development pressures are ingravescent across the Turtle's range in northern Virginia and West Virginia. For just one example, see the increase in residential development and road construction that has taken place in the vicinity of Wardensville, WV. And Ernst and McBreen (1991) warned about increasing road kill and development pressures 18 years ago; the situation has not improved for the Turtles since then.

Populations of the Wood Turtle are threatened with extinction now or in the foreseeable future because of the present or threatened habitat destruction, degradation and/or fragmentation, as well as road kill, collection for pets, water pollution, climate change, predation of eggs, young, and adults by high populations of human-subsidized predators such as Raccoons, Opossums, and Skunks, an inadequacy of existing regulations, and other factors, such as aspects of the Turtles' life history that exacerbate their vulnerability.

Many of these factors are interrelated, additive, and synergistic in their impact. Diffuse and chronic impacts, rather than acute impacts, may now present the greatest threats to Turtle populations. The life history traits of long-lived organisms such as Wood Turtles severely constrain the ability of populations to respond to chronic disturbances (Congdon, J. *et al*. 1993). The cumulative impacts of these numerous and increasing assaults are cause for great alarm and may certainly surpass the capability of many Wood Turtle populations to sustain themselves.

From my surveys, searches, and observations of the past five years, it appears to me that most of the populations/colonies of Turtles on the Forest are already very small. Which means their persistence is already at risk (O'Grady, J.J. *et al*. 2004).

At multiple scales Wood Turtle habitat and populations are diminished, fragmented, and altered by roads, logging, residential, commercial, and agricultural development, and other factors. An effect of this loss and disruption is to make the Turtles more susceptible to environmental stochasticity, demographic stochasticity, and inbreeding depression. All of which serve to decrease the long-term viability of populations (see Soule, M.E. 1987). An insidious mutual reinforcement of these biotic and abiotic elements occurs that serves to deteriorate population dynamics and collectively drive a population downward to extinction (see Gilpin and Soule 1986, and Fagan, W.F. and E.E. Holmes 2006).

What is the current status of populations on the National Forests? How many Turtles are currently lost from road kill, collection, and predation? What is the recruitment into the populations? What density of Wood Turtles is needed for ensuring reproduction and sustaining viability? How many may be lost if a project was implemented? How and to what extent would collection or mortality by Forest recreational visitors be exacerbated by a project? What are the cumulative impacts in conjunction with other stresses upon the population? How many can be lost/killed without significantly harming the viability and sustainability of the affected population(s)?

On all this and more the Forest Service does not have the basic information, yet it charges ahead with projects that may kill still more Turtles or degrade still more Turtle

habitat, adding additional stresses to populations. A critical question to ask is how much cumulative mortality can a population absorb and still be healthy and viable for the long term? The agency does not have fundamental information on the Turtles' populations, nor has it conducted population viability analyses (see Reed, D.H. *et al*. 2003), yet somehow it *does* know that its decisions are having "no significant impact" (see the Decision Notices, Decision Memos, and Findings Of No Significant Impact for numerous projects affecting the Turtle on the GWNF). The scientific integrity of such findings is dubious to say the least.

This has got to stop.

Conservation measures

Virginia's Wildlife Action Plan states that the Forest Service needs to alter its forestry practices to protect the Turtle (see VDGIF 2005, available at http://www.bewildvirginia.org/wildlifeplan/plan). Thus far, it does not appear that the GWNF planners are doing this, nor have significant steps been taken to accomplish this (see DCER and DLMP). Based on conversations at the November 12, 2008 Verona meeting concern my concern is that the same or similar riparian buffers used in the past are/will be considered to be somehow sufficient to adequately protect Wood turtles and their habitat.

"Conservation Actions and Strategies Species-specific actions that are necessary for wood turtle conservation include better enforcement and prosecution of capture laws (wood turtle is protected from all unpermitted take by virtue of its State threatened status) (Herpetofauna TAC 2004). In addition, USFS should be engaged in revising forestry practices in areas inhabited by the wood turtle, and they (and NPS) should restrict recreational activities in these areas (Herpetofauna TAC 2004)." (VDGIF 2005)

"Coordinate with Forest Service to identify Best Management Practices to protect wood turtle sites on their land. Habitat loss due to development is a severe problem for this species and developers need to be encouraged to follow Best Management Practices when working." (WVDNR 2005)

Although a primary requirement of their life history is the presence of water, the Turtles habitually use terrestrial habitat and are certainly not confined to waterways or narrow "riparian" zones. As Conant and Collins (1991) observe: "it frequently wanders far afield through woods and meadows, across farmlands, and – often with fatal results – on roads and highways." Studies clearly show that they may normally range up to 200-600 meters (660-2000 feet) from water (see, *e.g*., Akre, T. & C. Ernst 2006, Kaufmann, J.H. 1992, Arvisais, M. *et al*. 2002, Remsberg, A.J. *et al*. 2006). It is clear that in "in the range where conifer stands or alder thickets are absent, such as in . . . northern Virginia, deciduous woods are heavily used." (Ernst, Barbour, and Lovich 1994)

Wood Turtle population locations need to be protected from logging, burning, and road construction, as well as some recreational activities. In the absence of and/or in addition to allocating and protecting these sites as "special areas" (*e.g*., SBAs or RNAs) with their own prescriptions, meaningful protections (Guidelines, Standards, etc.) need to be in place to restrict the aforementioned harmful activities from occurring within the Turtles' core habitat.

The attenuated streamside buffer zones (the terrestrial habitat 33-100 feet from the stream) normally applied by the Forest Service are simply inadequate for protecting Wood Turtle populations and their habitat.

Traditionally, the application of riparian buffers has been done in order to protect water quality and aquatic habitat and populations. However, **it is crucial to recognize and address the fact that "riparian" or stream-associated zones are not just buffers for aquatic habitat, but are themselves part of the core habitat for various taxa, including Wood Turtles. So the "riparian" or stream-associated areas themselves not only need to be**

fully protected, but also buffered as well. This is a cogent reason for making strictly protected Turtle habitat areas as wide as possible. See Crawford, J.A. and R.D. Semlitsch 2007, Semlitsch, R. D. and J. R. Bodie 2003, Semlitsch, R.D. and J.B. Jensen 2001, Wenger, S. 1999, and Burke, V.J. and J.W. Gibbons 1995.

Site-specific boundary justification information for designating special protected areas and/or protected habitat buffers in Virginia and West Virginia is provided by the studies of Dr. Thomas Akre upon the Wood Turtles on the GWNF. The evidence shows that the mean maximum the Turtles' range from streams here is 350 meters (about 1050 feet) and the maximum distance is 650 meters (about 2,145 feet). At the forested study area "Ninety-five percent of all terrestrial locations were within 300 m of the stream." (Akre and Ernst 2006).

Wood Turtles use terrestrial habitats far from wetlands for extended durations and maintain associations with wetlands of different types over the course of a year (such as seeps and intermittent streams), even when the wetlands are widely dispersed. Consequently, management schemes directed at wetlands as individual units with only narrow terrestrial buffer zones would not adequately capture the mosaic of habitats used by this species (see, *e.g*., Roe and Georges 2007).

In recognition that riparian areas and watercourses exist as a **continuum** (DCER – 30), there is a **need to protect the full range of ephemeral, intermittent, and perennial streams as well as seeps, springs, and other wetlands.**

For the above reasons, the boundaries for designating special biological areas and/or protected buffer/riparian/stream-associated habitat zones should generally (depending on topography, habitat type, and land use) encompass those areas within 350 meters of both sides of the occupied waterway (*i.e*., encompassing core habitat). In this way much of the habitat critical to all of the Turtle's life history needs is included and its integrity maintained and buffered (see, *e.g*., Semlitsch, R. D., and J. R. Bodie 2003, and Burke, V.J. and J.W. Gibbons 1995).

The above-referenced dimensions are corroborated by numerous studies on the Turtles throughout their range. B. Compton *et al* (2002) who studied Wood Turtles in Maine suggested that buffer zones 300 meters in width from large wetlands, rivers, and streams would enclose 99% of Turtle locations. For a similar recommendation in a different habitat and forest type see M. Arvisais *et al*. (2002): "The wood turtle is easily disturbed and has only a moderate tolerance to human perturbations (Harding and Bloomer 1979; Harding 1991; Garber and Burger 1995). . . . Recruitment is low in *C. insculpta* and survival of the species depends on low levels of adult mortality. Kaufmann (1992) reported annual recruitment as low as 1%, so even the smallest additional mortality could jeopardize the survival of wood turtle populations. Human disturbance induces mortality in wood turtle populations (Garber and Burger 1995). The establishment of protected buffer strips on each side of streams used by wood turtles would significantly contribute to the conservation of wood turtle populations."

Implementation of the above proscriptions is also important for attempting to address metapopulation dynamics as well as movements in response to climate change.

Wood Turtles probably exist as **metapopulations**, meaning a non-contiguous set of local populations that may interact on occasion by migration. The Wood Turtles that exist at a place such as the GWNF may not be discrete colonies, but instead are subpopulations of larger populations or of metapopulations that are not confined to the public Forest but exist on private lands as well. These subpopulations may undergo natural extirpation-recolonization dynamics, so that conservation strategies must take into account migration corridors and dispersal routes as well as core nesting, breeding, foraging, and hibernation habitat. Habitat destruction/alteration that increases habitat patch isolation and fragmentation can be detrimental to the overall Turtle population. "Protection" of known sites of occurrence is not enough. Conservation strategies for metapopulations must consider not only occupied habitat,

but also unoccupied suitable habitat and intervening habitat that may be occasionally used during infrequent migration events (see, *e.g.*, Simandle, E.T. 2006).

"We want to stress that most populations of turtles exist as 'metapopulations.' According to Levins (1970), a metapopulation refers to a collection of populations that exist within a landscape matrix and are separated by areas of different or unsuitable habitat. However, for small populations to persist, some exchange of individuals between populations must occur (Gilpin, 1987; Primack, 1993)." (Buhlmann, K.A. *et al*. 1997) It is the low dispersal rates between local populations (which develop a significant degree of demographic independence) that characterizes metapopulation organization (Smith, M.A. and D.M. Green 2005).

Full protection of the Forest's extant individual populations is important as it may be that GWNF Turtles serve or may serve as critical source populations that subsidize sink populations at more heavily developed sites off the Forest. Or is it vice versa (*i.e.*, are Wood Turtle populations on the Forest subsidized by emigration from off-Forest?) In either case consideration of metapopulation dynamics is essential. Attention must be focused on the habitat conditions and amounts and edge effects not just on the Forest but also those off the Forest, particularly those affiliated with the Forest ownership boundary.

How permeable (amenable to movement) is the intervening habitat between Turtle populations both on and off the Forest? It may be that movements between populations are already significantly impeded by landscape modifications such as roads, development, and elevated populations of predators.

It is also possible that the Turtles presently surviving on the Forest are those individuals that do not move much. In other words, the reason they have survived is because they have not made long-distance journeys and so have not exposed themselves to the dangers found in the contemporary landscape (*e.g.*, roads with vehicular traffic, human-subsidized predators). Because the modern human-dominated landscape is actually in a degraded and fragmented condition for many species, those that are more mobile may actually be harmed more since their movements expose them to sources of harm (Cushman, S.A. 2006). In this sense, dispersal can serve to imperil population viability. The effects of this factor upon metapopulation dynamics and the long-term persistence of Turtle populations both on and off the Forest are unknown.

As a species, Wood Turtles are generally cold adapted. Some Canadian Wood Turtle populations are "at the northern limit of the geographical distribution of testudines worldwide (Bonin et al. 1998)." (Tessier, N. *et al* 2005) At these northern sites rivers used for hibernacula may be completely iced-over for four months (Greaves, W.F. and J.D. Litzgus 2007). Though active at a wide range of body and ambient temperatures, they are active at lower environmental temperatures than most other emydid species (Ernst, C.H. 1986). Unlike perhaps any other reptile in the Virginias, they may be observed as regularly active when air temperatures are only in the 50° F. or even less (Krichbaum pers. obs.). "We documented mating and basking behaviors until water temperatures dropped below 5˚C." (Greaves, W.F. and J.D. Litzgus 2007).

Here in the Virginias we are at the southern extreme of the species' global range. So staying warm may certainly be less of a problem for Turtles here than elsewhere. Habitat characteristics that may be necessary or preferred in Maine may not be so here. And habitat alterations from long term climatic warming and drying may be future additional problems of concern in the Virginias.

This is not in any way to deny the importance of opportunities for the Turtles to thermoregulate. Ambient temperature variation may affect the daily period within which the Turtles can maintain sufficiently high (or low) body temperatures, which in turn could affect seasonal and annual activity cycles. See the data on preferred temperatures in Ernst, C.H. 1986.

Aside from for nesting, another reason/purpose given for the proposed land-clearing project is to provide basking areas for Turtles. However, Wood Turtles do not need large clearings for thermoregulation. They are not large animals, nor do they travel in herds. A sunlit space a foot-square is easily of sufficient size for basking. In fact, using a large open site could increase their exposure to predators or human collectors. Wood Turtles cannot run away, nor can they slip out of sight into water as do aquatic turtle species that prominently bask. Exposure on land can easily lead to injury or mortality; cover and inconspicuity are key to survival for this species.

Bowne (2008) refers to this “potential mismatch between the perception of cover by turtles and humans. A [Painted] turtle in a mowed field was able to find adequate short-term cover under a single large plant, but I would classify that habitat as open and therefore less desirable. The grain of a turtle’s perception of the landscape (Turner, 1989) is far smaller than I could classify using remotely sensed images.” Also see M.G. Hamernick (2000) who wrote of how the use of macro scale land cover types for defining habitat use can be misleading. In his case some ostensibly favorable habitat types may “contain relatively no cover for thermoregulation nor refuge from predators and thus the turtles would potentially not be able to properly regulate their body temperature and would be vulnerable to depredation if they actually spent a significant amount of time in this habitat category.” As stated by Allen (1977), "the ecologist is likely to measure the environment at frequencies too long and at grain sizes too large to correspond to the short frequency, fine grain actuality. Small life forms are so far removed from human scales of perception that even the best amplifiers of our senses can't be used directly."

This **factor of scale** has management implications. There often seems to be a belief (not just limited to Wood Turtles) that if a little is good then more must be better. Meaning, in this particular case, that if a small natural canopy gap is beneficial, then a large (*e.g*., 20 acres) removal of the canopy through even-age logging will be even better. For various species this is not necessarily the case, and in fact can result in direct and/or indirect harm (for example, indirectly from the facilitation of predator ingress).

□□□□□ In the absence of human logging/cutting/clearing disturbance, mature and old-growth forest tracts (such as are found at Wood Turtle sites on the Forest) support numerous microhabitat patches that are used by flora and fauna on a fine scale (see, *e.g*., Law, B.S and C.R. Dickman 1998 and Braun, E.L. 1950). The disturbance regime in the GWNF is generally characterized by small-scale canopy disruptions, such as windthrow, senescence, ice storms, drought, insects, and pathogens (Braun, E.L. 1950 and Rentch, J.S. 2006). These disturbances and resultant canopy gaps are certainly of the appropriate spatial scale for Wood Turtles. For instance, I have often found Turtles near, in, or at the edges of small canopy gaps or semi-gaps and/or in low-lying vegetation. Such places provide cover from predators, while the dappled sunlight and/or small size of these sites allow the Turtles to thermoregulate with ease and efficiency, as only small movements are necessary to be in either sunlight or shade. For defense against predator attack they cannot close their shells like Box Turtles, but are instead dependant upon their camouflaged carapace (whose bumpy appearance looks like a rock), cover, and on being inconspicuous.

Based on my researches and observations, I firmly believe that current knowledge and evidence on Wood Turtles and their habitat indicate that Turtles on the GWNF would benefit most from management that allows for the development of wild old-growth forest conditions (with their full complement of woody debris, canopy gaps, niche complexity, and habitat mosaic) with as little human interference/disturbance/disruption as possible.

□ Further, the lack of adequate no-harvest buffers (such as provided for in the current Plan and DLMP) along all classes of stream channels means the recruitment of LWD will not be

sufficient to provide this critical habitat element in streams (see previous comments in re stream/riparian buffers). Turtles require LWD for basking substrate and escape cover as well as for the foraging opportunities afforded by this material.

As regards Wood Turtles, past and current Forest Service policies and actions have "impaired the productivity of the land" (MUSYA), evidenced by their scarcity in the Forest. Forest Service management (as evidenced in the current Plan and DLMP) does not ensure the "sustained yield" of Wood Turtles on the GWNF, nor is the Forest's diversity of communities (NFMA) properly protected. It is well past time for this to cease and the revised Forest Plan must recognize and rectify this situation.

It is important to know what amounts, types, and locations of cutting (and burning, roading, etc.) create conditions associated with declining Turtle populations. There is a dearth of such solid, site-specific, and long-term information on the affect of anthropogenic habitat alterations. However, reason and the information and evidence that we do have indicate that generally **the best way for the Forest Service and just about everyone else to deal with Wood Turtles is to leave them alone and disrupt their habitat as little as possible.**

Wood Turtles cannot fly or run away from harm. As small creatures of limited motility they are very vulnerable to on-site impacts. To ensure the Turtles' viability and distribution on the Forest, the full protection of all site-specific sub-populations or colonies is necessary. The importance of this is especially significant given the strong site-fidelity that the Turtles express. For example, as was observed in Michigan, "The high incidence of site fidelity in this population, compared to data from other populations of freshwater turtles, makes the preservation of these specific sites important as the turtles are not likely to move to other areas of the river, regardless of the potential the habitat has for supporting turtles." (Willoughby, J. 2008)

Though relatively minor site-specific improvements may be appropriate (*e.g*., fabrication of very small sandy/soily nesting sites), heavy-handed management such as logging and burning is not necessary, and is, in fact, harmful. A prescription of strict protection and allowing natural processes to operate such as occurs in National Forest Special Biological Areas, Research Natural Areas, and Wilderness Areas will favor the Turtles.

RECOVERY/RESTORATION OPPORTUNITIES

In many ways and situations, "passive" restoration is a suitable, desirable, and preferable way to deal with Wood Turtle habitat (see DellaSala, D.A. *et al*. 2003). Letting natural processes operate without human impedance and imposition has and will provide suitable habitat conditions. These opportunities are particularly expressed and appropriate on the larger tracts of occupied habitat such as are found on public lands. However, there are situations and locations where more active restoration measures may be appropriate. However, using adaptive management with long-lived organisms may be especially difficult because the full effects of a management regime may not be apparent for decades or even centuries (Strayer, D. *et al*. 2004).

Many forest streams, as well as terrestrial sites, are very impoverished as regards LWD/CWD loadings, even relatively exemplary places such as on the GWNF. The great majority of Wood Turtles observed by this writer in streams were associated with these conditions. **Augmentation of stream LWD, particularly at sites with pools or potential pools, would confer considerable and immediate benefits to Turtles and their habitat** (see Wallace *et al*. and Dolloff in McMinn and Crossley 1996). This augmentation means limbs and boles actually

in the water, not just crossing the channel.

In my experience (I have observed approximately 200 individual Wood Turtles in the wild), the one habitat characteristic with which the Turtles are definitely correlated is large woody debris ("LWD"); these are the boles and large branches of trees (often dead) that fall to the ground or into streams. I feel there is a direct, strong, and significant correspondence: the more LWD in a stream the more Turtles you find. This material is, I believe, essential for cover and protection from predators (it also, of course, provides the basis for food webs and serves as hibernacula). In fact, I believe data on stream LWD loadings could be used as a good indicator/predictor of whether Wood Turtles are resident in an area. I simply do not find them in streams without this material; I am not saying it is absolutely essential, but simply that there is a strong correlation. I also often find the Turtles in close proximity to LWD when terrestrial.

"Pristine watersheds have stream channels with a complex array of hydraulic conditions (pools, riffles, alcoves, side channels, single and multiple channel sections), substrate sizes, and accumulations of wood and other organic matter. Large woody debris (LWD) consists of large logs that fall into stream channels, either from natural tree death, wind throw, or bank failure, which then plays an important role in structuring stream habitats." (Welsh, H.M. *et al*. 1998) At Wood Turtle stream sites in VA and WV most pools may be either directly formed by or significantly influenced by LWD (Krichbaum pers. obs.). The pools formed by debris dams are small-scale nutrient catchment basins that strongly influence community structure (*i.e*., the provision of potential Wood Turtle prey organisms) (Pringle, C.M. *et al*. 1988). Wood Turtles commonly use streams with substrates consisting of silt, sand, small gravel, large gravel, cobble, and/or boulders (Krichbaum personal observations in Virginia and West Virginia).

The fabrication of very small sandy/soily nesting sites relatively closeby occupied streams may facilitate population recruitment and help prevent mortality to females by obviating long distance travel to find suitable nesting sites (see Kiviat, E. 2000). However, implementation of this has the potential to make matters even worse (*i.e*., fabricating a population sink). The concern is that fabricated nesting site(s), particularly those in close proximity to watercourses, may actually have negative effects upon the Turtle population there. This is due to high predation pressure, congregation of female Wood Turtles at nest sites, and clumping of nests.

For example, in New Hampshire studies involving simulated nests, "nests close to ponds (within 50 m) were more vulnerable to predators than those created far (100–150 m) from a pond. . . . Our results suggest that predation of simulated turtle nests may be a consequence of their distribution and location relative to the foraging activities of common nest predators, especially raccoons (*Procyon lotor*). Efforts to enhance recruitment among declining populations of turtles should consider the abundance and distribution of nesting habitat. Providing additional nesting sites away from predator foraging habitats may reduce nest predation and increase the recruitment of hatchlings into a population. . . . Habitat manipulations (e.g., patch cuts to open the canopy and tilling small areas) might be most beneficial in areas with limited nesting opportunities and chronically high rates of nest predation. Nesting habitats should be created away from road crossings and other potentially hazardous sites. Our results indicate that the location and size of nesting habitats are important parameters to consider. If nesting habitats are created near ponds, they should be large enough to minimize nests being clumped. Otherwise, nesting sites should be available at distances of at least 50 m from pond or wetland edges." (Marchand, M.N. and J.A. Litvaitis 2004)

Raccoons and other meso-predators certainly exist on the GWNF. Even a small number of such creatures can have a devastating impact upon turtle populations (see Engeman, R.M. *et al*. 2003 and Engeman, R.M. *et al*. 2005).

The impact of predation upon Wood Turtles cannot be overemphasized. It is believed that many of the smaller predator species have experienced great population increases due to direct and indirect human subsidy (see Mitchell, J. and M. Klemens 2000). Predation

pressure is having devastating impacts upon nesting success and subsequent recruitment throughout the Wood Turtle's range (see, *e.g*., James Harding pers. com. 2007, Siart 1999, Brooks *et al*. 1992, Hunter, M. *et al*., 1999, and Bowen & Gillingham 2004).

For much of the year Wood Turtles live terrestrially and occupy the same habitat types as do Box Turtles. However, without the *Terrapene* ability to close up tightly within their shell, Wood Turtles are much more exposed to harm from predators. It may be that predators are having an inordinate amount of impact upon Wood Turtles as compared to other chelonian species (meaning disproportionate to the Turtle's numbers in the landscape). This exposure to predation is further exacerbated by the Turtle's habitual use of streams and terrestrial habitat relatively closeby streams, and that they generally do not range as far from water as do Box Turtles. Predators such as Raccoons show a clear proclivity for foraging in proximity to water.

I have observed such predators as Raccoons, Skunks, Minks, Fox, Bobcat, Vultures, Turkeys, Great Blue Herons, Crows, Coyotes, Squirrels, and Chipmunks at Wood Turtle sites on the Forest. And numerous Wood Turtles I encounter on the Forest are missing feet, limbs, or tails and/or bear mutilated shells.

There may already be population sink dynamics operating on the Forest. For instance, I have observed nesting Turtles often using portions of a closed road. However, I have found seven nests disinterred and destroyed here in one day. I have observed a Raccoon at this site while female Turtles were in nesting mode. In addition, the nests are trampled by human pedestrians, horses, and mountain bikers. I have also seen utility maintenance vehicles driving upon and closeby this site; Akre and Ernst (2006) found the crushed skeletal remains of an old male Turtle in this corridor. Even though the physical conditions (environmental cues) at the site (*e.g*., open, sandy, close to the stream) are apparently attractive to and selected by the Turtles for nesting, it is actually functioning as an "**ecological trap**", the use of which elevates extinction risk (Kristan, W.B. 2003). Akre and Ernst (2006) recorded a similar situation where 18 Turtle nests were found depredated in a single day at a powerline right-of-way.

Beyond this example, of additional concern is that other human activities on the Forest (such as logging, burning, road building, wildlife management, vegetation manipulation, recreational or utility development) "can attract individuals, but then lead to reproductive failures (Delibes et al. 2001a, b). Additionally, changes that affect the distribution of predator communities independent of the habitat may uncouple the traditional relationship between habitat and risk of predation, thereby producing a trap (Misenhelter and Rotenberry 2000). Cases in which changes in vegetation concentrates both predators and prey, to the detriment of the prey, have also been observed (Gates and Gysel 1978, Purcell and Verner 1998)." (*id*.)

Marchand *et al*. (2002) are clear that "Attempts at managing habitats, such as creating artificial nesting areas to enhance recruitment (e.g., Kiviat et al. 2000), might prove unsuccessful if predation patterns are not considered. . . . However, any increase in nest success associated with greater distance from water might not correspond to increased recruitment. Hatchling turtles, as well as adult females, traveling a long distance from nest sites to ponds could incur greater mortality than those individuals traveling only a short distance to water." (Marchand, M.N. *et al*. 2002)

In short, **it is not clear that fabricating nesting clearings on the Forest for Wood Turtles is a good idea**.

Snapping Turtles (*Chelydra serpentina*) and Eastern Box Turtles (*Terrapene carolina*) are also sympatric with Wood Turtles, and syntopic at site-specific areas on the Forest. Experiences with these species can also shed light upon issues and concerns related to the Wood Turtles. "We characterized the microhabitat features of nests constructed by eastern box turtles, *Terrapene carolina carolina*, in central Illinois. All nests were sited in open habitats; 87.5% of them were depredated within 72 hours of oviposition [75% within 24 hours]. Nest sites differed from random sites in vegetation height and composition, percentage ground and canopy cover, and light intensity. Land management practices that provide open areas suitable for box

turtle nesting activity might make these areas more attractive to potential nest predators. . . . The fact that all the females in this study nested in disturbed clearings (campsites, roadways, or grazed fields) is important for at least 2 reasons. First, it indicates that anthropogenic open patches of habitat might have a potential use in helping increase turtle numbers for populations threatened by habitat loss. Secondly (and conversely), nesting in disturbed habitats may produce a negative effect on turtle populations by decreasing female reproductive success in areas where human disturbance is greater." (Flitz, B.A. and S.J. Mullin. 2006)

"However, any increase in nest success associated with greater distance from water might not correspond to increased recruitment. Hatchling turtles, as well as adult females, traveling a long distance from nest sites to ponds could incur greater mortality than those individuals traveling only a short distance to water. . . . Predation of snapping turtle nests was greater when nests were clustered (<1 m to nearest nest) than when nests were separated (Robinson and Bider 1988). Similarly, nests of diamondback terrapins (Malaclemys terrapin) located within 1 m of other nests suffered greater rates of predation (Burger 1977). . . . For example, vegetative cover at the nest might affect predator detection. Nests of snapping turtles located under moderate amounts of vegetation had greater survival (60%) than those found under little (35%) or no vegetation (11%) (Robinson and Bider 1988)." (Marchand *et al*. 2002)

"Understanding what environmental cues organisms use to select nest sites and the subsequent consequences for offspring is also important for conservation. Identifying areas or particular microhabitat variables associated with higher nest density and success within a nesting area provides clues for the habitat needs of a species. Additionally, this knowledge may aid in understanding the consequences of human alterations of habitat for critical life-history events such as nesting. Under some circumstances, negative consequences of seemingly adaptive nesting behavior may result because of human modifications of habitat (Gates and Gysel 1978, Misenhelter and Rotenberry 2000). . . . For example, survival of striped mud turtle embryos in Florida was higher at sites located close to vegetation because of lower nest temperatures due to shade (Wilson 1998)." (Kolbe and Janzen 2002)

There are various invasive exotic species found on National Forests and other Wood Turtle locations. One of the worst of these appears to be the Asian Stiltgrass (*Microstigeum vimineum*). The plant has overwhelmed numerous patches and crowded out native flora on the GWNF. The direct and indirect effects this has on the Wood Turtles is unknown. Be that as it may, land managers should implement non-chemical eradication of this invasive.

Road restrictions, closures, and revegetation should be initiated at Wood Turtle sites.

Place "Turtle Crossing" signs along open roads warning people to slow down and be alert for turtles.

Designate occupied Wood Turtle sites on public lands as Special Interest Areas – Biologic or other similarly strictly protective allocations. Some of these sites are strongholds that may serve as a source population in the future. In addition, what amounts to a great experiment in habitat alteration has been and is taking place at locations where the Turtle lives. These <u>public lands sites should be treated as unmanipulated "control" or "benchmark" sites for comparing and assessing management practices affecting the Turtle</u>. Rigorous protection of these sites should be an essential element of any Wood Turtle Conservation Plan or Wildlife Strategy that is implemented in Virginia and West Virginia.

Small waterways with this species should be preserved and development near them restricted.

Route people and vehicles away from nesting sites, including sandy road-beds.

Close trails that run immediately adjacent to occupied Wood Turtle streams and reroute them to roads and other trails that currently exist at a greater distance from the stream.

Abundant populations of generalist predators have become a concern among conservation biologists and controls may be necessary in some areas (Garrott, R.A. *et al*., 1993;

Congdon *et al*., 1993). An alternative approach is to manage landscapes in order to reduce predator impacts (Schneider, 2001). In other words, to halt the fragmentation of habitat where we can and restore more natural conditions to places that have been developed in the past (*e.g*., road obliteration and revegetation).

The major large predatory carnivores, Eastern Cougar (*Felis concolor*) and Gray Wolf (*Canis lupus*), have been extirpated (or only exist in severely reduced numbers) from the GWNF and its environs. The return of the Coyote (*Canis latrans*) serves to partially fill that open trophic niche. Meso-predators such as Raccoons are one of the greatest threats to the Turtle's viability. Promoting populations of Coyotes (such as by rescinding bounties and closing kill seasons) may help to control meso-predator numbers (Crooks, K.R. and M.E. Soule 1999).

Promote Beaver (*Castor canadensis*) populations where Turtles exist (*e.g*., closing the trapping season there, and/or not allowing private or public entities to control or kill them). Beavers are a riparian keystone species that provide and improve Wood Turtle habitat (Naiman, R.J. *et al*. 1988 and Wright, J.P. *et al*. 2002).

Road construction, logging, and burning should not occur at Wood Turtle sites. Current or newly constructed/reconstructed roads in Turtle habitat should be fully mitigated. "Recently, barrier walls surrounding roads in conjunction with wildlife underpasses have proven effective at reducing mortality of male and female freshwater turtles in Florida (Dodd, Barichivich & Smith, 2004; Aresco, 2005b). . . . Because of the relative vulnerability of female freshwater turtles to road mortality and the potential effects to turtle populations, mitigation measures should be considered when roads occur in high densities and in proximity to wetlands." (Steen, D.A. *et al* 2006)

Wood Turtles are perhaps the most valuable legally traded native species of turtle in the country (see Reed & Gibbons 2003 and Ernst, C.E. 2001). Their monetary value, in addition to their desirability as pets, makes them very vulnerable to collection. The agency states: "Currently the greatest threats to wood turtles are habitat destruction and overcollecting." (GWNF Lee RD 2007 control burn DM-9) In fact, in the summer of 2008 an individual was busted in West Virginia with perhaps a hundred Wood Turtles collected from the wild (Kleopfer, J.D. phone conversation 2008). Perhaps some of these individuals were snatched off the GWNF.

Yet on more than one occasion, the agency, through promulgation of public decision documents (DM and EAs) containing explicit reference to Wood Turtles, has broadcast the location of a species highly vulnerable to illegal collection.This disrespectful action is an abuse of discretion (APA) and a clear abuse of the "public trust". It would not take much for an unscrupulous actor to read these documents and figure out the precise location where the Turtles reside. There was no reference to the Turtle in the scoping letters for the decisions. Subsequent to scoping and prior to the decision the agency could very easily have withdrawn the areas in question from the proposals. They did not and instead the sensitive location information was released to the public.

In addition, a member of the public at the Woodstock public meeting organized by the Forest Service in March 2007 stated he called the Lee RD office to ask about a temporary road closure and was told by them it was due to the Turtle.

The Forest Service is accountable for the consequences of its actions. The attendant cumulative effects of these harmful disclosures must be addressed by the agency.

How will the revised Plan ensure that these harmful actions will not occur again?

It was heartening to see concern for the Wood Turtle listed in Mr. Landgraf's presentation of issues the planners have "heard' from the public. However, my optimism was saddened when conversations with current and retired Forest Service employees at the November 12, 2008 Verona public meeting indicated that some individuals consider the Wood Turtle to be yet another of the Forest's multitude of chainsaw-dependent species (along with Ruffed Grouse,

Peaks of Otter Salamander, Indiana Bats, Cerulean Warblers, oak spp., etc.). This perspective is spurious and problematic and needs to be reconsidered and ultimately rejected. Even though the Turtle has been officially "threatened" for over 15 years, it appears that there is still resistance to implementing strong and meaningful protective measures for the species. To continue on this path (for instance, narrow stream buffers and lack of special area allocations and protective prescriptions) is insufficient and unreasonable.

Wood Turtle Citations

Akre, T. 2002. "Growth, maturity, and reproduction of the Wood Turtle, *Clemmys insculpta* (LeConte 1830) in Virginia". PhD thesis, George Mason University, Fairfax, VA.
Akre, T. and C. Ernst. October 2006. "Final Report Population Dynamics, Habitat Use, and Home Range of the Wood Turtle, *Glyptemys* (=*Clemmys*) *insculpta*, in Virginia", submitted to the Virginia Department of Game and Inland Fisheries, contract ed0820ce_080. 273 pp.
Allen, T.F.H. 1977. Scale in microscopic algal ecology: a neglected dimension. Phycologia 16: 253-257.
Arvisais, M. *et al*. 2002. Home range and movements of a wood turtle (*Clemmys insculpta*) population at the northern limit of its range. Can. J. Zool. 80: 402–408.
Belzer, W. 2000. A nine year study of Eastern Box Turtle courtship with implications for reproductive success and conservation in a translocated population. Turtle and Tortoise Newsletter 6: 17-26. Available at <www.chelonian.org>.
Bowen, K.D. and J.C. Gillingham. 2004. R9 Species Conservation Assessment for Wood Turtle – *Glyptemys insculpta* (LeConte, 1830). USDA Forest Service, Milwaukee, WI. 39 pp.
Bowne, D.R. 2008. Terrestrial Activity of *Chrysemys picta* in Northern Virginia. Copeia 2008 (No. 2): 306–310.
Braun, E.L. 1950. Deciduous Forests of Eastern North America. Hafner Publishing: New York, NY. 596 pp.
Brooks, R.J., G.P. Brown, and D.A. Galbraith. 1991. Effects of a sudden increase in natural mortality of adults in a population of the common snapping turtle (*Chelydra serpentina*). Canadian Journal of Zoology 69: 1314-1320.
Brooks, R.J., Shilton, C.M., Brown, G.P., and N.W.S. Quinn. 1992. Body size, age distribution, and reproduction in a northern population of Wood Turtles (*Clemmys insculpta*). Canadian Journal of Zoology - Revue Canadienne de Zoologie 70(3): 462-469.
Bryan, R.R. 2007. Focus Species Forestry: A Guide to Integrating Timber and Biodiversity Management in Maine. Maine Audubon with Maine Department of Conservation, Professional Logging Contractors of Maine, Master Logger Program, and Small Woodland Owners Association of Maine: Falmouth, ME. 92 pp.)
Buech, R.R. *et al*. 1997. "Identification of Wood Turtle Nesting Areas for Protection and Management", pp. 383-391 in J. Van Abbema (ed.), Proceedings: Conservation, Restoration, and Management of Tortoises and Turtles – An International Conference, New York Turtle and Tortoise Society, New York. 494 pp.
Buhlmann, K.A. 1993. Legislation and Conservation Alert. Herpetological Review 24: 125.
Burger, J. and S. D. Garber. 1995. Risk assessment, life history strategies, and turtles: Could declines be prevented or predicted? Journal of Toxicology and Environmental Health 46(1): 483-500.
Burke, V.J. and J.W. Gibbons. 1995. Terrestrial buffer zones and wetland conservation: a case study of freshwater turtles in a Carolina bay. Conservation Biology 9: 1365-1369.
Caldwell, R.S. 1996. "Macroinvertebrates and their relationship to coarse woody debris: With special reference to land snails", pp.49-54 in Biodiversity and Coarse Woody Debris in Southern Forests. USDA FS Gen. Tech. Report SE-94.

Castellano, C.M., J.L. Behler, and G.R. Ultsch. 2008. Terrestrial movements of hatchling wood turtles (*Glyptemys insculpta*) in agricultural fields in New Jersey. Chelonian Conservation and Biology 7(1): 113–118.
Chen, J., S.C. Saunders, T.R. Crow, R.J. Naiman, K.D. Brosofske, G.D. Mroz, B.L. Brookshire, and J.F. Franklin. 1999 Microclimate in forest ecosystem and landscape ecology: Variations in local climate can be used to monitor and compare the effects of different management regimes. BioScience 49(4): 288-297.
Compton, B.W. 1999. Ecology and conservation of the Wood turtle (*Clemmys insculpta*) in Maine. M.Sc. Thesis. University of Maine, Orono, Maine.
Compton, B.W., J.M. Rhymer and M. McCollough. 2002. Habitat selection by Wood turtles (*Clemmys insculpta*): an application of paired logistic regression. Ecology 83: 833-843.
Congdon, J.D. *et al*. 1993. Delayed sexual maturity and demographics of Blanding's turtles (*Emydoidea blandingii*): Implications for conservation and management of long-lived organisms. Conservation Biology 7(4): 826-833.
Congdon, J.D., A.E. Dunham, and R.C. van Loben Sels. 1994. Demographics of Common Snapping Turtles (*Chelydra serpentina*): Implications for conservation and management of long-lived organisms. American Zoologist 34: 397-408.
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.
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.
Crooks, K.R. and M.E. Soule. 1999. Mesopredator release and avifaunal extinctions in a fragmented system. Nature 400 (5 August 1999): 563-566.
Cushman, S.A. 2006. Effects of habitat loss and fragmentation on amphibians: A review and prospectus. Biological Conservation 128: 231– 240.
DellaSala, D.A. *et al*. 2003. A citizens' call for ecological forest restoration: Forest restoration principles and criteria. Ecological Restoration 21(1): 14-23 (accessible at www.worldwildlife.org/klamathsiskiyou).
Dolloff, C.A. 1996. "Large woody debris, fish habitat, and historical land use", pp. 130-138 in McMinn, J.W., and D.A. Crossley, Jr. (eds.), Biodiversity and Coarse Woody Debris in Southern Forests. General Technical Report SE-94.
Doroff, A.M. and L.B. Keith. 1990. Demography and ecology of an ornate box turtle (*Terrapene ornata*) population in south-central Wisconsin. Copeia 1990: 387-399.
Engeman, R.M., Martin, R.E., Constantin, B., Noel, R. and J. Woolard. 2003. Monitoring predators to optimize their management for marine turtle nest protection. Biological Conservation 113: 171–178.
Engeman, R.M., R.E. Martin, H.T. Smith, J. Woolard, C.K. Crady, S.A. Shwiff, B. Constantin, M. Stahl and J. Griner. 2005. Dramatic reduction in predation on marine turtle nests through improved predator monitoring and management. Oryx 39(3): 318-326.
Enneson, J.J. and J.D. Litzgus. 2008. Using long-term data and a stage-classified matrix to assess conservation strategies for an endangered turtle (*Clemmys guttata*). Biological Conservation 141: 1560– 1568.
Ernst, C.H. 1968. Evaporative water-loss relationships of turtles. Journal of Herpetology 2: 159-161.
Ernst, C.H. 1986. Environmental temperatures and activities of the wood turtle, *Clemmys insculpta*. Journal of Herpetology 20: 222–229.
Ernst, C.H. 2001. An overview of the North American turtle genus *Clemmys* Ritgen, 1828. Chelonian Conservation and Biology 4 (1): 211-216.

Ernst, C.H. and J.F. McBreen. 1991. “Wood Turtle”, pp. 456-57 in Terwilliger, K. (coord.), Virginia's Endangered Species , McDonald and Woodward Publishing Co., Blacksburg, VA. 672 pp.
Ernst, C.H., J.E. Lovich, and R.W. Barbour. 1994. “Wood Turtle”, pp. 222-233 in Turtles of the United States and Canada. Smithsonian Institution Press: Washington D.C. 578 pp.
Fagan, W.F. and E. E. Holmes. 2006. Quantifying the extinction vortex. Ecology Letters 9: 51–60.
Flitz, B.A. and S.J. Mullin. 2006. Nest-site selection in the Eastern Box Turtle, *Terrapene carolina carolina*, in Illinois. Chelonian Conservation and Biology, 2006, 5(2): 309–312.
Ford, W.M., Menzel, M.A., McGill, W.W., Laerm, J., and T.S. McCay. 1999. Effects of a community restoration fire on small mammals and herpetofauna in the southern Appalachians. Forest Ecology and Management 114: 233–243.
Galbraith, D.A. *et al*. 1997. "Can management intervention achieve sustainable exploitation of turtles?", pp. 186-194 in J. Van Abbema (ed.), Proceedings: Conservation, Restoration, and Management of Tortoises and Turtles - An International Conference, New York Turtle and Tortoise Society, New York. 494 pp.
Garrott, R.A., White, P.J., and C.A. Vanderbilt White. 1993. Overabundance: an issue for conservation biologists? Conservation Biology 7: 946–949.
Gerber, L.R. and S.S. Heppell. 2004. The use of demographic sensitivity analysis in marine species conservation planning. Biological Conservation 120: 121–128.
Gibbons, J.W. *et al*. 2000. Reptiles in Decline: The global decline of reptiles, déjà vu amphibians. BioScience 50: 653-666.
J.P. Gibbs and G.D. Amato. 2000. “Genetics and Demography in Turtle Conservation”, pp. 207-217 in M.W. Klemens (ed.), Turtle Conservation, Smithsonian Institution Press Washington D.C. 334 pp.
Gibbs, J.P. and W.G. Shriver. 2002. Estimating the effects of road mortality on turtle populations. Conservation Biology 16(6): 1647-1652.
Gibbs, J.P. and D.A. Steen. 2005. Trends of sex ratios of turtles in the United States: Implications of road mortality. Conservation Biology 19(2): 552-556.
Gilpin, M.E., and M.E. Soule. 1986. “Minimum Viable Populations: Processes of Species Extinction”, pp. 19-34 in M.E. Soule (ed.), Conservation Biology: The Science of Scarcity and Diversity. Sunderland, Mass.: Sinauer Associates, Inc.
Greaves, W.F. and J.D. Litzgus. 2007. Overwintering ecology of Wood Turtles (*Glyptemys insculpta*) at the species’ northern range limit. Journal of Herpetology 41(1): 32–40.
Greenberg, C.H. and T.G. Forrest. 2003. Seasonal abundance of ground-occurring macroarthropods in forest and canopy gaps in the Southern Appalachians. Southeastern Naturalist 2(4): 591-608.
Grover, M.C. 2000. Determinants of salamander distributions along moisture gradients. Copeia 2000(1): 156–168.
Hamernick, M.G. 2000. “Home ranges and habitat selection of Blanding’s turtles (*Emydoidea blandingii*) at the Weaver Dunes, Minnesota”. Final report submitted to the Nongame Wildlife Program, Minnesota Department of Natural Resources. 18 pp. Accessed at http://www.dnr.state.mn.us/eco/nongame/projects/research_reports/reptiles.html.
Harding, J.H. and T.J. Bloomer. 1979. The Wood Turtle, *Clemmys insculpta* . . . A natural history. *HERP* 15(1): 9-26.
Hedman, C.W. *et al*. 1996. In-stream large woody debris loading and riparian forest seral stage associations in the southern Appalachian Mountains. Canadian Journal of Forest Research 26: 1218-1227.
Heppell, S.S. 1998. Application of life-history theory and population model analysis to turtle conservation. Copeia 1998: 367–375.

Herman, T.B. 1997. “Life on the edge: Managing peripheral populations in a changing landscape”, pp. 372-376 in J. Van Abbema (ed.), Proceedings: Conservation, Restoration, and Management of Tortoises and Turtles – An International Conference, New York Turtle and Tortoise Society, New York. 494 pp.
Hilton-Taylor, C. (Comp.). 2000. 2000 IUCN Red List of Threatened Species. Gland, Switzerland: IUCN, 61 pp.
Honnay, O., H. Jacquemyn, B. Bossuyt, and M. Hermy. 2005. Forest fragmentation effects on patch occupancy and population viability of herbaceous plant species. New Phytologist 166: 723–736.
Kappes, H. 2006. Relations between forest management and slug assemblages (Gastropoda) of deciduous regrowth forests. Forest Ecology and Management 237: 450–457.
Kaufmann, J.H. 1992. Habitat use by wood turtles in central Pennsylvania. Journal of Herpetology 26(3): 315-321.
Kaufmann, J.H. 1995. Home ranges and movements of wood turtles, *Clemmys insculpta*, in central Pennsylvania. Copeia 1995(1): 22–27.
Keeton, W.S., Kraft, C.E., and D.R. Warren. 2007. Mature and old-growth riparian forests: structure, dynamics, and effects on Adirondack stream habitats. Ecological Applications 17(3): 852-68.
Kiviat, E., Stevens, G., Brauman, R., Hoeger, S., Petokas, P.J., and G.G. Hollands. 2000. Restoration of wetland and upland habitat for the Blanding’s turtle, *Emydoidea blandingii*. Chelonian Conservation Biology 3: 650–657.
Kolbe, J.J. and F.J. Janzen. 2002. Spatial and temporal dynamics of turtle nest predation: edge effects. Oikos 99: 538–544.
Krichbaum, S. 2005. “Issues and Concerns Regarding the Wood Turtle (*Glyptemys insculpta*) on the George Washington National Forest”, unpublished report submitted to the U.S. Forest Service/George Washington National Forest, Virginia Division of Natural Heritage, and Virginia Department of Game and Inland Fisheries, dated October 31, 2005. 20 pp.
Kristan, W.B. III. 2003. The role of habitat selection behavior in population dynamics: source–sink systems and ecological traps. Oikos 103: 457–468.
Lauck, B. 2005. Can life history studies contribute to understanding the impacts of clearfell logging on pond breeding anurans? A review. Applied Herpetology 2(2): 125-137.
Law, B.S. and C.R. Dickman. 1998. The use of habitat mosaics by terrestrial vertebrate fauna: implications for conservation and management. Biodiversity and Conservation 7: 323-333.
Lindenmayer, D.B., J.T. Wood, C. MacGregor, D.R. Michael, R.B. Cunningham, M. Crane, R. Montague-Drake, D. Brown, R. Muntz and D.A. Driscoll. 2008. How predictable are reptile responses to wildfire? Oikos 117: 1086-1097.
Lövei, G.L., T. Magura, B. Tóthmérész, and V. Ködöböcz. 2006. The influence of matrix and edges on species richness patterns of ground beetles (Coleoptera: Carabidae) in habitat islands. Global Ecology and Biogeography 15: 283–289
Marchand, M.N. and J.A. Litvaitis. 2004a. Effects of habitat features and landscape composition on the population structure of a common aquatic turtle in a region undergoing rapid development. Conservation Biology 18(3): 758–767.
Marchand, M.N. and J.A. Litvaitis. 2004b. Effects of landscape composition, habitat features, and nest distribution on predation rates of simulated turtle nests. Biological Conservation 117: 243–251.
Marchand, M.N, J. A. Litvaitis, T. J. Maier, and R. M. DeGraaf. 2002. Use of artificial nests to investigate predation on freshwater turtle nests. Wildlife Society Bulletin 30(4): 1–7.
Martin, K. and M. Sommer. 2004. Relationships between land snail assemblage patterns and soil properties in temperate-humid forest ecosystems. Journal of Biogeography 31: 531–545.

McMinn, J.W., and D.A. Crossley, Jr. (eds.). 1996. Biodiversity and Coarse Woody Debris in Southern Forests. General Technical Report SE-94. USDA FS Southeast Research Station, Asheville, NC. 146 pp.
Mitchell, J. C. and M. W. Klemens. 2000. "Primary and Secondary Effects of Habitat Alteration," pp. 5-32 in M.W. Klemens (ed.), Turtle Conservation. Smithsonian Institution Press: Washington D.C. 334 pp.
Naiman, R.J., Johnston C.A., J.C. Kelley. 1988. Alteration of North American streams by Beaver. BioScience 38: 753–762.
O'Grady, J.J., D.H. Reed, B.W. Brook, and R. Frankham. 2004. What are the best correlates of predicted extinction risk? Biological Conservation 118: 513–520.
Ogren, S.A. and D.K. King. 2008. The effect of large woody debris on macroinvertebrate communities and epilithon detritus composition in a channelized headwater stream. Journal of Freshwater Ecology 23(1): 65-77.
Oliver, C.D. and B.C. Larson. 1996. Forest Stand Dynamics. Wiley: New York.
Powell, R.A. and M.S. Mitchell. 1998. Topographical constraints and home range quality. Ecography 21: 337-341.
Pringle, C.M., Naiman, R.J., Bretscroco, G., Karr, J.R., Oswoo, M.W., Webster, J.R., Welcomme, R.L., and M.J. Winterbourn. 1988. Patch dynamics in lotic systems: the stream as a mosaic. Journal of the North American Benthological Society 7(4): 503-524.
Reed, D.H., J.J. O'Grady, B.W. Brook, J.D. Ballou, and R. Frankham. 2003. Estimates of minimum viable population sizes for vertebrates and factors influencing those estimates. Biological Conservation 113: 23–34.
Reed, R.N. and J.W. Gibbons. 2003. *Conservation status of live U.S. non-marine turtles in domestic and international trade*. Report to US Department of the Interior and US Fish and Wildlife Service. 92 pp. At www.tiherp.org/docs/Library/Turtle_trade_report.pdf
Remsberg, A.J. *et al*. 2006. Home ranges of Wood Turtles (*Glyptemys insculpta*) in northern Michigan. Chelonian Conservation and Biology 5(1): 42–47.
Rentch, J.S. 2006. Structure and functioning of terrestrial ecosystems in the Eastern Rivers and Mountains Network: Conceptual models and vital signs monitoring. Technical Report NPS/NER/NRR-2006/007. National Park Service: Philadelphia, PA. 130 pp. Available at http://www.nps.gov/nero/science/.
Reynolds-Hogland, M.J., M.S. Mitchell, and R.A. Powell. 2006. Spatio-temporal availability of soft mast in clearcuts in the Southern Appalachians. Forest Ecology and Management 237: 103–114.
Robinson, C. and J. R. Bider. 1988. Nesting synchrony - a strategy to decrease predation of snapping turtle (*Chelydra serpentina*) nests. Journal of Herpetology 22: 470–473.
Roe, J.H. and A. Georges. 2007. Heterogeneous wetland complexes, buffer zones, and travel corridors: Landscape management for freshwater reptiles. Biological Conservation 135: 67– 76.
Rooney, T.P. and D.M. Waller. 2003. Direct and Indirect effects of White-tailed Deer in Forest Ecosystems. Forest Ecology and Management 181: 165-176.
Rubino, D.L. and B.C. McCarthy. 2003. Composition and ecology of macrofungal and myxomycete communities on oak woody debris in a mixed-oak forest of Ohio. Canadian Journal of Forest Research 33: 2151–2163.
Saumure, R.A., T.B. Herman, and R.D. Titman. 2007. Effects of haying and agricultural practices on a declining species: The North American Wood Turtle, *Glyptemys insculpta*. Biological Conservation 135:581-591.
Schneider, M.F. 2001. Habitat loss, fragmentation and predator impact: spatial implications for prey conservation. Journal of Applied Ecology 38: 720–735.
Semlitsch, R. D., and J. R. Bodie. 2003. Biological criteria for buffer zones around wetlands and riparian habitats for amphibians and reptiles. Conservation Biology 17: 1219–1228.

Semlitsch, R.D. and J.B. Jensen. 2001. Core habitat, not buffer zone. National Wetlands Newsletter 23: 5-11.
Shure, D.J. and D.L. Phillips. 1991. Patch size of forest openings and arthropod populations. Oecologia 86: 325-334.
Siart, L. 1999. "An investigation of Wood Turtle (*Clemmys insculpta*) nest success in southwestern Massachusetts". Thesis abstract accessed at www.woodturtle.org.
Simandle, E.T. 2006. "Population Structure and Conservation of Two Rare Toad Species (*Bufo exsul* and *Bufo nelsoni*) in the Great Basin, USA". PhD Dissertation, University of Nevada, Reno.
Smith, M.A. and D.M. Green. 2005. Dispersal and the metapopulation paradigm in amphibian ecology and conservation: are all amphibian populations metapopulations? Ecography 28: 110–128.
Soule', M.E. 1987. Viable Populations for Conservation. Cambridge University Press, Cambridge, UK.
Spetich, M.A., Shifley, S.R., and G.R. Parker. 1999. Regional distribution and dynamics of coarse woody debris in midwestern old-growth forests. Forest Science 45: 302–313.
Steen, D.A. *et al.* 2006. Relative vulnerability of female turtles to road mortality. Animal Conservation 9: 269-273.
Strang, C.A. 1983. Spatial and temporal activity patterns in two terrestrial turtles. Journal of Herpetology 17(1): 43-47.
Strayer, D.L. *et al*. 2004. Changing perspectives on Pearly Mussels, North America's most imperiled animals. BioScience 54(5): 429-439.
Tangredi, B.P. and R.H. Evans. 1997. Organochlorine pesticides associated with ocular, nasal, or otic infection in the eastern box turtle (*Terrapene carolina carolina*). Journal of Zoo and Wildlife Medicine 28(1): 97-100.
Tessier, N., S.R. Paquette, and F-J. Lapointe. 2005. Conservation genetics of the wood turtle (*Glyptemys insculpta*) in Quebec, Canada. Canadian Journal of Zoology 83(6): 765-72.
Tilman, D., R. M. May, C. L. Lehman, and M. A. Nowak. 1994. Habitat destruction and the extinction debt. Nature 371: 65-66.
Todd, B.D. and K.M. Andrews. 2008. Response of a reptile guild to forest harvesting. Conservation Biology 22(3): 753-761.
Tuttle, S.E. and D.M. Carroll. 2003. Home range and seasonal movements of the Wood Turtle (*Glyptemys insculpta*) in southern New Hampshire. Chelonian Conservation and Biology 4 (3): 656-663.
USDA Forest Service. 2006. Final EIS for the Monongahela National Forest Plan. Elkins WV.
Van Lear, D.H. 1996. "Dynamics of coarse woody debris in southern forest ecosystems", pp. 10-17 in McMinn, J.W., and D.A. Crossley, Jr. (eds.), Biodiversity and Coarse Woody Debris in Southern Forests. General Technical Report SE-94.
Vellend, M., K. Verheyen, H. Jacquemyn, A. Kolb, H. van Calster, G. Peterken, and M. Hermy. 2006. Extinction debt of forest plants persists for more than a century following habitat fragmentation. Ecology 87(3): 542–548.
Virginia Department of Environmental Quality. 2006. Final 2006 305(b)/303(d) Water Quality Assessment Integrated Report, at: http://www.deq.state.va.us/wqa/ir2006.html
Virginia Department of Game and Inland Fisheries [VDGIF]. 2005. Virginia's comprehensive wildlife conservation strategy. Virginia Department of Game and Inland Fisheries, Richmond, Virginia. 717 pp. plus appendices. Available at www.bewildvirginia.org/wildlifeplan/virginia-wildlife-action-plan.pdf
Webster, C.R. and M.A. Jenkins. 2005. Coarse woody debris dynamics in the southern Appalachians as affected by topographic position and anthropogenic disturbance history. Forest Ecology and Management 217: 319–330.

Webster, C.R., C.J.F. Huckins and J.M. Shields. 2008. Spatial distribution of riparian zone coarse woody debris in a managed northern temperate watershed. American Midland Naturalist 159: 225–237.
Welsh, Jr., H.M., A.J. Lind, L.M. Ollivier, G.R. Hodgson, and N.E. Karraker. 1998. Comments on the PALCO HCP/SYP and EIS/EIR with regard to the maintenance of riparian, aquatic, and late seral ecosystems and their associated amphibian and reptile species. Unpublished report dated November 16, 1998 from the Herpetology Research Group of the USDA Forest Service, Pacific Southwest Research Station, Redwood Sciences Laboratory, Arcata, CA.
Wenger, S. 1999. "A Review of the Scientific Literature on Riparian Buffer Width, Extent and Vegetation". Report dated March 5, 1999 for the Office of Public Service and Outreach, Institute of Ecology, University of Georgia. 59 pp.
West Virginia Division of Natural Resources (WVDNR). 2005. West Virginia Wildlife Conservation Action Plan. 1057 pp. Available at http://www.wildlifeactionplans.org/west_virginia.html
Willoughby, J., T.L. Lewis, and P.W. Huber. 2008. Site fidelity of wood turtles (*Glyptemys insculpta*) in the northern Lower Peninsula of Michigan. Presentation at the 93rd ESA Annual Meeting -- August 8, 2008 – abstract contained on official program CD.
Wright, J.P., C.G. Jones, A.S. Flecker. 2002. An ecosystem engineer, the beaver, increases species richness at the landscape scale. Oecologia 132: 96–101.

Special Areas

The upper slopes of Little Mountain (Hoover Creek) on the JR and WSRDs should be allocated as a SBA. There is a significant tract of old growth forest here.

******* At sites occupied by the imperiled Wood Turtle (*Glyptemys insculpta*) the GWNF planners need to fully consider and implement appropriate habitat protection and restoration actions; these may include road and trail closures, removals, and relocations, as well as restriction of some recreation activities and other access. Logging and road building should cease at all these sites ("not suitable"). Designation as RNAs or SBAs would be appropriate.**

The area of Threemile Mountain – Riles Run (SW of Columbia Furnace on the Lee RD) should be designated a RNA or SBA due to its exemplary biodiversity and presence of rare species. Around 70 years ago this site was identified on GWNF maps as a "natural arboretum" that included every tree species then known to occur on the Forest.

Impacts to Lichens, Bryophytes, and Fungi (including Mycorrhizae)

Lichens, Liverworts, Mosses, Bryophytes, and other non-vascular plants are typically found in the Forest. Because of their limited commercial value these species have received little attention from "foresters" and forest "managers". The exception is when such species are perceived to deter regeneration of commercial tree species. Some of these species are epiphytes or epilithic, growing on trees or on bare rock surfaces, and rely on nutrients dissolved in rainwater or deposited in particulate matter from the atmosphere. Therefore, they are **sensitive to changes in precipitation and effects of atmospheric pollution**, such as sulfates (Bates, Mcnee, and Mcleod 1996) or heavy metals (Insarov, Semenov, and Insarova 1999).

These species may be useful **indicators** of ecosystem health. Declining abundance and diversity of non-vascular plants should raise concerns on the part of GWNF managers

regarding the health of the Forest ecosystems and should initiate actions to remediate and restore communities to health.

"Our study confirms earlier findings that interior forest bryophytes such as *H. splendens* can be used as indicators to monitor edge effects and biodiversity recovery following forest harvesting. We demonstrate that growth and vitality of these bryophytes reflect the prevailing near-ground microclimatic conditions at the forest edges. Abundance estimates of such bryophytes can be used to determine the depth of edge effects across both ecotonal edges (e.g., riparian-upland forest edge) and anthropogenically created edges (e.g., clearcut edge)." (Stewart, K.J. and A.U. Mallik 2006 *op cit*.)

Terrestrial Invertebrates

Certain invertebrate species may serve a role as especially good **indicators** of overall ecosystem health and diversity. These include **ground beetles** (Rainio and Niemela 2003) and **Tiger Beetles** (Pearson and Cassola 1992). Changes in abundance and diversity of sensitive invertebrate species should serve as an index to changes in overall ecosystem states and therefore will serve to alert Forest managers to these changing conditions. Diversity of species like **butterflies** also can also serve as indicators of ecosystem changes, such as global warming and rainfall patterns (Pollard 1998).

See Pearson, D. L. and F. Cassola. 1992. World-wide species richness patterns of tiger beetles (Coleoptera: Cicindelidae): Indicator taxon for biodiversity and conservation studies. Conservation Biology 6(3): 376-391; and Pollard, E. 1988. Temperature, rainfall, and butterfly numbers. Journal of Applied Ecology 25: 819-828; and Rainio, J., and J. Niemelä. 2003. Ground beetles (Coleoptera: Carabidae) as bioindicators. Biodiversity and Conservation 12: 487-506; and Taylor, R. J. and N. Doran. 2001. Use of terrestrial invertebrates as indicators of the ecological sustainability of forest management under the Montreal Process. Journal of Insect Conservation 5: 221-231.

The **affect of logging and burning upon ant populations and distribution** is an issue that is unaddressed in the DCER and DLMP. Ants can be responsible for a significant amount of herbaceous seed dispersal in the Forest. "Combining our findings with other studies, there is strong evidence that *A*.[*Aphaenogaster*] *rudis* is a keystone seed dispersal mutualist in eastern deciduous forests, where this species is responsible for the majority of seed dispersals of ant-dispersed herbaceous flora (Ness et al., in preparation). All of these findings are striking given that up to 50% of all herbaceous species in the eastern deciduous forests are adapted for dispersal by ants (Handel et al., 1981; Gaddy, 1986). An important, yet unanswered question in ecology is whether seed dispersal mutualisms are diffuse or whether certain species contribute to the process more than others. Evidence is building that myrmecochory is not a diffuse mutualism, as previously thought, but one in which key ant species play a disproportionate role in dispersing the majority of seeds where they occur (Gove et al., 2007). This is especially important in the context of geographic variation in species interactions, as the variation in the abundance of key mutualists is likely to have profound consequences for the species dependent on those mutualists." Zelikova, T.J., R.R. Dunn, and N.J. Sanders. 2008. Variation in seed dispersal along an elevational gradient in Great Smoky Mountains National Park. Acta Oecologica 34: 155–162.

See also Handel, S.N., Fisch, S.B., and G.E. Schatz. 1981. Ants disperse a majority of herbs in a mesic forest community in New York State. Bulletin of the Torrey Botanical Club 108: 450–458; and Gaddy, L.L. 1986. Twelve new ant-dispersed species from the southern Appalachians. Bulletin of the Torrey Botanical Club 113: 247–251; and Gove, A.D., Majer, J.D., Dunn, R.R., 2007. A keystone ant species promotes seed dispersal in a ''diffuse'' mutualism.

Oecologia 153: 687–697; and Ness, J.H. and D.F. Morin. 2008. Forest edges and landscape history shape interactions between plants, seed-dispersing ants and seed predators. Biological Conservation 141: 838– 847.

<u>Transportation/Road Closures/Decommissioning</u>

I often encounter roads on the Forest that are “closed” with a metal gate. This method of so-called closure is not very effective. Miscreants can and do drive around gates. I recently saw evidence of this (tracks and bare/worn earth) at Cedar Creek on the Lee District at the metal gate at the north end of road #1863. And then in the interior of the Big Schloss roadless area it was obvious that an ATV had been driving on the trail (#573) and in nearby seeps. This is certainly not the only example of such non-closure on the Forest. **The Forest Service needs to identify closed roads on the Forest and actually close them to vehicles with barriers other than gates that can be driven around or under** (as was the case on the top of Shenandoah Mountain at the end of road #396).

“Forest restoration begins with comprehensive transportation planning that identifies and funds upgrading, maintenance, or decommissioning forest roads.” (Jim Burchfield and Martin Nie. September 2008. “National Forests Policy Assessment: Report to Senator John Tester”. College of Forestry and Conservation, The University of Montana, Missoula, MT)

It is not apparent that the GWNF planners are performing the comprehensive transportation planning necessary to address significant public issues and meaningfully revise the Plan. Instead, the DCER and DLMP indicate that the agency is putting off analysis of Forest roads and identification of roads for decommissioning until some unknown time in the future. But as we have seen in the past, this tactic means that the proper identification, consideration, and analysis may not occur.

The January 3, 2003 Dice Run timber sale decision on the North River RD is a typical example of this avoidance of proper and comprehensive roads analysis and planning. This decision proposed to build 0.4 miles of new road into the project area and “re-open” (what amounts to reconstruct) another 0.3 mile. The information in the EA regarding the environmental effects from FDRs 151 and 151A and what the agency is proposing to do to these roads is extremely meager. It is not even clear if 151A’s standard, condition, or maintenance or surface level would be changed. It is clear, however, that the proposed work is not regular maintenance.

On May 22, 2002, acting District Ranger Plunkett signed a file document on the subject of the proposed Dice Run Timber Sale. In this document are statements, reprinted in the EA at pg. 20, pertaining to the proposed road construction: “I have determined that a road analysis is not needed for this project. . . . Therefore, a discussion of needed and unneeded roads and priorities for road improvements and decommissioning is beyond the scope of this proposal.”

The Ranger’s statements and findings in the instant case are logically absurd and illegal. The very reason a road analysis is done is to determine the needed and unneeded roads and priorities for road improvements and decommissioning. In this way the agency can make scientifically based well-reasoned decisions on how the <u>overall transportation system (part of which is FDR 151 and 151A</u>) is to be affected. And spending thousands of taxpayers’ dollars on reconstructing and improving a road, the capital investment needed there for FDR 151A, may certainly affect any future road management objectives or uses for that road (and what these

are was unknown as neither a site-specific nor Forest RAR were in hand that addressed these issues).

The reconstructed road will also allow or facilitate a variety of legal and illegal uses and result in various environmental impacts. It is to be "improved" with culverts and grading. It is to be seeded with native grass species. The roads are to be used to implement the proposal and part of the proposal involves work and expenditures on the roads. The roads are part of the overall transportation system. So the Ranger's statement that "[t]he overall transportation system is not being affected by the proposal" is plainly and simply false and ludicrous.

In this case the Ranger turned the entire process on its head. Instead of using the scientific road analysis process to determine how the transportation system should be managed (affected), he claims to somehow not be affecting the transportation system (though deciding to spend thousands of dollars to improve and reconstruct a road to ready it for use by logging equipment) so therefore does not need to perform a road analysis.

The deciding official cited to no Forest Roads Analysis Report in support of deciding that a road analysis was not needed there. Nor did he cite to a watershed- or project-scale road analysis report in support of his decision. Neither documentation nor reason support the finding that a road analysis was not needed here. It was not established by proper due process and scientific analysis that FDR 151A was a priority for improvement (and attendant capital outlays) or that it is even needed, or if it should instead be decommissioned or if it should be rerouted out of riparian areas. Nor did a proper analysis identify the road associated environmental risks there.

Such analysis and reports are particularly important there due to the ecological, social, and scenic significance of such a large tract of roadless/unroaded Forest (the Dunkle Knob Mountain Treasure is the site of the timber sale actions) and the high MAIS score for Dice Run (EA-10). Road Analysis and Report are also needed due to the fact that the county and/or watershed harbor rare species, such as the Cow Knob Salamander, Wood Turtle, Indiana and Virginia Big-eared Bats, Coal Skink, Bald Eagle, and Potomac Sculpin.

It was additionally important that a determination of needed and unneeded roads and priorities for road improvements and decommissioning be accomplished there since public comments specifically raised the issues involving restoration activities, unroaded/roadless areas, and roads (see project file).

The revised Plan and its accompanying analysis must ensure that situations such a occurred with the Dice Run project do not happen again. The GWNF must disclose to and involve the public in comprehensive transportation planning that identifies and funds upgrading, maintenance, or decommissioning forest roads. The DCER and DLMP do not manifest this clear necessity.

Logging

C. Suitability

***** *Special Conditions*: Aside from discrete special areas, there are numerous **conditions within the general forest area of the GWNF that need to be given special consideration, such as scree, talus, rocky slopes and outcrops, springs, and seeps**. **These sites, as well as a substantial buffer around them, must be considered not suitable for timber production/harvest, road construction, wind development, drilling, or mining**.

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). The "proximity to extant populations is a critical factor

controlling the rate and timing of secondary forest colonization. . . . These results suggest that redevelopment of RMF [rich mesic forest] vegetation in secondary forests has proceeded more rapidly where species that are poor dispersers have persisted locally (e.g. on and around bedrock outcrops). . . . many secondary forest sites that are environmentally suitable for RMF vegetation do not support the suite of species typical of the community, apparently because of the dispersal limitations of forest herbs with ant-dispersed seed and those with no morphological adaptations for seed dispersal. . . . Protection of secondary forests around such refugia (e.g. bedrock outcrops, hedgerows) could allow for the development of significant RMF sites, given sufficient time." (*id*.)

Issue 8. Vegetation Manipulation

Biocides

***** The FS planners have thus far failed to adequately and fairly evaluate **the direct, indirect, and cumulative effects of biocide applications upon Forest diversity, sustainability, populations, and communities.** I am particularly concerned about impacts to amphibians and reptiles. See, *e.g*., Relyea, R.A. 2005. The lethal impact of Roundup on aquatic and terrestrial amphibians. Ecological Applications 15(4): 1118-1124; and Relyea, R.A. 2006. Response letter. Ecological Applications 16(5): 2027-2034.

"Recent research on chemical disruptions of the endocrine systems of animals indicates that many common industrial chemicals can have profound and long-lasting adverse effects on many vertebrates species, including humans (Colborn and Clement 1992, Colborn et al. 1993, Colborn et al. 1996, EPA 1997). At this point in time, the Environmental Protection Agency (EPA) has no formal tests or screening processes established for detecting these commercially available hormone-mimicking and hormone-blocking chemicals (EPA 1997). Adverse effects can occur with even miniscule doses (parts per trillion) of some of these chemicals (Colborn and Clement 1992, Colborn et al. 1993, Colborn et al. 1996, EPA 1997). This hormone-mimicking mechanism has been proposed as a possible explanation for the current, pervasive breast cancer epidemic in western society (Davis et al. 1993). Many chemical herbicides used on PALCO forests have been documented to mimic the female hormone estrogen (e.g., 2,4-D, 2,4,5-T, atrazine; Colborn et al. 1993). These herbicides have also been linked to deformities or mortalities in birds, mammals, amphibians, reptiles, and fish (Hall and Henry 1992, Colborn et al. 1993, Berrill et al. 1994, Berrill et al. 1997). In the absence of studies of any particular chemical which demonstrate that it is not harmful to the species of concern in this HCP/SYP, and in the interest of ecosystem health, the safest approach currently available would be to avoid the use of all of these chemicals." Welsh, H. *et al*. 1998 *op cit*.

The FS must fully assess and consider avoiding the use of all hormone-mimicking and hormone-blocking chemicals on the Forest. This is a feasible management direction/option.

***** Again, **cumulative impacts** of biocides are a significant concern. See, *e.g*., Relyea, R.A. 2008. A cocktail of contaminants: how mixtures of pesticides at low concentrations affect aquatic communities. Oecologia DOI 10.1007/s00442-008-1213-9.

The following press release is about this research:

"Pitt Research Finds That Low Concentrations Of Pesticides Can Become Toxic Mixture - Concentrations Of 10 Most Popular Pesticides That Fall Within EPA Safe-Exposure Levels, When Combined, Cause 99 Percent Mortality In Leopard Frog Tadpoles

November 11, 2008
Contact: Morgan Kelly, 412-624-4356 (Office); 412-897-1400 (Cell)

Mekelly@Pitt.Edu, Press Release

PITTSBURGH - Ten of the world's most popular pesticides can decimate amphibian populations when mixed together even if the concentration of the individual chemicals are within limits considered safe, according to University of Pittsburgh research published Nov. 11 in the online edition of “Oecologia.” Such “cocktails of contaminants” are frequently detected in nature, the paper notes, and the Pitt findings offer the first illustration of how a large mixture of pesticides can adversely affect the environment.

Study author Rick Relyea, an associate professor of biological sciences in Pitt's School of Arts and Sciences, exposed gray tree frog and leopard frog tadpoles to small amounts of the 10 pesticides that are widely used throughout the world. Relyea selected five insecticides-carbaryl, chlorpyrifos, diazinon, endosulfan, and malathion-and five herbicides-acetochlor, atrazine, glyphosate, metolachlor, and 2,4-D. He administered the following doses: each of the pesticides alone, the insecticides combined, a mix of the five herbicides, or all 10 of the poisons.

Relyea found that a mixture of all 10 chemicals killed 99 percent of leopard frog tadpoles as did the insecticide-only mixture; the herbicide mixture had no effect on the tadpoles. While leopard frogs perished, gray tree frogs did not succumb to the poisons and instead flourished in the absence of leopard frog competitors.

Relyea also discovered that endosulfan - a neurotoxin banned in several nations but still used extensively in U.S. agriculture-is inordinately deadly to leopard frog tadpoles. By itself, the chemical caused 84 percent of the leopard frogs to die. This lethality was previously unknown because current regulations from the U.S. Environmental Protection Agency (EPA) do not require amphibian testing, Relyea said. His results showed that endosulfan was not only highly toxic to leopard frogs, but also that it served as the linchpin of the pesticide mixture that eliminated the bulk of leopard frog tadpoles.

‘Endosulfan appears to be about 1,000-times more lethal to amphibians than other pesticides that we have examined,’ Relyea said. ‘Unfortunately, pesticide regulations do not require amphibian testing, so very little is known about endosulfan's impact on amphibians, despite being sprayed in the environment for more than five decades.’

For most of the pesticides, the concentration Relyea administered (2 to 16 parts per billion) was far below the human-lifetime-exposure levels set by the EPA and also fell short of the maximum concentrations detected in natural bodies of water. But the research suggests that these low concentrations-which can travel easily by water and, particularly, wind-can combine into one toxic mixture. In the published paper, Relyea points out that declining amphibian populations have been recorded in pristine areas far downwind from areas of active pesticide use, and he suggests that the chemical cocktail he describes could be a culprit.

The results of this study build on a nine-year effort by Relyea to understand potential links between the global decline in amphibians, routine pesticide use, and the possible threat to humans in the future. Amphibians are considered an environmental indicator species because of their unique sensitivity to pollutants. Their demise from pesticide overexposure could foreshadow the fate of less sensitive animals, Relyea said. Leopard frogs, in particular, are vulnerable to contamination; once plentiful across North America, including Pennsylvania, their population has declined in recent years as pollution and deforestation have increased.

Relyea published a paper in the Oct. 1 edition of “Ecological Applications” reporting that gradual amounts of malathion - the most popular insecticide in the United States - that were too small to directly kill developing leopard frog tadpoles instead sparked a biological chain of events that deprived them of their primary food source. As a result, nearly half the tadpoles in the experiment did not reach maturity and would have died in nature. Relyea published papers in 2005 in the same journal suggesting that the popular weed-killer Roundup® is ‘extremely lethal’ to amphibians in concentrations found in the environment. News releases about Relyea's previous work are available on Pitt's Web site at www.news.pitt.edu

The paper can be found on the Oecologia Web site at www.springerlink.com/content/3420j3486k108805/ or by contacting Morgan Kelly."

***** **Indirect effects (*e.g.*, the initiation of deleterious trophic cascades)** are also a significant concern. See, *e.g.*, Relyea, R.A. and Diecks, N. 2008. An unforeseen chain of events: Lethal effects of pesticides on frogs at sublethal concentrations. Ecological Applications 18(7): 1728-1742. doi: 10.1890/08-0454.1

"Abstract:

The field of toxicology has traditionally assessed the risk of contaminants by using laboratory experiments and a range of pesticide concentrations that are held constant for short periods of time (1–4 days). From these experiments, one can estimate the concentration that causes no effect on survival. However, organisms in nature frequently experience multiple applications of pesticides over time rather than a single constant concentration. In addition, organisms are embedded in ecological communities that can propagate indirect effects through a food web. Using outdoor mesocosms, we examined how low concentrations (10–250 ug/L) of a globally common insecticide (malathion) applied at various amounts, times, and frequencies affected aquatic communities containing zooplankton, phytoplankton, periphyton, and larval amphibians (reared at two densities) for 79 days. All application regimes caused a decline in zooplankton, which initiated a trophic cascade in which there was a bloom in phytoplankton and, in several treatments, a subsequent decline in the competing periphyton. The reduced periphyton had little effect on wood frogs (*Rana sylvatica*), which have a short time to metamorphosis. However, leopard frogs (*Rana pipiens*) have a longer time to metamorphosis, and they experienced large reductions in growth and development, which led to subsequent mortality as the environment dried. Hence, malathion (which rapidly breaks down) did not directly kill amphibians, but initiated a trophic cascade that indirectly resulted in substantial amphibian mortality. Importantly, repeated applications of the lowest concentration (a "press treatment" consisting of seven weekly applications of 10 ug/L) caused larger impacts on many of the response variables than single "pulse" applications that were 25 times as great in concentration. These results are not only important because malathion is the most commonly applied insecticide and is found in wetlands, but also because the mechanism underlying the trophic cascade is common to a wide range of insecticides, offering the possibility of general predictions for the way in which many insecticides impact aquatic communities and the populations of larval amphibians."

***** The consideration of herbicides in the DCER and DLMP is superficial and inadequate. For just one issue, the effects of these chemicals on reptiles and amphibians are big unknowns.

"Little has been published on the sensitivity of turtles to pesticides. Marked decreases were observed in Wood Turtle numbers in parts of New Jersey subjected to heavy spraying of pesticides for Gypsy Moth control (especially in the late 1950's and 1960's)—even where habitats remained essentially unchanged. Although more quantitative studies are needed, observations do suggest a relationship between pesticide usage and reptile population declines. Minton (1972) noted that insectivorous lizards, snakes, and amphibians have decreased at a more rapid rate than non-insectivorous species, and that decreases were more marked in area of heavy pesticide use. Clark et al. (1971) noted that oviparous species of snakes in a heavily sprayed area of Texas were practically eliminated, while "live-bearing" species fared better. It would come as no surprise to find that highly insectivorous turtles are affected by pesticide usage." (Harding, J.H. and T.J. Bloomer. 1979. The Wood Turtle, *Clemmys insculpta* . . . A Natural History. *HERP*, Vol. 15, No. 1: 9-26.)

Immunosuppressive effects of low-level exposure to organochlorines have been implicated in pathologies observed in Eastern Box Turtles (*Terrapene carolina carolina*) (see Tangredi, B.P. and R.H. Evans. 1997. Organochlorine pesticides associated with ocular, nasal,

or otic infection in the eastern box turtle (*Terrapene carolina carolina*). Journal of Zoo and Wildlife Medicine 28(1): 97-100).

Since the Harding & Bloomer statement was published almost 30 years ago the use of biocides on the Forest (including to "control" Gypsy Moths) has continued unabated.

The effects of these chemicals on reptiles and amphibians are mostly big unknowns. For example, what are the direct impacts of herbicides upon Wood Turtles? The Forest Service has applied herbicides at locations where the Turtles occur. The "fact sheets" in the project files (see, *e.g*., the GWNF NRRD Maybe TS) contain no information on the effect of the herbicides upon Wood Turtles or other reptiles.

Disturbance Regimes and Oaks

The discussion in Rentch, J.S. 2006 *op cit*. is relevant to the GWNF:

"In eastern, mesic, deciduous forests of the type found in ERMN [Eastern Rivers and Mountains Network in the Central Appalachians] units, most forest turnover is associated with small, single- and multiple-tree canopy gaps (Runkle 1982, 1990). Major, stand initiating disturbances reach perhaps their lowest level of importance for forest types in the eastern United States (Runkle 1990). Tornadoes occur, but are relatively rare. The frequency of large-scale wind events declines in the southern portion of ERMN (Runkle 1982, 1985, 1990). Wind is the dominant agent of gap formation (Barden 1981; Romme and Martin 1982; Runkle 1985; Clebsch and Busing 1989) and single and multiple tree-fall gaps are the dominant disturbance type (Runkle 1982; Crow 1988), especially as forests mature. Winds and thunderstorms accounted for 40–70% of severe weather events in portions of WV and southwestern PA in one study (Rentch 2003a). In a study that examined five oak-dominated stands in three states, small-scale disturbances occurred, on average, every three years, while larger events, involving more than one tree, occur on a 17-year interval (Rentch et al. 2003a). While wind is the most common precipitating cause, excessive rainfall, flooding, erosion and soil slippage, insect defoliation and/or fungal infestation, lightning strike, drought, and many others may be contributing factors."

Oaks are plastic and polymorphic in their adaptations to environmental gradients and disturbances. "[D]ecadal-scale growth changes of 150- to 350-yr-old overstory oaks were used to identify canopy disturbance events in five old-growth stands . . . the majority of multiple-tree disturbances were associated with gaps < 200 m2 in area. Historic disturbance frequency and size distribution of canopy gaps suggest that the oak components of these stands persisted by utilizing a variety of growth strategies appropriate to large and small openings. The absence of significant changes in overstory disturbance frequencies further suggests that increases in the level of understory competition are responsible for the present-day decline in oak dominance." Rentch, J.S., M.A. Fajvan, R.R. Hicks Jr. 2003a. Spatial and temporal disturbance characteristics of oak-dominated old-growth stands in the central hardwood forest region. Forest Science 49(5): 778-789.

In a study of five old-growth stands in OH, PA, and WV "understory residence times averaged 89, 54, 50 and 38 years for white oak, northern red oak, black oak, and chestnut oak, respectively" before canopy gap release to the overstory. "For sample oaks, three canopy accession strategies were identified based on juvenile growth rates (at dbh), overall growth patterns, and the presence or absence of a major crown release . . .

"The tree-ring record suggests three modes of oak establishment and canopy recruitment: (a) establishment/release in large, multiple-tree openings after a stand-initiating disturbance; (b) episodic recruitment in canopy gaps that either remain open long enough for

stems to reach the overstory without being overtopped from above, or which temporarily close followed by a repeat disturbance and release; and (c) continuous establishment, extended period of low annual growth in the understory, and subsequent overstory recruitment by means of either (a) or (b)." Rentch, J.S., M.A. Fajvan, and R.R. Hicks, Jr. 2003b. Oak establishment and canopy accession strategies in five old-growth stands in the central hardwood forest region. Forest Ecology and Management 184: 285–297.

Oaks are of intermediate tolerance to shade (Burns, R.M. and B.H. Honkala (tech. coords.) 1990. Silvics of North America, vol. 2, Hardwoods. Agriculture Handbook No. 654. USDA Forest Service: Washington, DC).

However, "if an increase in light reaching the forest floor is not accompanied by a reduction in competing species, the temporary advantage available to oaks may be lost." Rentch *et al*. 2003b *op cit*.

Again, what is not being properly considered is that on the GWNF perhaps a 'problem' for oaks can be called: 'It's the Deer, stupid'. See, *e.g*., Rooney, T.P., S.M. Wiegmann, D.A. Rogers, and D.M. Waller. 2004. Biotic impoverishment and homogenization in unfragmented forest understory communities. Conservation Biology 18(3): 787-798.

Examination of basal slabs from trees that germinated prior to European settlement and population expansion suggest that fire was not always prevalent and that additional factors may be responsible for the lack of oak recruitment (McCarthy, B.C., Small, C.J., and D.L. Rubino. 2001. Composition, structure and dynamics of Dysart Woods, an old-growth mixed mesophytic forest of southeastern Ohio. Forest Ecology and Management 140: 193–213).

"The canopy disturbance regime described in this study—large, infrequent stand-initiating disturbances, and frequent, small, repeat canopy gaps—should facilitate the presence of shade tolerant species in the old growth cohorts (Barden, 1980, 1981; Runkle, 1985; Canham, 1990; Poulson and Platt, 1996). However, none of these sites had these species in the oldest cohort. . . . First, they may have recruited and died. Red maple and hickories at Murphy Tract are currently present in the overstory, yet neither is as long-lived as white oak (Iverson et al., 1999), and had they been a component of the initial stand, they would not necessarily be present today. The absence of overstory sugar maple and beech suggests the second dynamic. . . . The dominance of oak in presettlement-era forests can be attributed, in part, to the frequency of surface fires set by native Americans (Bromley, 1935; Day, 1953; Buell et al., 1954; Abrams, 1992; Bonnicksen, 2000). Settlers continued this practice through the 1800s (Van Lear and Waldrop, 1989; Abrams, 1992; Sutherland, 1997)." (emphasis added) Rentch *et al*. 2003b *op cit*.

Here a forester is explicit that the disproportionate amount of oaks in the GWNF is a human artifact, the result of anthropogenic disturbance. The agency's rationale for management actions that serve to perpetuate this condition (through Plan objectives, desired conditions, and guidelines) is not clear. And such a trajectory is not necessary.

"The continued dominance of *Quercus* spp. seems most likely on the more nutrient poor, west- southwest-facing sites at mid- to upper-slope positions." (Rentch, J.S., R.H. Fortney, S.L. Stephenson, H.S. Adams, W.N. Grafton, R.B. Coxe, and H.H. Mills. 2005. Vegetation patterns within the lower Bluestone River gorge in southern West Virginia. Castanea 70(3): 184–203.) A multitude of such sites on the GWNF, so dominance by oaks can be expected to persist on much of the Forest without the logging and intentional burning contemplated in the DLMP.

Much verbiage is spent on what may be termed 'the ecological foundations of the oak regeneration problem'; whereas actually a far greater problem appears to be the cultural foundations of oak misperception/regeneration. The GWNF planners have thus far failed to properly consider this relevant factor. At various sites the high numbers of oaks are a cultural artifact of past and ongoing anthropogenic fires and other disruptions (such as logging and the Chestnut blight). It is not necessary or necessarily desirable to sustain/perpetuate these

disproportionate numbers. In many ways such enforced conditions or lack of diversity (disproportionate amounts) are not good for forest health (such as providing more favorable conditions for invasive pests like Gypsy Moth).

Fewer numbers of oaks of oaks does not spell doom to the Forest's ecosystems. As the FS likes to point out, ecosystems are plastic and resilient. When Chestnuts (in many places a species more dominant than oaks) died out wildlife populations continued. And there is plenty of wildlife in entire areas not dominated by oaks, such as the Beech – Maple – Basswood (PA, NY, WS, MN, IA), Northern Hardwoods – Hemlock (PA, NY, CN, MA, VT, NH, ME), and Northern Hardwoods – Red Pine (MI, WS, MN) forest regions (see Dyer, J.M. 2006. Revisiting the Deciduous Forests of Eastern North America. BioScience 56(4): 341-352). And many of these floral and faunal species are the same as those found here (see, *e.g*., McNab, W.H. and P.E. Avers, comps. 1994. Ecological subregions of the United States: Section descriptions. Administrative Publication WO-WSA-5. Washington, DC: USDA Forest Service. 267 pp.)

"The species composition of presettlement forests suggests a highly variable disturbance regime in which a variety of species with different life history strategies, disturbance tolerances, and growth requirements shared overstory position. Changes in species dominance over the time period reviewed suggest that 20th century reduction in fire frequency resulted in reduced oak abundance and accelerated recruitment of fire intolerant species." Rentch J.S. and R.R. Hicks. 2005. Changes in presettlement forest composition for five areas in the central hardwood forest, 1784-1990. Natural Areas Journal 25(3): 228-238.

This reduction (if it occurs) in sheer numbers of oaks is good as it can result in a healthier forest with a more balanced diversity of overstory species and a forest more "natural" and less a cultural artifact (as was alluded to in Rentch *et al*. 2003b *op cit*.).

Acidic Deposition/Acid Neutralization/Soils/Nutrients/Air Pollution

Air pollutants/contaminants/effects of concern include acidification (acidic deposition), nitrogen and sulfur deposition and saturation, changes in nutrient dynamics (*e.g*., elevated/mobilized aluminum and increased leaching of base cation minerals), heavy metal toxicity, pesticide toxicity, and visual impairment. I am concerned that the DLMP and DCER do not adequately address and provide for long-term sustainability and productivity and sustained yield.

"Wet/dry depositional effects are manifested in a variety of ways, depending on the pollutant. Direct effects include foliar necrosis and dieback in plants. In other cases, pollutants may be directly toxic to plants, animals, or microorganisms. However, indirect effects that result, for example, from soil acidification and its effect on mineral cycling may be more significant in the long term. Atmospheric pollutants and contaminants potentially affect resources such as water and mineral nutrients. The long-term effects, such as altered litter decomposition, micro-flora and fauna, and altered nutrient cycling pose major threats to the health, fecundity, and sustainability of the ecosystems, and lead to an overall loss of species diversity." Rentch, J. 2006 *op cit*. Also see Lovett, G. M. 1994. Atmospheric deposition of nutrients and pollutants in North America: an ecological perspective. Ecological Applications 4(4): 629-650; and McLaughlin, S. and K. Percy. 1999. Forest health in North America: some perspectives on actual and potential roles of climate and air pollution. Water, Air, and Soil Pollution 116: 151-197.

Acidification of streams on the GWNF is of course an issue of great concern. See Webb, R. 2004. Effects of Acidic Deposition on Aquatic Resources in the Central Appalachian Mountains. A Shenandoah Watershed Study Report, Department of Environmental Sciences, University of Virginia. 82 pp.

Acidically impaired streams and their watersheds need special attention (such as a special management area/prescription) and need to be a priority for restoration efforts. In addition, even if the source of degradation is not in the control of the FS, **the agency must refrain from management activities that add cumulative impacts to already stressed or impaired systems (such as logging at acidic sites)**.

At the table devoted to "vegetation manipulation" at the November 12, 2008 Verona public meeting I raised the issue/concern about acidic deposition, poor acid neutralizing capacity at sites on the Forest, and cumulative impacts of the above factors in conjunction with logging.

This issue/concern was disposed of/brushed aside in a matter of seconds by Mr. MacFarlane. It was as if the last 30 years of concern and research regarding the problems related to acidification do not exist.

I hope this is not the official stance of the agency.

The response at the Verona meeting makes me extremely concerned about just what the FS is "hearing" from the public, as well as how fairly and fully the agency is going to address this significant issue (and others).

I raised this issue and concern in my previous comments and here reiterate them in expectation that they will be taken seriously and explicitly and thoroughly addressed.

Acidic deposition is certainly an issue that needs to be taken seriously on the GWNF. "There is strong evidence that human actions can influence nutrient status of a site at macro-, meso-, and micro-scales. For example, at the macro-scale, precipitation in the central Appalachian Region is among the most acidic in the United States, and pH readings below 4.0 are common in summer months (Rentch and Hicks 2000)." Rentch, J.S. 2006 *op cit*. citing to Rentch, J. S., and R. R. Hicks, Jr. 2000. Nutrient fluxes for two small forested watersheds: sixteen-year results from the West Virginia University Forest. WV Agricultural and Forestry Experiment Station Report.

***** The DCER and DLRMP fail to fully and fairly consider and disclose **effects of acid deposition on soil productivity, nor effects of removal of tree biomass (boles) from logging sites, and the affects of these upon nutrient depletion, long-term productivity and sustainability, and sustained yield**. The FS must fully and fairly evaluate this significant issue in detail. See Gasper, D. C., 1997, "Forest and Trout Stream Nutrients in a Period of Acid Rain", pp. 68-73 in N. Hitt, ed., Proceedings from the 1996 Central Appalachian Ecological Integrity Conference, Heartwood, IN.

"□□□□□□□□□□Forests that may be particularly susceptible to nutrient depletion effects of harvest removals would be those with a large proportion of species such as hickories (*Carya*), basswood (*Tilia americana*), oak (*Quercus*), and yellow-poplar (*Lirodendron tulipifera*), which store large amounts of calcium in their bole wood (Raynal et al., 1992). Johnson et al. (1988) found significant decreases in subsoil exchangeable calcium due to high uptake rates by the Walker Branch mixed deciduous forest, containing a high proportion of calcium-demanding species. Forests where large amounts of the base nutrients are stored aboveground would be susceptible to base losses from harvesting. Soils that are sensitive to base cation depletion from harvesting include those with low CEC, moderate to low base saturation, those that develop from parent material low in weatherable bases or those that are highly weathered." Adams, M.B. *et al*. 2000. Impact of harvesting and atmospheric pollution on nutrient depletion of eastern US hardwood forests. Forest Ecology and Management 138: 301-319.

The attributes and factors outlined in the preceding quote typify conditions on the GWNF.

□□□□ □□ □□□□□□□ □□ □□□□ □□□□□□□□ □□□□□ □□□ □□□□□□□□ □□□□□□
□□□□□□□□ □□□□ □□□□□□□□□ □□ □□□ □□ □□□□□ □□□□ □□□ □□□ □□□□□□□□□
□□ □□□□□□□□ □□□□□□□ □□□□

***** **<u>The FS needs to identify and map the soils and sites on the GWNF that are at risk of nutrient depletion due to acidic degradation</u>**. **These sites should not be "suitable" for logging**. The FS needs to map and disclose these areas.

Researchers in WV identified "soils that are most sensitive to acidification and base-cation loss [as] those with low base saturation, low C/N ratios, high Al saturation of the cation-exchange complex, and derived from acidic parent material." Adams, M. B. 1999. Acidic deposition and sustainable forest management in the central Appalachians, USA. Forest Ecology and Management 122: 17–28.

***** What areas on the GWNF where there is the **potential exceedance of critical acid loading**? What areas on the GWNF where there is the **current actual exceedance of critical acid loading**? **These sites should not be "suitable" for logging**. **The FS needs to map and disclose these potential and existent areas**.

See McNulty, S.G. *et al*. 2007. Estimates of critical acid loads and exceedances for forest soils across the conterminous United States. Environmental Pollution 149: 281-292.

***** Trees contain large reservoirs of calcium and magnesium. Removal of the trees from a site, particularly at areas that are already stressed and degraded, has clear implications for the ability of the site to buffer and recover from acidic deposition (see, e.g., "Base cations are removed from soil by . . . harvesting (Gibondo-Tugbawa and Driscoll 2002)." USDA FS 2006 Monongahela National Forest FEIS 3 – 30, incorporated by reference). This is in addition to the other stresses upon the ecosystem resulting from invasively entering with heavy machinery and altering and removing site conditions.

Mr. MacFarlane indicated that this is not a concern since a greater proportion of potential soil nutrients are found in leaves and branches (which are usually left on site). Is this lack of concern the official stance of the Forest Service? Even at sites with inherently low buffering capacity, with potential or actual exceedence of critical acid loads, and/or with low productivity?

What specific scientific research is the agency using in support of Mr. MacFarlane's position? ***** **Please send me copies (paper or electronic) of these citations ASAP**. Thank you.

The cumulative impacts of the cutting in conjunction with the current degraded situations may be significant. The revised Plan must fully address these factors and concerns.

***** **The DCER and DLMP do not fully and fairly address the direct, indirect, and cumulative <u>impacts of acidic precipitation and deposition</u> upon many taxa, such as trees, herbs, lichens, snails, birds, reptiles, and amphibians**. See, *e.g*., Pierce, B.J. 1993. The effects of acid precipitation on amphibians. Ecotoxicology 2: 65-77; and Wyman, R.L. and J. Jancola. 1992. Degree and scale of terrestrial acidification and amphibian community structure. Journal of Herpetology 26(4): 392-401. "Impacts of global climate change, atmospheric deposition, and air pollution would most likely be apparent in herptofaunal communities before they would in other sectors of the terrestrial ecosystem." (Rentch, J.S. 2006 *op cit*.) The sustained yield of populations (such as salamanders or snails) and/or their habitat on the Forest is threatened. Implementation of the DLMP would violate or threaten to violate the MUSYA and NFMA. Although acidic atmospheric deposition and its direct impacts may not be in control of the Forest Service, management actions that work in conjunction with those impacts are (cumulative effects).

At the ecosystem level, deposition/saturation/acid precipitation has been linked to **calcium depletion** in the Central Appalachians (Adams, M. B. 1999 *op cit*.). "N deposition is

expected to increase by 25% during the next 25 years (Galloway et al., 1995), raising concerns about N saturation of forest soils. . . . Thus, over time elevated inputs could result in significant decreases in soil fertility and nutrient deficiencies. Ca deficiencies have been identified in high elevation red spruce (McLaughlin et al., 1991) and may be linked to sugar maple decline (Long et al., 1997) on non-glaciated soils. Of particular interest and significance are those forest ecosystems that are believed to be N saturated as a result of ambient N deposition. Forest ecosystems in the United States which are N saturated due to ambient levels of N deposition include . . . hardwood forests of the central Appalachian region (Adams et al., 1997). . . . These changes are attributed to the effects of ambient acidic deposition. Thus these long-term effects can occur at ambient levels." (*id*.) And in the almost 10 years since the previous quote was written, in what other tree species and forest communities have effects been identified or have declines gotten worse? □□□□□□□□□□□

The DCER and DLMP pretty much just sweep these major issues/concerns under the rug.

□□□□"Calcium and magnesium may also leach into the water due to an increase in positive ions from acid precipitation and are ultimately carried downstream, thereby unavailable to plants or trees. There is evidence that the decline of both sugar maples and northern red oaks in areas of Pennsylvania may be linked to these processes (see Long et al. 1997; Horsley et al. 1999; Demchek and Sharp 2004)." Rentch, J. 2006 *op cit*.

Acid deposition that causes a decline of soil calcium on poor soils (soils with poor buffering capacity are found throughout the GWNF) may reduce snail populations. This reduction may have cascading/rippling effects upon populations of other taxa such as salamanders, turtles, and birds. See, *e.g*., Graveland J. and R. vanderWal. 1996. Decline in snail abundance due to soil acidification causes eggshell defects in forest passerines. Oecologia 105(3): 351-360; and Hotopp, K.P. 2002. Land snails and soil calcium in central Appalachian mountain forest. Southeastern Naturalist 1(1): 27-44 ("As in Scandinavia, land snails in Maryland forests of the Appalachian Mountain Plateau appear to be linked to soil Ca. . . . Because of the snail-Ca linkage in central Appalachian Mountain forest ecosystems, temporal changes in soil Ca resulting from acid rain or timber harvest would be expected to affect land snail community metrics. Over a 20-year interval in Swedish spruce and oak forest sites, soil and litter-layer Ca loss was associated with an 80% decline in land snail numbers (Wäreborn 1992). At herb-rich forest sites snail decline averaged 60%. The average decrease in Ca was 31% at these unlogged sites. These declines were noted on soils with Ca levels similar to those in the present study (Garrett County sites had Ca values ranging from 4 – 15 g/kg of dry soil, acidic Swedish sites 4 – 12 g/kg and richer Swedish sites and 10 – 28 g/kg).")

Nitrogen deposition can affect deciduous forest trees and conditions as well as coniferous. See Boggs, J.L., S.G. McNulty, M.J. Gavazzi, J. Moore Myers. 2005. Tree growth, foliar chemistry, and nitrogen cycling across a nitrogen deposition gradient in southern Appalachian deciduous forests. Canadian Journal of Forest Research 35: 1901-1913) and Boggs, J.L., S.G. McNulty, and L.H. Pardo. 2007. Changes in conifer and deciduous forest foliar and forest floor chemistry and basal area tree growth across a nitrogen (N) deposition gradient in the northeastern US. Environmental Pollution 149(3): 304-314 ("the point at which harmful ecological effect will occur as a result of chronic N deposition inputs differs between forest types.") <u>These negative and variable impacts must be considered in determining "suitability" on the Forest</u>.

"Similarly, alteration of soil resources as a result of acid precipitation may change the mycorrhizal community composition, which in turn may affect vegetative germination and growth rates, species presence/absence, and the rates of natural forest development (e.g., Blaney and Miller 1995)." Rentch, J. 2006 *op cit*.

I am concerned about not only the direct and indirect effects of acidic deposition, but also the cumulative effects in conjunction with management actions (such as logging and/or

burning) and other factors. I am additionally concerned about the sustained yield of populations and habitat under the potential cumulative impacts that could accrue were the DLMP to be implemented. The DCER and DLMP do not reflect the full and fair consideration of this issue (such as determining areas to not be "suitable" for various management activities due to factors involved with acidic deposition).

See McLaughlin, S.B. and R. Wimmer. 1999. Calcium physiology and its role in terrestrial ecosystem processes. New Phytologist 142: 373-417 ("It appears that in both the USA and Europe longer-term supplies of soil Ca can be expected to be chronically reduced for many forest systems if high N-loading continues.").

***** Is part of the reason numerous sites on the Forest have low site indices (*e.g.*, 40-60) due to the fact that have been intensively logged in the past? How and to what extent will continuing to log these low site index sites make their productivity even poorer? What are the effects and situation associated with poor soil quality, low buffering capacity, and/or high leaching rates? How much N-loading is occurring on the Forest and what is projected? What are the impacts from past, current, and future N deposition? What data, monitoring, information, and research is the Forest Service using to address these concerns/issues?

Individually, acidic deposition or poor nutrient availability might not be enough in and of themselves to affect long-term sustainability, but what about the synergism and/or amplification of numerous factors that may increase susceptibility to other stresses? And different communities/species differ in their susceptibility or vulnerability, as do mature or old growth systems differ from younger seral stages.

The FS has thus far not properly and adequately addressed and evaluated the issue of **long-term and cumulative impacts to soils and trees and other vegetation**, particularly in conjunction with the massive logging assault of 80-130 years ago (see DCER and DLRMP).

I am concerned about the sustained yield of populations, habitat, and site productivity under the potential cumulative impacts that could accrue were the DLMP to be implemented. The DCER and DLMP do not reflect the full and fair consideration of this issue. The issues, concerns, and factors (*e.g.*, **high N-loading, old growth, soils with poor acid neutralizing capacity, low nutrient sites, and ozone**) discussed in the McLaughlin and Wimmer (1999) paper are relevant here.

"Over longer-term cycles, repeated harvesting can also be evaluated as a soil-acidifying process associated with the net removal of cation bases from the soil (Ulrich & Matzner, 1986). . . . Knowledge of the relative importance of weathering, leaching and uptake rates by vegetation coupled with estimates of the pools in foliage and forest floor can provide forest managers important insights into long-term sustainability of nutrient cycles with available harvesting options. . . . It appears that in both the USA and Europe longer-term supplies of soil Ca can be expected to be chronically reduced for many forest systems if high N-loading continues. . . . The association of Ca deficiency with accelerated plant senescence, derived principally from experience with crop plants and horticulture (Pooviah, 1988), appears to have particular relevance to potential Ca limitations on the size and age of mature forest trees, and the structural integrity of old-growth forests.

"How might this occur? As trees increase in age and stature, the challenges of providing carbohydrates to support increasingly large maintenance respiration rates of support structures lead to an increasingly narrow margin of physiological flexibility to meet the demands of growth, reproduction and defense (McLaughlin & Shriner, 1980; Waring, 1987). The logistics of supply of nutrients and water to aboveground structures becomes increasingly difficult with larger, older trees as root systems are weakened by the increasing carbohydrate demands of maintenance and defense and transport systems are extended. . . .

"For example, decreases in Ca supply by natural soil or climatic limitations can be further amplified by increased N deposition, which typically shifts carbohydrate allocation to shoots at

the expense of roots (Persson & Majdi, 1995). Under these conditions, potential reductions in transport of water and Ca would probably act to amplify the influence of Ca deficiency, whatever the primary cause. Loss of membrane integrity in roots or foliage, and increased rates of respiration resulting from Ca deficiency would be expected to amplify the effects of carbohydrate shortages associated with aging stress in larger, older trees, or competitive stress of younger trees growing under conditions of intensive demand on site-supply capacity. The expected consequence in either case is increased sensitivity of trees to a variety of stresses. Likely mechanisms for such responses include altered structural integrity of woody tissues above and below ground, and increased susceptibility of these tissues to structural damage from wind and ice as well as reduced capacity to repair damage and defend against disease." (McLaughlin and Wimmer 1999 *id*.)

"Ozone has often been cited as the air pollutant of greatest direct threat to vegetation in the eastern U.S. (EPA 1996). . . . ozone affects vegetation, causing foliar injury and premature aging of leaves, destruction of the photosynthetic enzymes, (i.e., Rubisco), and thereby, leading to a reduction in growth. Chronic ozone exposure has three main physiological effects on plants: 1) disruption of transpiration; 2) disturbances in carbohydrate metabolism and movement; and 3) mineral nutrient deficiencies. All of these lead to premature leaf aging, yellowing, and reductions in growth rates (Chappeklka and Samuelson 1998). . . .
"There is also a positive feedback mechanism between ozone and acid deposition. Chronic ozone exposure may lead to mineral nutrient deficiencies, as ions and organic compounds are leached from leaves. Greater uptake of minerals from soil may compensate for leaching; however, soil acidification may reduce the availability of soil nutrients due to leaching and aluminum release. Chappelka and Chevonne (1992) conclude that the literature also indicates that ozone has the potential to influence tree reproduction, directly by affecting reproductive structures, and indirectly by affecting plant metabolism." (Rentch, J.S. 2006 *op cit*.)

Also see Chappelka, A. H. and L. J. Samuelson. 1998. Ambient ozone effects on forest trees of the eastern United States: a review. New Phytologist 139: 91-108; and Davison, A. W. and J. D. Barnes. 1998. Effects of ozone on wild plants. New Phytologist 139: 135-151; and Edwards, P., C. Huber, and F. Wood. 2004. Ozone exposure and implications for vegetation in rural areas of the central Appalachian Mountains, U.S.A. Environmental Monitoring and Assessment 98: 157-174 ("Our analysis indicates that ozone levels frequently exceed the 8 hr standard in rural areas of the central Appalachians. . . . Parsons, Cedar Creek, Big Meadows, and Horton Station each were projected to have growth reductions of moderate and/or resistant tree species, but moderate to severe drought probably reduced the extent of those reductions at all but the Big Meadows site.")

Yet the DCER barely addresses the threat posed by ozone. Where on the Forest is ozone damage most prevalent at present? What areas of the Forest have the most potential to sustain ozone damage in the future? How do "suitability" determinations for various management practices respond to the ozone issue? It is not apparent that the DLMP adequately and properly responds to the issue of ozone pollution/damage on the Forest.

Nor do the DCER and DLMP adequately and properly consider and respond to the threat posed by increased levels of **ultraviolet radiation** damage on the Forest.

I am concerned about not only the direct and indirect effects of ozone and ultraviolet radiation (such as enabling invasive species, loss of focal species or communities, impacts on lichens and fungi and sensitive tree species, effects on terrestrial, aquatic, and amphibious fauna when key habitat is altered), but also the cumulative effects in conjunction with management actions (such as logging and/or burning) and other factors (such as acidic deposition). I am additionally concerned about the sustained yield of populations and habitat under the potential cumulative impacts that could accrue were the DLMP to be implemented. The DCER and DLMP do not reflect the full and fair consideration of this issue (such as

determining areas to not be “suitable” for various management activities due to factors involved with ozone).

What Endangered, Threatened, and Sensitive species (species of concern and interest) are directly harmfully impacted by acidic deposition and conditions, air pollution, ozone, and ultraviolet radiation on the Forest? What Endangered, Threatened, and Sensitive species (species of concern and interest) are indirectly harmfully impacted by acidic deposition and conditions, air pollution, ozone, and ultraviolet radiation on the Forest?

Although **lichens** can be used as an indicator of air quality (Showman and Long 1992), there are
few lichen inventories in the region (Manville and Webster 1998).

Fire

Vale (1998) criticized the “myth of the humanized environment” and suggests that for many areas the influence of native-Americans has been overstated; the mountainous areas of the Central Appalachians qualify as one such area. See Vale, T.R. 1998. The myth of the humanized landscape: an example from Yosemite National Park. Natural Areas Journal 18: 231–236.

Age Classes

Mr. Landgraf’s presentation at the Verona meeting made clear that the Forest Service is using “age class” representation as an important rational for wildlife management” and “vegetation manipulation”. I am reminded of the three types of falsehood as attributed to Mark Twain: lies, damn lies, and statistics. **The manner in which the agency delineates, uses, and refers to age classes is specious and a way to mislead with statistics**.

Aside from “forest type” another primary delineator of diversity as inventoried by the FS are “age classes” of forest. Every “stand” on the Forest is given an age. One of the agency’s primary rationales for cutting is the “need” to move toward a “balance” of these age classes in a project area (see multitudinous GWNF EAs, incorporated by reference). However, the FS approach to this is very misleading. The agency lumps all the older age classes together, using terms such as “140+” or “150+” or “170+”.

Consider if the converse tactic was taken; *i.e.*, if the younger age classes (0-10, 11-20 and on up to 81-90, 91-100 years of age) were all clumped together as 0-10+ and all the others such as 151-160, 161-170, and on up to 271-280, 281-290, 291-300, 301-310, 311-320, 321-330, 331-340, 341-350 years-old (and beyond to 500 years) were used as individuated age classes. Then of course it can readily be seen that **there is an enormously disbalanced excess of the younger age class (0-100 years old) on the Forest**. The Forest’s diversity is not being properly and legally considered and protected, nor are conditions “at least as great as that which would be expected in a natural forest”, nor is its sustained yield.

The use of truncated and/or misleading age classes has little or no ecological basis, but instead is based upon the concerns and convenience of timber management.

A site that has not been cut for 300, 350, 400, or 500 years is NOT the same as one that is 150 years old. Conditions (such as amounts of woody debris) are different as are communities. Who could even look at a 350-year old tree and think it to be the same in structure (or function) as one 150 years old of the same species on similar site conditions? Of course they are not the same. And various research indicates that plant and animal communities are

not the same at ancient sites as at younger sites.

It may take centuries for plant species to colonize and populations to stabilize. “Similarly, the colonization capacity of forest plant species is extremely low, although there is much evidence available that colonization of recently established forest fragments occurs, albeit at a very slow rate (see Section VI.3). The issue in these cases is to extend the timescale of the metapopulation from years to decades or even centuries, as was recently successfully done for forest plant metapopulations by Verheyen et al. (2004). . . .

“The main reason is very likely that a lot of forest plant species are long-lived perennials that form remnant populations by prolonged clonal growth, exhibiting a lowered susceptibility to habitat fragmentation. The result of this persistence is that current patch occupancy patterns for many long-living and clonally propagating species may be not in equilibrium with the present degree of habitat fragmentation (Eriksson & Ehrlén, 2001). This means that the time period since forest fragmentation (in most studies c. 100 yr, sometimes up to 250 yr) may be not sufficient to monitor extinction, and that we are dealing with a so-called extinction debt (Tilman et al., 1994; Hanski & Ovaiskanen, 2002) in our fragmented forests. In this case, patch occupancy reflects the historical distribution of habitat fragments rather than the actual distribution.” Honnay, O. *et al*. 2005 *op cit*.

For another example, Lydic (1999) compared salamander abundance and distribution in old-growth forest and secondary forest (60-70 years old) of the Southern Appalachians. The total number of salamanders encountered was higher in old-growth than in secondary growth. Numbers of *Plethodon jordani*, *Desmognathus wrighti*, and *D. santeetlah* were significantly higher in the old-growth forest. Higher numbers of *D. wrighti* in a reproductive state occurred in the old-growth than in the secondary forest, indicating better environmental conditions. See Lydic, J. 1999. Populations of salamanders within an old and secondary growth mesic cove forest with reference to coarse woody debris. M.S. thesis, University of Pennsylvania.

Further, “age classes” and “balanced” “age classes” are an artificial regime; a regime that falls outside the historic range of natural variability of the ecosystem. Managing to achieve some set proportions of certain narrowly delineated age classes is properly an artifact of tree farming. It belongs on tree farms, not on the GWNF. Functioning forest ecosystems in the Appalachian region of the GWNF typically do not naturally have a balance of a narrowly defined range of “age classes”. Nor are tracts generally in an even-age condition of discrete age classes. Natural functioning forest ecosystems here contain multi-aged or all-aged stands, with a great preponderance of tracts in a condition that the FS would call mature or old-age or old growth. <u>The DCER and DLRMP fail to address and evaluate this artificial age-class and balancing scheme and its lack of desirability from an ecological perspective, nor do they address the controversy associated with the use of a specious and misleading rationale</u>. The agency also fails to address sustained yield and sustainability of the older age classes (referred to in the paragraph below) and the characteristics/taxa/communities associated with them.

And on top of this, even if the ‘stands’ (another artificial delineation) on the Forest are ascribed to ‘age classes”, in actuality **there is already an extreme disbalance in the distribution of age-classes on the Forest. <u>The older age classes are severely under-represented. At timber sale project areas there are generally very little or zero acres represented in the 131-140, 141-150, 151-160, 161-170, and on up to 271-280, 281-290, 291-300, 301-310, 311-320, 321-330, 331-340, 341-350 years-old age classes</u>.** These ages are significant components of forest diversity. If the FS is intent on using “age classes” as a management tool then it must include ALL the age classes above (at least) in its deliberations and calculations. Trees of the species found here, such as White, Chestnut, and Northern Red Oaks, Black Gum, Tulip Poplar, and Sugar Maple are known to attain such ages, and higher, when allowed. <u>The DCER and DLRMP fail to fairly, reasonably, and adequately address and evaluate this disbalance</u>.

The **cutting of old growth and/or old age stands on the Forest** is partially rationalized through the use of the above-described specious/misleading age-class system. This is a particularly destructive and inappropriate result of this system. To help achieve a true balance of age-classes on the Forest the cutting of all old growth and/or old-age tracts must cease. The DCER and DLMP fail to address and analyse this relevant and feasible option, guideline, objective, or desired condition.

A moratorium on timber harvest/production on the Forest's suitable lands should be enacted until age classes up to 400-500 years are represented (such a timeline will serve to capture typical lifetimes of tree species on the Forest as well as the time of recomposition of large dead trees). After this representation occurs, then, if found to be necessary, a timber program based on a 400-500 year rotation can be implemented. In this way a serious attempt can be made to provide for diversity that is "at least as great as that which would be expected in a natural forest". The GWNF planners must fully consider and analyse this relevant, reasonable, and feasible option, guideline, objective, and/or desired condition.

Need for Standards/Illegal Planning/EIS Required

To guide this Plan revision, the GWNF planners are using a set of NFMA regulations that have been found by federal courts to be illegal (the 2008 version is little different from that of 2005).

Use of a "categorical exclusion" for this Plan revision is neither appropriate nor legal. Forest Plans make choices such as "suitability" determinations, Wilderness Area recommendations, "special area" designations, "desired conditions" and management "prescriptions", and "management area" allocations (a type of zoning). All these decisions set the Forest on a certain trajectory (guide future actions). For instance, who thinks county or city zoning allocations or ordinances are not significant and important just because a site-specific development has not been proposed?

NEPA regulations define "major federal action" determining environmental impact statement eligibility to include "formal plans...which guide or prescribe alternative uses of federal resources, upon which future agency actions will be based." C.F.R. §1508.18(b)(2). The regulations also state that "[a]gencies shall integrate the NEPA process with other planning at the earliest possible time to insure that planning and decisions reflect environmental values, to avoid delays later in the process, and to head off potential conflicts." 40 C.F.R. §1401.2.

Thus, **preparation of a full EIS for the GWNF Plan revision is required now**.

Foregoing analysis at this programmatic stage and putting it off to the site-specific stage is inadequate and inappropriate. This is due in part to the fact that **a significant number of site-specific projects are "categorically excluded"** as well (*e.g.*, see the November 21, 2008 decision for the "North Short Mountain Prescribed Burn" on the GWNF WSRD that includes **2400 acres of burning and the 2.3 miles of "reopened dozer line" smashed through the Forest**). The Government Accountability Office found that nearly three quarters of forest management projects were excluded from full NEPA analysis.

See GAO report "Forest Service: Use of categorical exclusions for

vegetation management projects, calendar years 2003 through 2005" (GAO-07-99 – 2006); incorporated by reference.

See also "Management By Exclusion: The Forest Service Use of Categorical Exclusions from NEPA: Oversight Hearing Before the U.S. House Comm. On Natural Resources", 110th Congress, June 28, 2007).

Categorically excluding analysis now (Plan level) and then categorically excluding it later (project level) means that the full in-depth ("hard look") analysis demanded by NEPA before decisions are made will never occur.

Foregoing full analysis at this programmatic stage and putting it off to the site-specific stage is additionally inadequate and inappropriate because it forecloses the reasonable analysis of cumulative impacts and landscape scale (larger than project areas) issues and effects. It is preposterous to believe or expect that such over-arching and in-depth analysis will occur every time a site-specific project is developed.

In addition, the use of enforceable Plan "Standards" is apparently to be dropped or greatly reduced (see DCER and DLMP). This significantly increases public and scientific **confusion**, **uncertainty**, and **controversy** about the future management of the GWNF. This is neither necessary, desirable, or appropriate. Comprehensive Standards, at least to the extent manifest in the current Plan, must be an integral part of the revised Plan.

The DCER and DLMP omit any discussion on or inadequately address numerous relevant issues and concerns detailed in this and previous comment letters. In failing to ensure the scientific accuracy and professional integrity, including scientific integrity, of the information contained in the DCER, the Forest Service is in violation of the NEPA (see, *e.g.*, 40 CFR 1502.24).

Further, the DCER does not disclose adequate information for the public to make reasonable decisions about the proposed revised Plan. See 40 CFR 1502.1 and 1508.25 and 36 CFR 219.19(a)(4). All this adds up to not only a failure by the Forest Service to properly respond to the public, but also a failure to provide the public enough information to participate intelligently in the Forest planning process. See 16 USC 1604 Sec.6(d).

The preceding comments are submitted for myself (S. Krichbaum) personally as well as on behalf of Heartwood, a nonprofit forest conservation organization. Their contact information follows:

Heartwood
Mark Donham - Program Director
P.O. Box 1011
Alton, IL 62002-1011
618-564-3367 markkris@earthlink.net

"steven krichbaum" <lokitoad@gmail.com>

01/09/2009 03:12 PM

To: comments-southern-georgewashington-jefferson@fs.fed.us
cc:
Subject: reRe: plan revision comments

hi Karen - thanx for info - below is the section beginning on pg. 16 - is the gobbledyggok only here or should i try another font and send the whole document? - s

Multiple edges from a multitude of sources currently exist on the Forest; they result from roads, utility corridors, gas lines, maintained openings, developed campsites, adjacent agriculture and residential development, and other sources. The additive and cumulative impacts of these overlapping (in time and space) sources need to be analysed and disclosed by the Forest Service.

"[M]ultiple edges could influence not only the magnitude but also the extent of edge effects (i.e. the distance/depth of rdge influence, DEI; Harper % McDonald 2001). Untangling how multiple edges influence edge effects is particularly important when extrapolating edge effects to different patches and landscapes (Laurence & Yensen 2001; Malcolm 2001), and it will be critical for determining if edge effects operate at large spatial scales (Laurence 2000). In fact, a recent synthesis on edge effects suggested that multiple edge effects were a primary issue limiting extrapolation of edge responses and identified no empirical data on how multiple edges influence animals (Ries et al. 2004) . . .
.
"Edge effects can be intensified when multiple edges converge and these effects could have strong impacts on bird distributions in highly fragmented landscapes. I documented that multiple edges increased both the magnitude and extent of the edge effect on bobolink distributions. While my results were confined to a single bird species, multiple edge effects probably operate on any species influenced by habitat edges (Fletcher 2003)." Fletcher R. 2006 op cit.

On 1/9/09, comments-southern-georgewashington-jefferson@fs.fed.us <comments-southern-georgewashington-jefferson@fs.fed.us> wrote:
> Hi Steve - yes, we got it and we can open the second attachment (with the
> .doc extension). However, there is still one font (or more) that comes
> out gobbly-gook. For example, there is a quote at the bottom of page 16
> (in the paragraph that starts off 'Multiple edges...' that is not readable
> at all and some of the references within the text are not readable. *karen
>

January 14, 2009

George Washington Plan Revision
George Washington & Jefferson National Forests
5162 Valley Pointe Pkwy
Roanoke, VA 24019

To Whom It May Concern:

This letter is to acknowledge that I visit the **George Washington National Forest** weekly. I am an avid mountain biker as well as life-time hiker of the National Forest.

As a member of the **Shenandoah Valley Bicycle Coalition**, I have participated in numerous cycling activities in the George Washington National Forest for years. The Narrowback/Tillman region is perhaps my favorite area. We have done numerous clean-up efforts on the Tillman Road. The SVBC members have logged thousands of volunteer hours in the GW National Forest. We would like to continue to maintain trails as well as build future trails in the National Forest.

I have been an active organizer and participant in the SVBC Mountain Bike Festival held every October. Participants provide hundreds of hours of trail work during that event. The experienced leadership of our club is reflected in the many projects we have completed in the GW National Forest.

Please continue to allow bicycle access on trails in the GW National Forest. I do not support Wilderness designation that would eliminate bicycle access. I believe that both cyclists and Wilderness supporters can share and protect the GW National Forest.

I appreciate your time in considering my comments.

Sincerely,

Marcia E. Lamphier

Marcia E. Lamphier
1221A Old Windmill Circle
Harrisonburg, VA 22802

Southern Shenandoah Valley Chapter
Potomac Appalachian Trail Club
204 Seawright Springs Road
Mount Sidney, Virginia 24467

11 January, 2009

George Washington Plan Revision
George Washington & Jefferson National Forests
5162 Valleypointe Parkway
Roanoke, VA 24019

RE: National Forest Planning Process and Wind Power

Dear Planning Team:

The Southern Shenandoah Valley Chapter of the Potomac Appalachian Trail Club endorses the position expressed by Virginia Forest Watch in their letter of 2 January 2009 regarding wind power installations on the George Washington National Forest.

Most of our chapter members live in Staunton, Waynesboro, Harrisonburg and Augusta and Rockingham Counties and we consider the George Washington National Forest to be part of our neighborhood. Our duty as good citizens of the neighborhood includes voicing our concerns about the forest plan revision and the consideration of wind power installations.

While wind power appears to be a "clean" energy source, the infrastructure to install and support wind power installations will devastate the high mountain environment. Roads, site clearing and excavation will fragment forest habitat and further compromise the watersheds which provide drinking water to 260,00 residents. There is no calculus to determine how many windmills would be needed to prevent the removal of one West Virginia mountaintop for coal, or how many bird and bat deaths per kilowatt-hour we should accept.

Thank you for the opportunity to comment.

Sincerely,

Mark Gatewood

Mark Gatewood
President, Southern Shenandoah Valley Chapter PATC
Volunteer trail maintainer, North River Ranger District

VIRGINIA DIVISION
Appalachian Society of American Foresters

We're Growing Virginia's Forests For Virginia's Future

January 15, 2009

Maureen Hyzer, Forest Supervisor
George Washington Plan Revision
GWJNF, 5162 Valleypoint Parkway
Roanoke, Va. 24019

Dear Supervisor Hyzer:

The Skyline Chapter of the Society of American Foresters believes that the George Washington N.F. must be managed under the multiple-use mandates described in the Organic Administration Act of 1897 and the Multiple-Use Sustained Yield Act of 1960. In recent years the George Washington-Jefferson N.F. has moved away from the multiple use mandate and toward the preservation management mandate of the National Park Service. We reject this shift in management direction and recommend that scientifically based management strategy incorporated in your plans current vision statement be your future guide.

There are many issues that must be addressed in the revised plan and its implementation. We will comment on a few:

Potential Wilderness – The 372,631 acres in the potential wilderness inventory is a huge amount of national forest land. We believe few of these areas merit the quality to be recommended for wilderness. Those lands that do not merit quality wilderness should be returned to the status that best meets their multiple use roles. They should not be left in limbo as de-facto wilderness.

Roadless Areas – The RARE 11 process that inventoried roadless areas was flawed from the beginning. Many areas that had existing roads were closed for management purposes, which allowed them to be erroneously inventoried as roadless. Some roadless boundaries were drawn beside traveled roads, precluding management for timber and other multiple uses. Other boundaries were drawn to reduce or essentially eliminate entry into lands suitable for timber and wildlife management.

Habitat Management – We believe the vision for the forest is correct. The forest will be managed for a diverse mix of forest types, communities and forest successional stages. This will provide habitat for various species associated with mid- to- late successional forest conditions. To reach this vision will require:

Continued strong cooperation with the Virginia Dept. of Game and Inland Fisheries and the West Va. Dept. of Natural Resources, incorporating current scientific research into the plans standards that were not available in the last plan.

- Developing and maintaining balanced forest -age classes across the forest to enhance biological diversity and forest health. Presently the forest is well out of balance with less than 4% younger than 20 years old. The forest is moving toward an over-mature forest, vulnerable to insect and disease attacks. The large amount of mature forest is a detriment to wildlife populations that require younger habitats. Increased timber harvests are essential to meet this goal. The harvests must be distributed over the forest in a planned system.

- The 1993 plan was successful in identifying and protecting habitat for the variety of threatened or endangered species. The forest should continue to manage these areas and re-evaluate management techniques since new scientific information is available.

Vegetative Management – Currently the area harvested annually (800 acres) remains insufficient to maintain forest health and habitat needs as well as helping to control insect epidemics. The 1993 plan significantly reduced the land available for commercial timber harvesting while concentrating cutting units. This restricted the dispersion of early successional habitat. Lands reduced in the 1993 plan should be re-evaluated and, where appropriate, returned to the commercial base. The level of commercial timber harvesting is an essential component of sustainable forestry and involves local communities. It will augment a strong timber industry and provide local jobs. The use of low-grade timber may become an important product as an energy fuel not considered in the 1993 plan. Increased timber sales will add to the amount of KV funds available to carry out timber stand improvement and habitat projects that are not now funded.

Non-Native Invasive Species – The Forest Service has an overall plan for managing forest pests with recommended control. This is the Chief's high priority. The standards in the 1993 plan for Integrated Pest Management principles seem adequate. Yet budget constraints have generally not allowed for concentrated effort to carry out the strategy. Invasives such as ailanthus and autumn olive continue to spread and need to be controlled before further spread. A corps of organizations, such as, the National Wild Turkey Federation and others, might be organized to volunteer under adequate supervision and attack problem areas.

Forest pest research is actively under study and may produce new biological control measures. The forest should remain in close cooperation with state and national research to integrate findings into control measures.

- Prescribed Fire – We support the continued use of prescribed fire that has been used to create habitat. The burns should also focus on high priority lands that encourage oak regeneration and reduce shade tolerant species.

The Skyline Chapter of SAF believes the vision statement for the future management is correct and, if followed, will lead to a sustainable and scientifically based forest management that will meet multiple-use goals. Unfortunately, we see large segments of the forest being set aside as de-facto wilderness that prohibits or restrains the quest to meet this vision.

The SAF will continue to testify before Congress and state legislatures on the value of managing the National Forests through scientifically-based forest management to meet environmental, economic and social values and to encourage adequate budgets to carry out the plan. The Chapter will continue to support the George Washington National Forest with our expertise and ability to educate the public on certain forest issues. We look forward to this mutual cooperation.

Sincerely,

Charles Huppuch

Charles Huppuch- GWNF Plan Task Force

Planning.comments.form@svinet2.fs.fed.us

01/15/2009 10:11 AM

To: comments-southern-georgewashington-jefferson@fs.fed.us
cc:
Subject:

Submitted by: Wendy Richards
At: richardsw@wlu.edu
Remark: I am in full support of the Virginia Wilderness Committee\'s recommendtions for this revision plan. The individuals on this committee have given many hours and much energy towards assuring that the viability of our forest ecosystems are maintained for the future. Please allow their recommendations to be a integral part of the George Washington Plan Revision.

From a concerned citizen,

Wendy E. Richards
2105 S Buffalo Rd
Lexington, VA 24450

H1

VIRGINIA WILDERNESS COMMITTEE

423 Sheep Creek Lane
Fairfield, VA 24435
January 16, 2009

Ms. Maureen Hyzer, Supervisor
George Washington & Jefferson National Forest
George Washington Plan Revision
5162 Valleypointe Parkway
Roanoke, VA 24019

Dear Ms. Hyzer and the GW Planning Team,

I am writing on behalf of the Virginia Wilderness Committee to urge you to recommend an increase in acreage of Wilderness in the George Washington National Forest. The areas are familiar to you as the Virginia Wilderness Committee has previously submitted a list. Please find the list attached, with maps and descriptions. It is important to note that there are a couple of changes from our last submission.

There are many reasons for the GW to recommend all of our proposed areas. One of the most powerful is that the United State Congress in the very first sentence of The Wilderness Act states "In order to assure that an increasing population, accompanied by expanding settlement and growing mechanization, does not occupy and modify all areas within the United States and its possessions, leaving no lands designated for preservation and protection in their natural condition, it is hereby declared to be the policy of the Congress to secure for the American people of present and future generations the benefits of an enduring resource of wilderness." Given the mandate to establish a National Wilderness Preservation System, and a particularly relevant reiteration of that mandate with the passage of the Eastern Wilderness Areas Act, it behooves the USFS to recommend the addition of all eligible lands. Furthermore, the proximity of large masses of people to the GW compels expansion of the Wilderness System, and the FS has the opportunity to boost its Wilderness acreage by making optimistic recommendations in its Plan.

The GW's convenient accessibility to so many people makes it a travel destination for growing numbers of recreationalists, and, as population swells out of the metropolitan areas, subject to increased visitation due to development pressures along its boundaries. The more people there are, the more critical it becomes to protect public lands for their multiple benefits to society. One of the direct benefits is recreation. Recreation is a growing phenomenon on the GW. Recreationalists who visit the National Forest do spend money and do boost local economies. Plain and simple – there are many more people living within a day's drive of the GW. Limited supplies of petroleum and the inevitable increase in gas prices will make a closer drive more attractive to more folks

heading out to experience nature for a day or a week. This makes the need for increased Wilderness acreage twofold. Firstly, a certain segment of the population is looking for a Wilderness experience and their numbers compel an expansion of available lands in order to continue to offer this type of experience. Secondly, and perhaps more importantly to future generations, it is necessary that we safeguard blocks of land in an effort to protect inherent natural systems therein.

I have been hiking in the mountains of the George Washington for twenty years, and it is my personal observation that there is irrefutable evidence of "need" for expanding the NWPS. People flock to "The Wilderness". People "need" Wilderness. In fact, the existence of Wilderness, in the minds of many people, I believe, represents freedom, wildness, unexplored terrain, and the possibility of finding something missing in their lives. It is evident by the outpouring of comments supporting the "Roadless Rule" and the protection of 58,000,000 acres of public lands, that Americans who will NOT be physically visiting a "wilderness" NEED for it to exist.

Permanent protection of forest land is the very best way to protect our watersheds. Pristine forestlands provide an invaluable service for our communities by purifying water. As "downstream" Virginia continues to grow, the protection of our National Forests become increasingly essential. Demand for clean water will increase.

Protected forest will continue to be an important reservoir of biological information. As forest fragmentation in the national forest and in private holdings increases because of management methods and development pressures, larger blocks of forest increase in value as irreplaceable assets. It is vital for future scientific reference that we attempt to preserve areas that are the least compromised as an "enduring resource".

Forest protection in our changing world has become essential as we confront the changes to our natural world accelerating with climate change, globalization, and population explosion. As we look at ways to mitigate impacts of climate change, we look to the forests as valuable assets for their ability to sequester carbon. Recent research published in the journal *Nature*. (http://www.nature.com/nature/journal/v455/n7210/full/nature07276.html) shows the very important role that undisturbed forests contribute to carbon sequestration – particularly old growth forest.

Another consequence of climate change and global warming is the impact on latitudinal ranges of living organisms. The Forest Service has a responsibility to respond to this trend. Protecting large, unroaded blocks of land is an essential component of a plan to meet this challenge.

The Virginia Wilderness Committee has been reaching out to other user groups in an attempt to find areas for Wilderness recommendation that will not conflict with the needs of users who prefer areas that are more actively "managed", or who wish to use mechanized equipment. Collaborative efforts and sensitivity to other user groups have played a huge part in the creation of our list of Wilderness candidates. We will continue to work with other groups. I have encountered folks who feel that their uses of the forest preclude additions to the National Wilderness Preservation System. The current

acreage in Wilderness on the GW is about 5 % of the Forest. The national average is 18%. Certainly there are lands enough to meet the needs of the different user groups and to satisfy the Congressional policy to secure the resource of wilderness.

Finally I would like to suggest that the Virginia Wilderness Committee as an organization dedicated to the Wilderness Act and the expansion of the National Wilderness Preservation System is qualified to determine whether an area is a worthy candidate. We have invested much time, energy, thought, and discussion into the selection of proposed areas. I hope you will agree that it is a list of candidates that will meet the needs of our growing populace. Thank you for your consideration.

A list of our areas which we hope you will consider follows. Maps and descriptions are attached. (Maps and descriptions of what we are calling the "Shenandoah Mountain Proposal" were submitted by the Friends of Shenandoah Mountain to the GW Planning Team on October 30 2008. We enthusiastically support this proposal).

Lee District
- Three High Heads in Big Schloss

North River District
- Beech Lick Knob
- Bald Ridge (Ramsey's Draft Addition)
- Skidmore Fork
- Little River
- Lynn Hollow
- Benson Run
- Bolshers Run
- Elliott Knob
- Archer Knob

Warm Springs District
- Laurel Fork
- Paddy Lick
- Little Allegheny
- Rough Mountain Addition

James River District
- Oliver Mountain
- Rich Hole Addition (also Warm Springs)

Pedlar District
- St. Mary's West Addition
- St. Mary's South Addition
- Adam's Peak
- Three Ridges Additions
- Three Sisters

Additionally, we would also like to see recommendations for National Scenic or Recreation Areas for the Big Schloss, Shenandoah Mountain, Kelley Mountain, Northern Massanutten.

Respectfully,

Laura Neale

Laura Neale, President
Virginia Wilderness Committee

Adams Peak

Approximate Size: 9969 acres
Location: Rockbridge County, Virginia in the Pedlar District
Topos: Cornwall, Montebello, Vesuvius

The Adams Peak roadless area is dominated by the steep and rugged Whetstone Ridge, South Mountain, and McClung Mountain. Irish Creek forms much of the eastern and southern boundary. Elevations range from 1200 feet to just over 3000 feet on Whetstone Ridge. This long ridge is dissected by numerous deep, narrow drainages with steep side slopes. Rock slides are common.

The entire area is forested by upland hardwoods with Pitch Pine communities occurring on the driest and warmest slopes and ridges. In some of the sheltered hollows, stands of tall cove hardwoods are present. Scenic rock outcroppings and pinnacles occur within the area. The rugged interior provides habitat for Black Bear and Timber Rattlesnakes. Adams Peak may contain 1066 acres of old growth.

There are several small prehistoric sites scattered throughout the area. The northern part was traversed by a post road dating from the nineteenth century. A mail carrier on horseback traveled this route delivering mail to several homes located on Big Marys Creek.

The major recreational activities here include hunting, hiking and mountain biking. The long Whetstone Ridge Trail begins at Irish Creek, climbs to the summit of South Mountain, and then follows Whetstone Ridge to the Blue Ridge Parkway.

Whetstone Ridge presents a conflict with the mountain bike community but it is our belief that some trails on the George Washington National Forest should be placed within Wilderness boundaries so that those of us who enjoy wilderness can do so while hiking on trails. The proposal that we have put forth protects access for mountain bikers on most trails on the forest.

To accommodate concerns about road access issues for Nature Camp, we would request signage at the entrance of Nature Camp directing Wilderness visitors past the camp entrance. Also, some sort of boundary adjustment might be necessary to eliminate group size issues. These can be arranged through additional discussion with the Nature Camp Director. Further, to address issues raised by VDGIF we would recommend following the roadless boundaries for the area.

Archer Knob

Approximate Size: 4880 acres
Location: Augusta County, Virginia in the North River District
Topos: Craigsville, Deerfield, Elliott Knob, Augusta Springs

Archer Knob is the southern portion of Great North Mountain, just south of the Elliott Knob Roadless Area. Not as lofty as its neighbor to the north, elevations here range from 2000 to almost 3300 feet. Steep slopes dissected with numerous drainages characterize the eastern and western flanks.

The area includes Kennedy and Wallace Drafts; Phillips Lick; Archer Run; and Gum Lick, Taylor, Staples, Mays, Dunlap, and Scott Hollows. The Scott Hollow Barrens conservation site lies along the crest of the mountain in the northern part of the area.

While the area is less than 5000 acres it contains significant stands of old growth. In fact, according to Forest Service stand data much of this western ridge is largely populated by old growth. Archer Knob may contain 1835 acres of potential old growth. The Forest Service has identified a large area of "semi-primitive" lands here. Nonetheless, much of it is considered suitable for timber harvesting and road construction.

Seven miles of the Great North Mountain Trail pass through the heart of Archer. This trail continues north through the Elliott Knob and Crawford Mountain potential wilderness as identified by the Forest Service, for a total length of about twenty miles. A boundary adjustment for Elliott Knob and dropping wilderness consideration for Crawford Mountain would keep intact this critical recreational trail.

The boundary that proposal for Archer Knob is different from the potential wilderness area. We propose utilizing the North Mountain Trail as the eastern boundary for Archer Knob. This trail would not be included in the proposed wilderness. The adjustment would eliminate conflicts with the mountain bike community and access to this trail. Additionally, we would like to propose that FDR 381 serve as the western boundary. This would eliminate the need for a potential road closure.

Beech Lick Knob

Approximate Size: 11,111 acres
Location: Rockingham County, Virginia in the North River District
Topos: Fulks Run, Cow Knob

This is one of the largest roadless tracts on the GWNF that the Forest Service failed to include in its official inventory of roadless areas. Elevations here range from 1650 to 3150 feet, with a great diversity of topography. Drainages include Sumac, Liars, Root, Stony, Martin Lick, Marshall, and Carr Runs. Ridges and peaks include Clover Lick, Beech Lick, White Grass, and Wetzel Knobs; Carr, Little, and Snake Hollow Mountains; and First, Middle, and Third Points.

A very large area of "semi-primitive" acreage occurs here where visitors can experience solitude and serenity. There are 4241 acres of possible old growth.

FDR 235A along Root Run is a closed, low-maintenance, grassed-over, little used road that goes into the interior of the area for about 1.5 miles. Blue Hole campground is at the northeastern boundary of the area.

The proposed Beech Lick Wilderness is much smaller than the designated potential wilderness. The Beech Lick boundary should be adjusted to the recently scoped Carr Mountain Trail. This trail is a critical link in the Great Eastern Trail and should serve as the boundary to ensure that mountain biking will be allowed on the trail when it is completed. Additionally, we request that the FDR 302, Grove Hollow Road, serve as the northern boundary, as this road will also be utilized as a part of the Great Eastern Trail.

Finally, to eliminate the mineral rights issues we recommend that the minerals rights located on the western edge of the proposed area be removed from the Beech Lick Knob proposal.

Benson Run

Approximate Size: 8599 acres
Location: Highland County, Virginia in the North River District
Topos: Deerfield and McDowell

The proposed Benson Run Wilderness is a part of the greater Jerkemtight/Benson Run potential wilderness as identified by the Forest Service in the planning process. We propose expanding the boundary to the Shenandoah Mountain Trail and allowing the Benson Run Trail to be located within the wilderness boundary. Thus, the proposal would protect the entire drainage of Benson Run. According to Forest Service stand data there is a significant stand of old growth within this expanded boundary. There are also stands of old growth located across the western slope of Shenandoah Mountain and the western flank of Gwin Mountain.

Across the entire National Forest we are recommend excluding most trails from wilderness proposals in order eliminate as many potential conflicts with other user groups as possible. To balance the inclusion of the Benson Run Trail in wilderness, we would propose the development of a trail network on the nose of Crawford Mountain. The recently decommissioned Crawford Mountain Trail would serve as the hub for this trail network that would include several old roads and other old trails to create a loop trail system of approximately 25 miles.

On the southwestern boundary of this area would be the Nelson Draft Trail. The Nelson Draft Trail and the Shenandoah Mountain trail would not be included within the wilderness boundaries. The western boundary of the proposed area would be FDR 395J (Hamilton Draft Road) and FDR 395 (Liberty Road). The power line would serve as the northern boundary.

With regards to roads in the proposed area, FDR 396 (Shinault Shanty Road) is an administrative road only and its closure would not impact the hunting community. Additionally, the roads that snake into the area form the western boundary are not currently open to the public and, again, closure would not have an impact on the hunting community.

There is a large mineral rights claim in the Benson Run drainage. We understand that this could present a potential problem for future wilderness designation. However, these rights extend beyond the boundary of the proposed area but still on public lands. We believe that recommending this area as wilderness study will not deny access to these mineral rights, as directional drilling could be utilized to access any gas deposits under the proposed area.

Big Schloss National Scenic Area

Approximate Size: 30,129 acres
Location: Frederick and Shenandoah Counties, Virginia in the Lee District
Hardy County, West Virginia in the Lee District

Big Schloss is one of the largest inventoried roadless areas not only on the George Washington National Forest, but in all of the eastern National Forest. The National Scenic Area proposal includes not only the Big Schloss Virginia Mountain Treasure but also the Great North Mountain and Jonnies Knob Virginia Mountain Treasures.

The elevations of this area range from 1600 feet to almost 3300 at the top of Mill Mountain. The ridgetops are capped with sandstone which creates the many rock outcrops the area is noted for. Some of these include Big Schloss, Little Schloss, Halfmoon, and Three High Heads. These rocky knobs are "hacking sites" where endangered Peregrine Falcons were reintroduced to the wild.

The upper reaches of Stony Creek, Paddy Run, and Cove Run have their beginnings in the Big Schloss. These are all tributaries of Cedar Creek and the North Fork of the Shenandoah River.

Approximately 7500 acres of this roadless area lie within the Big Schloss Special Management Area. The Salus Spring Special Biological Area is also within the boundaries of the proposal. Much of the area is considered unsuitable for timber harvesting and is managed to maintain a natural appearance. Forest Service stand data identifies over 6000 acres of old growth.

Recreational activities are the highlight of the area. Hiking, backpacking, horseback riding, and mountain biking are the primary recreational activities. In the late fall hunters take to the woods in large numbers, and fishing opportunities are well known in Little Stony Creek, a native trout stream. The proposed Great Eastern Trail traverses the spine of Great North Mountain on the western end of the National Scenic Area. The Old Dominion Endurance Ride would be a recognized use in the Big Schloss National Scenic area.

Hunter access would be protected in the NSA on the forest Development Road up to Sugar Knob, Vances Cove and Wilson Cove. Access to these roads would remain the same.

Three High Heads is a proposed Wilderness study area. This proposal contains 5224 acres lying on the northeastern end of the Big Schloss roadless area. The Sulphur Gap Trail would be included within the proposed boundary of the wilderness area. Also, the wonderful rock formation known as Three High Heads lies within the proposed boundaries.

Currently, there are no areas designated as Wilderness on the Lee Ranger District. It is our belier that there is a need to establish a Wilderness on the Lee District and the Three High Heads proposal addresses this need in a small way. The Lee Ranger District has many recreational opportunities for hiking, mountain biking and equestrian use. The Three High Heads proposal seeks to address both the need for Wilderness on the Lee Ranger District and eliminate as many user conflicts as possible. However, we are requesting this trail inclusion as we believe that people out to enjoy Wilderness should

have some trail access. Out of over 260 miles of trail on the Lee Ranger District we are requesting only 1.1 miles of trail to be included within a Wilderness proposal.

Bolshers Run

Approximate Size: 5417 acres
Location: Bath and Augusta Counties, Virginia in the North River District
Topos: Deerfield, and Williamsville

The proposed Bolshers Run wilderness anchors the southern end of the Jerkemtight Roadless area and the proposed Jerkemtight/Benson Run potential wilderness. The western boundary is the Shenandoah Mountain Trail. This trail is an important link in the proposed shared use Great Eastern Trail. The northern boundary is the Jerkemtight Trail. The summit of Wallace peak would be excluded from the proposed boundary as well as the clearing at the junction of the Jerkemtight Trail and the Shenandoah Mountain Trail. The southern boundary would exclude FDR 1594 (Murph Hollow Road) and the management clearings associated with this road.

The proposed eastern boundary would exclude all current management activity and FDR 433 (Beck Access Road) and FDR 392 (Short Ridge Road). There is significant management activity along both of these roads and adjustment could be made to accommodate this activity.

The proposed Bolshers Run wilderness would protect the entire upper drainage of Bolshers Run as well as the ridges to the north and to the south. There are significant stands of old growth located through out the area. In addition, the proposed area would permanently protect a significant portion of the Sister Knob Special Biological Area as well as the eastern slope of Sister Knob.

There are no trails within the proposed boundaries of Bolshers Run wilderness and therefore there would be minimal impact on other recreational users.

Elliott Knob

Approximate Size: 7156 acres
Location: Augusta County, Virginia in the North River District
Topos: Elliott Knob, Augusta Springs

Elliott Knob is the summit of Great North Mountain, the southeastern leg of Shenandoah Mountain. With an elevation of 4463 feet this behemoth rises high above the surrounding countryside. Lead-off Ridge and Hogback are other high features along the crest of Great North Mountain. Slopes near the ridge line are very steep. In some areas the grade exceeds 80 percent.

Buffalo Spring and Chestnut Flat Spring are two clear, cool springs that originate high up the ridge. Cold Spring bubbles out of the ground on the western flank of the mountain. These springs, and others like them, feed streams such as Montgomery Run, Fridley Branch, and West Dry Branch.

The Virginia Division of Natural Heritage has identified several threatened and endangered plants along the ridgeline of Elliott Knob. Another attractive quality of the area is its Black Bear habitat. The dense understory vegetation and species composition makes it a desirable place for Black Bear.

Elliott Knob has a forest plan-designated 962 acre Special Biological Area. There may also be as much as 4407 acres of possible old growth.

The proposed Elliott Knob wilderness study area is significantly smaller than the proposed Forest Service potential wilderness. The eastern boundary would run along the crest of Elliott Knob excluding both the North Mountain Trail and the communication facilities located on the ridge summit. The western boundary would be located at or near FDR 77 (Cold Springs Road) with adjustment made as necessary to reduce conflict with current management activities occurring along the road.

The Cold Springs Trail would be reserved for foot travel only, balanced, and the loss of access to this trail by mountain bikes would be compensated by the development and construction of a trail network on the nose of Crawford Mountain and a short trail that would connect FDR 393 (Tizzle Road) with FDR 399B (Tom Lee Branch Road) in the Jerkemtight/Benson Run areas. This trail would cross Hughart Run.

Little Allegheny Mountain

Approximate Size: 15,991 acres
Location: Bath County, Virginia in the Warm Springs District
Topos: Minnehaha Springs, Mountain Grove, Sunrise

This large roadless area includes portions of Wildcat Ridge that were excluded from the Forest Service roadless inventory. The slopes of Little Allegheny Mountain contain rock rubble and ledges with bands of solid rock walls running parallel to the slope. On Little Mountain, shaly surface is common, and rock and ledge barriers are rare. In general, the area is steep, rugged, and relatively isolated.

The elevation ranges from 1850 feet near Sapling Woods Hollow to over 4200 feet on Mad Sheep Ridge. Mad Tom Ridge also climbs to over 4000 feet. Both of these ridges are on Big Allegheny Mountain. Elevations on Little Mountain do not rise over 3400 feet.

Jim Dave Run is a small creek that lies in a long valley almost totally within the confines of the roadless area. Many smaller streams and hollows, including Rattlesnake Hollow and Gill Gum Hollow, drain the steep ridge slopes. Little Allegheny Mountain may contain 4161 acres of possible old growth.

Due to the rugged terrain and topography, an abundance of primitive recreational opportunities occur. There are no maintained trails within the roadless area. Several informal campsites exist along the crest of Big Allegheny Mountain and are utilized during hunting season.

There are no trails located with the boundaries of the proposed area and thus conflicts with potential user groups are limited. All the roads that access the area are closed to the general public and therefore there would be do no impact on hunters.

Oliver Mountain

Approximate Size: 8730 acres
Location: Alleghany County, Virginia in the James River District
Topos: Callaghan, Rucker Gap

This wild and remote area is located in the northwest portion of Alleghany County. Oliver Mountain is the dominant feature of this roadless area. Several small creeks drain the mountain. Spring Branch drains the southern end, while Hickory Lick and Brushy Lick flow into Lake Moomaw which forms the northern boundary.

The area is predominantly composed of eastern uplands hardwoods, with Pitch Pine, Table Mountain Pine, and Virginia Pine located in drier regions. Elevations range from 1430 feet to 3565 feet along the crest of Oliver Mountain. The terrain is steep and rugged.

Much of the roadless area is regaining its natural untrammeled appearance. Hunting, hiking, and backpacking are the primary recreational activities. The Oliver Mountain Trail passes through the roadless area and its beautiful stands of old growth forest. There are several miles of trail located near Lake Moomaw. These trails are open to mountain biking and equestrian use.

Forest Service stand data indicates there are 1562 acres of possible old growth.

An illegal jeep road along Hughes Draft would be the boundary of the proposed wilderness study area. The Jackson Trail would serve as the boundary on the eastern portion of the proposed area. This would allow the trail to continue as a shared use trail. The trail known as Brushy Lick Loop on the Trails Illustrated map would serve as the northern boundary of the area. This would eliminate many of the noises and sounds generated by recreational activities on Lake Moomaw.

Paddy Lick

Approximate Size: 5444 acres
Location: Bath and Highland Counties, Virginia in the Warm Springs District
Topos: Paddy Knob, Sunrise

Located on the Virginia and West Virginia border, Paddy Lick lays claim to some of the highest elevations in the George Washington National Forest. Located on Allegheny Mountain, Paddy Knob has an elevation of over 4477 feet.

This steep ridge is dissected by many small intermittent and year round streams. Some of these include Paddy Lick, Mud Lick Run, and Dry Run, all of which feed into Back Creek. This small stream provides some of Virginia's finest whitewater paddling, but only after significant rain events.

A 728 acre portion of this area is listed as the Paddy Knob Special Biological Area and is home to species such as Bald Eagle, Mourning Warbler, Yellow-bellied Sapsucker, Roughhead Shiner, Southern Rock Vole, and Southern Water Shrew. Significant stands of old growth have been identified. Paddy Lick may contain 2649 acres of possible old growth.

Due to the nature of the terrain of Paddy Lick much of the area is undeveloped, and because of this rugged nature and a lack of trails, there are no significant user group conflicts.

Rich Hole Addition

Approximate Size: 9908acres
Location: Alleghany and Bath Counties, Virginia in the James River and Warm Springs Districts
Topos: Longdale Furnace, Millboro, Nimrod Hall

Rich Hole addition contains mountain ridges with parallel drainages in a contorted arrangement, with spur ridges and associated small drainages falling from the major ridge. Elevations range from about 1200 feet near the Cowpasture River to over 3300 feet on the top of Mill Mountain. Slopes vary from moderate to very steep and are dissected by numerous small and moderately sized streams.

Due to its location adjacent to the Rich Hole Wilderness, consideration should be given to wilderness protection.

Because of the rugged nature of Mill Ridge, there is only one, little used trail in the area. The White Rocks Tower Trail parallels the Rich Hole Wilderness boundary to the crest of Mill Mountain and then follows the ridge to FDR 333. Hunting is the primary recreational activity of the area. Mill Mountain's rugged terrain and remote location help to foster a healthy bear population. This area may contain 2376 acres of old growth, mainly along the long ridge line.

To limit user conflicts the proposed study area should exclude the White Rocks Tower Trail. FDR 362 (Orebank Road) she be excluded from the wilderness boundary to ensure that this road remain available as hunter access. The Bubbling Springs Recreation Area, a small picnic and camping site on Pads Creek Road should also be excluded from this area.

The addition of this area to the Rich Hole Wilderness would create one of the largest wilderness areas in Virginia with an area which exceeds 16,000 acres. In addition, given the Rich Hole's proximity to Rough Mountain Wilderness and its addition, these additions would create a wilderness complex in excess of 27,000 acres.

Rough Mountain Addition

Approximate Size: 2196 acres
Location: Bath County, Virginia in the Warm Spring District
Topos: Nimrod Hall, Millboro

This Wilderness addition includes the part of Rough Mountain that was not included in the Virginia Wilderness Act of 1988. Designating the addition as Wilderness would protect the upper drainage of Big Hollow.

Elevations range from about 1400 feet near Lick Run to approximately 2100 feet on Rough Mountain.

There are no user conflicts in this area and a boundary adjustment could be made to preserve access to Teapot Road.

St. Marys Wilderness Additions

Approximate Size: West-277 acres, South-1508 acres
Location: Augusta and Rockbridge Counties, Virginia in the Pedlar District
Topos: Big Levels, Vesuvius

Located on the western flank of the Blue Ridge, the Saint Marys Wilderness is 10,090 acres of rugged slopes, deep ravines, and scree. Saint Marys West is a recent Forest Service acquisition. The dominant geological feature of the area is Cellar Hollow and the small stream that drains the steep and rugged Cellar Mountain. While the area is small the forest is not. Cellar Hollow provides a wonderful refuge for cove hardwoods like Tulip Poplar and Hemlock. Some of these trees are very large.

Saint Marys South is located on the southwestern edge of the existing Saint Marys Wilderness. The area is known for its steep V drainages and numerous scree slopes especially in Dogwood Hollow. There is evidence of past human activities including an old homestead site and sites of past mining activities from the early 1900s. One old mine fissure has become a bat hibernaculum.

Saint Mary's North addition is problematic as it would probably require the closing of the Jeep Road to Russell Rocks. Therefore, we are not requesting wilderness for this area.

Three Ridges Wilderness Additions

Approximate Size: Approximate Size 500 acres
Location: Nelson County, Virginia in the Pedlar District

The Three Ridges Wilderness was established by Congress in 2000. This 4800 acres wilderness is characterized by steep rugged ridges climbing to an elevation of over 3900 feet. The Forest Service is recommending four small additions to the Three Ridges Wilderness in order to extend its boundaries to it natural limits.

Three Sisters

Approximate Size: 6327 acres
Location: Amherst and Rockbridge Counties, Virginia in the Pedlar Ranger District
Topos: Buena Vista, Glasgow

Three Sisters forms the northern slope of the James River Gorge, where the James River cuts through the Blue Ridge and debouches into the Virginia Piedmont. Straddling the high crest of Rocky Row, the Three Sisters area has elevations ranging from almost 3400 feet on Bluff Mountain to less than 900 feet near the James River. This ridge gives rise to several small streams including Bennetts Run, Belle Cove Branch, and Battle Run. These all drain into the Maury River. Bennetts Run supports a small population of native trout. The headwaters of Otter Creek are located on the eastern slope of Rocky Row Ridge.

Rocky Row Ridge is the most prominent geological feature. The ridge provides outstanding views of the James River and the James River Face Wilderness. This rugged mountain ridge has 2777 acres of possible old growth.

There are several trails that climb the ridge to the crest. The Appalachian Trail also passes through. The trail begins climbing to Rocky Row from the James River. Once on the ridge crest it follows along to the summit of Bluff Mountain.

The Three Sisters proposal is much smaller that the potential wilderness designated by the Forest Service. The proposal excludes the Appalachian Trail, and utilizes the privately held mineral right to the west

Toms Knob

Approximate Size: 7879 acres
Location: Alleghany and Craig Counties, Virginia in the James River and Eastern Divide Districts
Topos: Alleghany, New Castle, Jordan Mines, Potts Creek

Toms Knob gets its name from a series of rock outcrops on the crest of Potts Mountain. They provide beautiful views of the Potts Creek Valley and Peters Mountain to the west. This area is located almost entirely on the western flank of Potts Mountain. It is separated from the Barbours Creek Wilderness by the Potts Mountain Jeep Road that runs along the crest of the mountain. A small portion of Toms Knob lies in the Jefferson National Forest. Establishing Toms Knob as a plan designated WSA would create a wilderness complex of over 18,000 acres.

The elevation ranges from about 3800 feet on the crest of Potts Mountain to 1750 feet in Shanty Hollow. Nichols Knob in the extreme northern part of the area is clearly visible from the surrounding countryside.

The steep, rugged eastern flank of the ridge forms the headwaters for Barbours Creek. Many small streams both perennial and intermittent cascade down the western side of the mountain and are tributaries of Potts Creek. There is a small Special Biological Area located on the crest of the ridge, and small pockets of potential old growth.

There are several short trails that follow old road up the ridge and dead end. The only trail of significance is the Children's Forest Horse Trail. This trails serves as the boundary and is not included in the wilderness proposal. It is important to note that the Potts Mountain Jeep Road will not be affected by this proposal.

To who it may Concern

My name is Whitney am I am a Mountainbiker. I learned to bike in George Washington National forest and really want the same opportunity for many others. I would like to see more trails in GW!

Sincerely
Whitney

I ride my bicycle in the George Washington National Forest. Narrowback is my favorite trail. I think the Shenandoah mountain bike festival around and it is an excellent time. I would like to have more trails that are easy to ride in the GW.

thanks
Scott Johnson

RE: George Washington Plan Revision

I ride my Mountain Bike Often in the George Washington National Forest, near Reddish Knob and Stokesville I go to the festival every year and enjoy my time there. I would like more trails in the forest.

Thank you,

Christopher Michaels

George Washington National Forest.

I Ride, Hike in the George WNF
I would like to have more
Trails to ride. I attend Shennan
doah mountain 100 every year
I like it so much!

thanks
Jonathan Martinez

To whom it may concern,

I have recently moved to Harrisonburg area in the last few years to attend James Madison University. The bike riding in this area has helped me maintain a healthy and focused school life. It is only because of these trails that I have not slipped into the alcoholism & drug culture that is so popular amongst college students. The riding in the forest promotes much more than simple trails but a healthy way of life.

-Daniel Oates
Harrisonburg, VA

HH
MTH

Botetourt County, Virginia
Office of the County Administrator

1 West Main Street, No. 1
Fincastle, Virginia 24090
Phone (540) 473-8223
Fax (540) 473-8225

Board of Supervisors
Don A. Assaid
Chairman
Donald L. Meredith
Vice Chairman
Terry L. Austin
Stephen F. Clinton
Billy W. Martin, Sr.

January 26, 2009

Ms. Maureen T. Hyzer, Forest Supervisor
George Washington & Jefferson National Forests
5162 Valleypointe Parkway
Roanoke, VA 24019-3050

Dear Ms. Hyzer:

The attached letter is being forwarded to you for your information.

Sincerely,

Gerald A. Burgess
ICMA Credentialed Manager
County Administrator

Attachment

Part of newva

Botetourt County, Virginia
Office of the County Administrator

1 West Main Street, No. 1
Fincastle, Virginia 24090
Phone (540) 473-8223
Fax (540) 473-8225

Board of Supervisors

Don A. Assaid
Chairman

Donald L. Meredith
Vice Chairman

Terry L. Austin

Stephen P. Clinton

Billy W. Martin, Sr.

December 29, 2008

The Honorable Bob Goodlatte
U. S. Congressman
540 Crestar Plaza
10 Franklin Road, SE
Roanoke, VA 24011

Dear Congressman Goodlatte:

Thank you for letting us know of the plans of the National Forest Service (NFS) to consider designation of 4,731 acres in Botetourt County as "wilderness."

While we fully understand that such a designation can appear to be attractive on the surface, Botetourt County believes that active management practices are a much more preferred course of action. Such practices have been demonstrated to result in the protected lands being utilized in the most efficient manner. The NFS staff are able to utilize several management tools based upon observed need with the goal of achieving a healthy and diverse forest habitat.

Given the above points, Botetourt County strongly opposes the Wilderness Designation proposed for lands in the Rich Patch area within the George Washington National Forest in Botetourt County.

With best regards, I am,

Sincerely,

Gerald A. Burgess
ICMA Credentialed Manager
County Administrator

cc: Members, Botetourt County Board of Supervisors

Part of newva

To whom it may concern:

I ride my bicycle in the George Washington National Forest. I have especially enjoyed riding at Narrow Back and Mud Pond. I would like to have more trails that are easy to ride in the GW National Forest.

Sincerely,

Jay Blum

1/29/2009

Comments from the:

Virginia State Chapter of the National Wild Turkey Federation

The VA NWTF has almost 7000 members.

The National Wild Turkey Federation supports conservation of the wild turkey and its habitat and preservation of the hunting tradition. The NWTF has over 500,000 members.

There are only 350,000 acres identified as suitable for timber/wildlife management. This is unacceptable. There should be no more acres removed from active wildlife management.

Large blocks of old geriatric forest are wildlife wastelands. There is little food or cover at the level that most birds and animals live. Most wildlife need a diverse habitat including small blocks of herbaceous grass and forbs, early successional habitat, young forest, and old forest. This kind of habitat is not available where active wildlife management is excluded. The American Bird Conservancy and the National Audubon Society both have named loss of early successional Eastern deciduous forest as one the most threatened bird habitats.

Roadless and wilderness areas go right up to roads. In existing roadless and wilderness areas, there should be a significant setback from all roads. These areas can be managed for wildlife from existing roads. Why exclude these areas from management?

The NWTF would like to see the national forests managed in accordance with the recommendations of Department of Game and Inland Fisheries Wildlife Biologists.

These recommendations include:

1. Create and maintain balanced forest age classes:
   5% herbaceous grass/forbs,
   10% early successional forest, <10 years old,
   15% young forest habitat, 10-40 years old,
   60% mast producing habitat, 40-120 years old,
   10% old growth, 120 years and older.

   The current draft of the Forest Plan only includes 350,000 acres of the forest suitable for timber production/habitat management. There is no way there can be the above recommended percent of herbaceous grass, early successional and young forest habitat in the overall forest with the current and proposed wilderness and roadless areas.

2. Create more early successional habitat.

   Many wildlife species, which require this type of forest habitat, are in serious decline (American Woodcock, Yellow-breasted Chat, Golden-winged Warbler, Prairie Warbler, Chestnut-sided Warbler, ect.). In addition, turkeys, deer, grouse and quail and other game species will benefit.

3. Utilize prescribed fire as a tool to create wildlife habitat on the GWNF.

4. Incorporate new scientific research findings when developing management Guidelines. The Cooperative Alleghany Bear Study, Appalachian Cooperative Grouse Research Project, Turkey Dynamics Study, Turkey Gobbler Study and numerous songbird studies have revealed new information, which needs to be incorporated in the GWNF plan revision.

5. Open road densities should be increased. Open road densities should be determined by biological concerns and the needs for hunter access. Existing roads should not be decommissioned. You can only drag a harvested deer so far.

6. Cooperate with the VADGIF to meet habitat goals in Virginia's 2006-2015 Deer Management Plan, 2001 Bear Management Plan, and Virginia's Wildlife Action Plan.

7. The Forest Plan should encourage the used of stewardship contracting and cooperation with conservation organizations to leverage the amount of habitat management that can be done for wildlife.

8. Recommended areas for possible wilderness and roadless area consideration should **not include** any areas with:

   existing roads-whether used or not
   openings managed for wildlife in the past
   established water structures
   prior logging activity
   prior prescribed burns
   mineral rights
   roads within ½ mile of the border

Rick Layser
Vice President
Virginia State Chapter
National Wild Turkey Federation
148 Troxel Gap Road
Middlebrook VA, 24459
(H) 540-886-1761
(C) 540-490-0350

Hello,
I would like to write to you today with my comments about the proposed expansion of Wilderness within the George Washington National Forrest. I have lived in Linden Virginia for the last 8 years. I am an avid mountain biker and road cyclist. The primary reason I chose to live in Linden was the proximity to the beautiful Shenandoah Valley and George Washington National Forrest, and the cycling opportunities that are available to me here.

I believe it is very important to passionately pursue protection of all forms of the increasingly limited natural and historic areas remaining in this country. But it is equally important to me that this protection not include the banning of low impact recreational pursuits that have traditionally been allowed within our public lands. I am a ardent supporter of designations that protect those resources from exploitation and degradation as long as access for non motorized recreational users is also preserved. I feel that mountain biking is an especially compatible activity that should be allowed to continue under any protected status that is placed on any part of the GWNF.

My understanding of the current interpretation of the Wilderness law is that it does not allow for mountain biking or machine based trail maintenance practices. I am a member of the Shenandoah Valley Bicycle Coalition (SVBC) and the Mid Atlantic Mountain Bike Enthusiasts (MORE) and we contribute large amounts of time and labor to maintaining trails in the GW. These efforts benefit all users of the GW, not just mountain bikers. I personally feel that designating parts of the forest as Wilderness will likely result in the decay of the trail system within those Wilderness areas due to the increase in the labor necessary to maintain the trails using only non mechanically assisted methods.

In addition to the hundreds of rides, camping weekends, and trail work days spent in the GW, I have also participated in the Shenandoah Mountain 100 mountain bike race since it's inception in 1999. This is an amazing challenge and has become a nationally known race that is attended by some of the best cyclists in the country. The overwhelming opinion expressed at this event is that the trails in this part of the GW are some of the absolute best in the country. The type of people that participate in an event like the Shenandoah Mountain 100 (and mountain bikers in general) are people that love the outdoors and spend huge amounts of their free time in our national lands. They contribute money, time and labor to promoting and protecting these public lands. They are a tremendous asset to the National Forrest Service and it would be terribly unfair if they were to loose access to the amazing riding opportunities that exist in the GWNF due to a restrictive Wilderness designation.

Please choose to protect our forest using a designation that provides the needed protection without limiting the recreational opportunities that are traditional uses of the GWNF. Please do not designate any part of the GW where mountain bike accessible trails exist as Wilderness.

Sincerely,

Barry Quigley
703-282-5173
295 Long View Rd. Linden, Va. 22642

Kate G. Wofford, Executive Director, P.O. Box 186, Luray, VA 22835, 540-303-7404

January 29, 2009

George Washington Plan Revision
George Washington & Jefferson National Forests
5162 Valleypointe Parkway
Roanoke, VA 24019

RE: GWNF Forest Plan Revision, Wind Energy Development

Dear Planning Team,

Shenandoah Valley Network (SVN) is a non-profit conservation organization that links community groups working on land protection, land use and transportation issues in the northern Shenandoah Valley. The six counties where we work, Frederick, Shenandoah, Warren, Page, Rockingham, and Augusta, each include portions of the George Washington National Forest (GWNF).

SVN is a strong proponent of reducing our region's reliance on fossil fuels. We encourage compact growth around existing towns for less driving; we promote rail improvements over an expanded I-81 for more efficient trucking; and we support small, appropriate-scale wind energy projects on private lands through our participation in the development of county wind ordinances. Therefore it is with careful consideration that we oppose wind energy development on the George Washington National Forest at this time. We strongly encourage you to disallow wind projects in the revised Forest Plan.

The George Washington National Forest 2007 Comprehensive Evaluation Report (CER), which guides the Forest Plan revision, correctly identifies wind energy development as an emerging public issue. The CER outlines four Tentative Options for establishing guidelines for wind energy development on the Forest. Option C-4 states:

> *Identify that nowhere on the National Forest is generally suitable for wind energy development because of known effects on bats, particularly the Indiana bat (whose summer habitat is the entire Forest), until such time as wind energy technology exists that significantly lessens the known effects of the turbine on bats. (Draft Comprehensive Evaluation Report p. 120, 2/15/2007).*

We encourage the pursuit of Option C-4 with some critical additions.

1- Broader Wildlife Impacts. The potential wildlife consequences of construction and operation of large-scale wind power projects are well-documented in United States Fish and Wildlife Service's (USFWS) November 16, 2007 letter to Ms. Wendy Tidhar recommending against wind turbines on the Shenandoah Mountain. site (enclosed). the USFWS states that wind turbines on Shenandoah Mountain site would likely impact the Indiana bat, as well Virginia big-eared bat, bald eagles and migratory songbirds. Beyond turbine effects, the USFWS letter raises concerns about the consequences of clearing forest for roads to construct and access turbines. According to USFWS, these consequences may include "*direct loss of deep forest habitat; an increase in edge habitat; increased nest parasitism and predation; a decrease in abundance and diversity of area-sensitive species with a concurrent increase in habitat suitability for edge and generalist species; and interruption of travel corridors, displacement, and other behavioral effects.*" **Until technology exists that significantly lessens turbine effects on at-risk birds and bats and minimizes the habitat impacts of construction and access, wind energy development is unsuitable on the George Washington National Forest.**

2- Scenic and outdoor recreation impacts. Public lands are one of this country's greatest legacies. Good stewardship of these lands requires a strong public commitment to the land and the public land management agencies charged with their protection. In order to ensure that the public insists upon good land management, it is critical that George Washington National Forest continue to provide a wonderful outdoor experience for hikers, birders, hunters, fisherman, backpackers, and other recreationists. Current technology for wind energy development, which requires huge towers, wide roads on ridgetops, and forest clearing, is inconsistent with the recreational experience on the George Washington National Forest. **Until wind energy projects can be developed that have a minimal footprint on the landscape for scenic and recreational resources, industrial wind projects are inappropriate on the George Washington National Forest.**

3. Private land suitable for wind projects. National Forest lands can only be used for energy development when other non-Federal lands cannot. According to a letter submitted to Ms. Linda Brett by Southern Environmental Law Center (SELC) on May 13, 2008 regarding the Church Mountain wind turbine proposal (enclosed), the Forest Service Handbook implementing special use regulations, under which wind applications would be considered, requires that applicants demonstrate the need to use National Forest lands. According to SELC, "private land ridge tops account for more than half of the class 3+ wind potential" in western Virginia. **Until wind energy applicants can demonstrate that there is not suitable non-Federal land on which to develop wind energy, industrial wind projects should not be permitted on the George Washington National Forest.**

In developing your draft Forest Plan, please reconsider CER's recommendation to pursue Option 1, identifying the Forest as generally suitable for locating wind energy development outside of special areas. Instead, we encourage you to protect the multiple uses for which the Forest was created by prohibiting wind energy development. Impacts of wind generation on wildlife, scenic and recreational resources are too high to warrant the use of George Washington National Forest lands for industrial wind projects at this time.

Thank you for your consideration of these comments. Please do not hesitate to contact us if we can provide additional information.

Sincerely,

Kate G. Wofford

Kate G. Wofford
Director

Enclosures

United States Department of the Interior

FISH AND WILDLIFE SERVICE

West Virginia Field Office
694 Beverly Pike
Elkins, West Virginia 26241

November 16, 2007

Ms. Wendy Tidhar
WEST, Inc.
2003 Central Avenue
Cheyenne, Wyoming 82001

Re: Proposed Construction and Operation of a Wind Power Facility, in Pendleton and Hardy Counties, West Virginia

Dear Ms. Tidhar:

This responds to your letter dated October 5, 2007, requesting information on the presence of rare/sensitive habitat or natural features and communities within the vicinity of the proposed construction and operation of a wind power facility. The project is located in Pendleton and Hardy Counties, West Virginia. A portion of the project appears to enter Rockingham County, Virginia, according to the map provided in the letter. We have reviewed the information you supplied and are providing comments on it in accordance with the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*)(ESA), the Migratory Bird Treaty Act (16 U.S.C. 703-712)(MBTA), and the Golden Eagle Protection Act (16 U.S.C. 668-668d) (Eagle Act). For reasons explained in more detail in this letter, we recommend that you consider alternative locations for this wind power facility because the proposed site is a high risk site, and wind power operations at this location pose a reasonable likelihood of take[3] of species protected by the ESA, MBTA and Eagle Act.

---

[3] Take under the ESA means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct (16 U.S.C 1532(19)). Except as otherwise permitted, it is unlawful for "any person subject to the jurisdiction of the United States to take any [federally listed] species within the United States..." (16 U.S.C. § 1538(a)(1)(B)). Unless permitted by regulations, the MBTA provides that it is unlawful to pursue, hunt, take, capture or kill; attempt to take, capture or kill;...(16 U.S.C. §§ 703-712).

We are concerned about the proximity of these species occurrences to the proposed project. Given the significance of these occurrences, we provide more extensive comments and identify information needs, which when satisfied, will enable both the project proponent and the U.S. Fish and Wildlife Service (Service) to discuss the baseline conditions, examine risk and, if necessary, determine a proper course of action to avoid and minimize any impacts. We also address possible impacts to migratory birds and bats. As plans progress, you should contact us regarding alternative sites and any additional proposals for power lines, roads, and other ancillary facilities as these have the potential to affect wildlife in the area. Finally, we reserve the right to revise our position if the scope of the project changes, or if new information about species presence or interactions with turbines becomes available.

Threatened and endangered species known to occur near the project area which may be affected by the construction and operation of the project include the Indiana bat (*Myotis sodalis*), Virginia big-eared bat (*Corynorhinus townsendii virginianus*), and shale barren rock cress (*Arabis serotina*). Under section 9 of the ESA, a project proponent is responsible for ensuring that its actions do not result in unauthorized take of a federally-listed species. The Service is available to assist you in this regard. We are also concerned with the possible effects of this project to migratory birds and non-endangered bat species.

A known bald eagle (*Haliaeetus leucocephalus*) nest is also located near the proposed wind power facility. Eagle Act prohibits the take of bald and golden eagles unless pursuant to regulations. In the case of bald eagles, take can only be authorized under a permit. The Eagle Act defines the "take" of an eagle to include a broad range of actions: "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, or molest or disturb"; the broadest of these terms is "disturb." "Disturb" has now been defined by the Service in regulations at 50 CFR 22.3 as: "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior." The Eagle Act does allow for incidental take of bald eagles associated with the disturbance of nesting or foraging eagles. The bald eagle is also protected by the MBTA, which prohibits the taking of any migratory bird or any part, nest, or egg, except as permitted by regulation. At this time, neither the Eagle Act nor the MBTA permits incidental mortality of a bald eagle due to collisions with wind towers.

Indiana bat (*Myotis sodalis*)

The federally-listed endangered Indiana bat hibernates in caves or mine shafts in the winter and roosts in trees in the summer. Indiana bats migrate between hibernacula and summer maternity habitat, with records ranging from less than 30 miles to over 300 miles. There is one Indiana bat hibernacula located within 10 miles of the proposed wind power facility (WVDNR 2006). The Indiana bat may use the project area for roosting and foraging between April 1 and November 15 (USFWS 1999).

Data collected during a two-year study tracking spring emerging females to their summer roost sites in the Lake Champlain valley of New York and in a separate Vermont study suggest that females do not remain in the area surrounding the hibernacula after emerging from hibernation, but leave for summer habitat soon after emergence from hibernation (Britzke et al. 2004). Data indicate that the area within an approximate 5-mile radius of a hibernaculum is important

foraging and roosting habitat for the Indiana bat at the time of spring emergence (staging) and prior to hibernation (swarming), although males have been found almost 10 miles from the hibernacula in Indiana (U.S.D.A 2000).

Females dispersing from a Kentucky hibernaculum in the spring moved 4 to10 miles within 10 days of emergence, eventually traveling more than 300 miles from the hibernaculum to the maternity area (Gardner et al. 1996; Gardner and Cook 2002). However, maternity colonies have been also located within 10 to 25 miles of the hibernaculum (Butchkoski and Hassinger 2002; Britzke et al. 2004). Less is known about the male migration pattern, but many males summer near the hibernacula (Whitaker and Brack 2002). Some males disperse throughout the range and roost individually or in small numbers in the same types of trees and in the same areas as females.

It has been suggested that bats orient in response to landscape features during migration (Humphrey and Cope 1976). The mountain ridges of West Virginia may serve as corridors for bats migrating between their summer and winter habitats. Several bat species, including Indiana bats are known to follow linear features in the landscape when traveling between roosting and foraging sites (Verboom and Huitema 1997; Verboom and Spoelstra 1999; Murray and Kurta 2004). However Indiana bats are also known to cross high Appalachian ridges as demonstrated in an electronic tracking study (Chenger 2003).

Indiana bats feed exclusively on flying insects, and forage in riparian, bottomland, or upland forests (including ridge-tops), preferring a mosaic of open and forested areas (USFWS 1999). Such habitat conditions are likely to result from forest clearing associated with the proposed construction of turbines. While such clearing may appear to benefit bats, it may also attract bats after the turbines have been constructed, increasing the potential for bat mortality.

Virginia big-eared bat (*Corynorhinus townsendii virginianus*)
The federally-listed endangered Virginia big-eared bat lives in caves year round, and moves between winter hibernation sites and summer maternity sites. These movements may be within the same cave, but are more commonly between caves. Migration distances are usually less than 40 miles. There are four Virginia big-eared bat hibernacula located within 10 miles of the project area shown on your map. This includes Hoffman School Cave, Cliff Cave, Sinnitt-Thorn Cave, and Minor Rexrode Cave. Hoffman School Cave and Sinnitt-Thorn Cave have been designated as critical habitat for the Virginia big-eared bat. The Virginia big-eared bat uses all of these caves as hibernacula in the winter.

The Virginia big-eared bat may use the area for foraging between April 1 and November 15. They feed exclusively on flying insects, with the majority of their diet consisting of moths. Foraging habitat includes woodlands, old fields and hay fields (USFWS 1995). In summer, Virginia big-eared bats may forage more than six miles from their cave, and will cross ridges to reach foraging areas. Preferred foraging areas for Virginia big-eared bats consist of a mosaic of open and forested habitat. Such habitat conditions are likely to result from the construction of the proposed wind power facility.

SUMMARY OF BAT CONCERNS

The wind power facility is proposed along a mountain ridge in West Virginia and could pose a risk to Indiana and Virginia big-eared bats, as well as many non-endangered bat species foraging or migrating through the area. Since bats are long-lived and have low reproductive rates, high mortality levels could have serious impacts on populations.

Bat mortality at wind turbine sites in North America has been documented to occur during summer foraging activities, as well as during migration (Keeley *et. al* 2001, Erickson *et. al* 2002, Johnson *et. al* 2003, Johnson 2003, Kerns and Kerlinger 2004). An estimated 2,092 bats, representing at least six species, were reported killed between August 18th and November 9th of 2003 at the Mountaineer Wind Energy Center, located on Backbone Mountain in Tucker County, West Virginia (Kerns and Kerlinger 2004). An important field study conducted during 2004 by the Bats and Wind Energy Cooperative (BWEC) (Bat Conservation International, Inc. 2004) at the Mountaineer and Meyersdale Wind Energy Centers found similar results (Arnett 2005). Both projects are located along ridges of the Appalachian plateau in West Virginia and Pennsylvania, respectively. This study is relevant to the proposed project due to geographic proximity, location on forested ridges with comparable forest composition, bat species, similarity of turbine and project design, and perhaps other factors. Therefore, we will go to some length below to recount some salient points reported by Arnett (2005):

- Mountaineer has 44 and Meyersdale has 20 NEG Micron 1.5 MW turbines.
- Mountaineer began operation in December 2002; Meyersdale exactly one year later.
- Fatality searches were conducted at both sites between July 31 and September 13, 2004.
- Half of the turbines at each site were searched daily and the other half weekly.
- Human search efficiency was 42% at Mountaineer and 14% at Meyersdale, while the search efficiency of trained dogs was 71% at Mountaineer and 81% at Meyersdale.
- Trained dogs consistently found higher proportions of carcasses in high, medium, and low visibility habitats than humans.
- Thermal imaging cameras were used to assess bat activity at turbines at Mountaineer, which provided video of bats coursing between moving blades in foraging behavior, chasing blades, being struck by blades, and falling to the ground.
- Most bat activity was observed within 2-hours after sunset.
- Six species were found killed at Mountaineer and 7 at Meyersdale: hoary bats, eastern red bats, eastern pipistrelles, little brown bats, silver-haired bats, big brown bats, and northern long-eared bats (only found at Meyersdale) (from highest to lowest number found).
- While no endangered species were found dead, no hibernacula were reported in the project areas. There are hibernacula in the proposed project area.
- Bat fatalities were highly variable and periodic throughout the study.
- Fatality was distributed across all turbines, although higher than average numbers of bats generally were found at turbines located near an end or center of the string on both sites.
- At both locations, the majority of bats were killed on low wind nights when power production appeared insubstantial, but turbine blades were still spinning and often at or close to full operational speed (17 rpm).
- Of the 64 turbines studied, one turbine was non-operational throughout the study period and this was the only turbine where <u>no</u> fatalities were found.
- Timing of bat fatalities at Mountaineer and Meyersdale were highly correlated, providing

evidence that broader landscape patterns, perhaps regional in scope, dictated by weather and prey abundance/availability or other factors influenced mortality events.

- FAA lighting had no detectable impact on bat fatality.
- At Mountaineer, 1,364 to1,980 bats are estimated to have been killed by the 44 turbines during the 6-week study. Based on daily searchers, 38 bats per turbine were killed during this study (90% confidence interval = 31-45).
- At Meyersdale, 400-660 bats are estimated to have been killed by the 20 turbines during the 6-week study. Based on daily searches, 25 bats per turbine were estimated killed during this study (90% confidence interval = 20-33).
- The estimates of mortality are among the highest ever reported in the world, and support the contention that forested ridges are locations of especially high risk for bat fatality at wind energy facilities.
- The findings reflect an emerging pattern of bat fatality associated with wind turbines located on forested ridges and suggest that similar fatality rates could be expected at sites with comparable forest composition and topography, especially in the eastern U.S.

Results of a pilot study designed to investigate bat mortality associated with wind turbines in Sweden indicated that migratory and non-migratory aerially-hunting bats will forage on insects that concentrate near wind turbines (Ahlén 2003). This behavior was observed at facilities sited within flight corridors of migrating bats and/or foraging habitat of non-migrating bats. Ahlén (2003) also reported finding dead migratory and non-migratory species of bats near the turbine structures. The project site may be within the migration path or serve as a foraging area for several bat species, including Indiana and Virginia big-eared bats.

We strongly encourage you to determine the temporal and spatial use of the project area by bats so that such use by bats can be reported to us and others prior to filing an application with the West Virginia Public Service Commission. The spatial areas of greatest concern include the ridgelines, side slopes, and valley sections. We are interested in the seasonal and annual variability of bat use of these areas, which occurs for a variety of reasons, including weather. So that variability can be accounted for with some reliability, we recommend conducting multi-year studies (usually for three years). Radar, thermal imaging, acoustical studies, mist-netting and other appropriate sampling techniques should be employed. With respect to Federally-listed species, we recommend conducting springtime emergence studies to detect when and where species from nearby hibernacula travel. We also suggest that you review the scientific literature and data and consult with species experts with experience in this[4] to develop a study plan. The Service is available to review and comment on the draft study plan, and the results of the studies. We are interested to learn how you propose to avoid and minimize fatality of endangered and non-endangered bats should the project be constructed and operated.

Shale Barren Rock Cress (*Arabis serotina*)

The project boundary overlaps with known locations and potential habitat of shale barren rock cress in West Virginia. Shale barren rock cress is a member of the mustard family, Brassicaceae,

[4] For example, Al Hicks with the New York Department of Environmental Conservation, Office of Endangered Species, in Albany has been directing the spring emergence project in New York. He may be the first to successfully locate maternity colonies of bats, in this case Indiana bats, by tracking them from their hibernacula to their summer range. He can be r reached at 518-402-8854 office; or 518-461-4632 cell; or at achicks@gw.dec.state.ny.us.

and is one of several endemic species restricted to the mid-Appalachian shale barrens of the Ridge and Valley province of the Appalachian Highlands (USFWS 1991). Shale barren vegetation occurs on eroding shale formations. Mid-Appalachian shale barren is a designation for a shale slope of the region with an open, scrubby growth of pine, oak, red cedar, and other woody species adapted to xeric conditions. Shale barren rock cress is a biennial herb.

The primary threat to listed plants is habitat alteration. Factors that contribute to this threat include natural forest succession and subsequent canopy closure, changes in hydrology (either more water or less water), competition by invasive plant species, and catastrophic disturbance such as development or road construction. The construction of access roads and support facilities may result in loss of shale barren rock cress populations.

Migratory Birds

Most birds migrate – from hundreds to thousands of miles each year – in their quest for food. Many bats also migrate. The season and weather conditions affect when and where the migratory path will go. Birds and bats may converge along distinct landforms that are either barriers or aids to migration. Some birds congregate along the shores of large water bodies as they migrate. Some songbirds and soaring birds, like eagles and hawks, migrate along Appalachian Mountain ridge lines. Thermal updrafts along the ridges provide lift, allowing the birds to conserve energy. Inclement weather can force birds to fly lower than usual, where they can collide with human-made structures. Coping with storms or obstacles causes an increase in energy expenditure, and can reduce the birds' lifespan and ability to reproduce. The majority of birds that migrate over North America do so east of the Mississippi River, including the Northeast and the ridges of the Appalachian plateau.

We are concerned about potential impacts of wind power facilities on migratory birds, a Federal trust resource the Service is mandated to protect. Birds have been killed by rotating turbine blades and/or by striking turbines structures at the Mountaineer Wind Energy Center (Arnett 2005) and other projects. Wind energy generation facilities may also affect bird movements, breeding, and habitat use (USFWS 2003). Take (i.e., killing) of migratory birds by any person without authorization constitutes a violation of the Migratory Bird Treaty Act (MBTA), which is a strict liability statute.

While the MBTA has no provisions for allowing unauthorized take, we recognize that some birds may be killed at structures such as wind turbines even if all reasonable measures to avoid take are implemented. The Service's Office of Law Enforcement carries out its mission to protect migratory birds not only through investigations and enforcement, but also through fostering relationships with individuals and industries that proactively seek to eliminate their impacts on migratory birds. Although it is not possible under the MBTA to absolve individuals, companies, or agencies from liability (even if they implement avian mortality avoidance or similar conservation measures), the Office of Law Enforcement focuses on those individuals, companies, or agencies that take migratory birds with disregard for their actions and the law, especially when conservation measures have been developed but are not properly implemented.

We recommend that multiple years of pre-construction monitoring of birds be conducted at the proposed project site in order to determine the spatial and temporal uses of the project area by migratory birds. Radar and other appropriate sampling techniques should be employed. For

example, one study performed at Mt. Storm in the fall of 2003, estimated that nearly 16% or 300,000 birds and bats flew low enough (below 125 meters above ground level and the height of proposed wind turbines) to collide with the turbine's tower or blades during fall migration. Radar technology was used to track birds in flight. The relevant paragraph follows:

> "...it is estimated that approximately 1,830,800 birds may have passed over the study area during the fall migration below 1.5 kilometers agl [199 targets per kilometer per hour x 10 kilometers of migratory front x 10 hours per night x 92 nights] and approximately 292,928 (16%) would pass though the area below 125 meters agl."

The study conducted in the fall of 2004 at Liberty Gap in Pendleton County concluded that the average flight altitude above the vertical radar was 583 m (mean varying from 284 m to 781 m), with 8% of the targets flying below an altitude of 125 m, or the height of the proposed turbines (Roy et al 2004). However, the range of targets flying below the 125 m altitude mark was 2% to 26% (Roy et al 2004), or 88 to 1,144 of the targets (n=4,402) identified in the vertical radar. The vertical radar was set to identify bird and bat targets. A similar study conducted in the spring of 2005 found that the total migratory activity appeared to be approximately twice as high during the spring sampling period compared to the previous fall (Woodlot Alternatives 2005). We suggest that you review the scientific literature and other data as well as consulting with species experts to develop a study plan. As previously mentioned for bats, the Service is available to review the draft plan, as well as study results.

We recommend that studies be conducted over a three-year period to help ensure that year-to-year variability would be included in the data. For example, data only from one year or even one season on nocturnal migrant passage will not likely accurately represent the passage during other years and thus may fail to account for annual variation in numbers, species, weather, altitude, etc. The three-year duration was chosen for the proposed site as a compromise between five-or seven-year sampling periods and single-year studies.

Bald Eagle (*Haliaeetus leucocephalus*)

A bald eagle nest is located within 6.9 km (4.3 miles) of the project boundary. Bald eagles are a North American species that historically occurred throughout the contiguous United States and Alaska. Bald eagle distribution varies seasonally. Bald eagles that nest in southern latitudes frequently move northward in late spring and early summer, often summering as far north as Canada. Most eagles that breed at northern latitudes migrate southward during winter, or to coastal areas where waters remain unfrozen. Migrants frequently concentrate in large numbers at sites where food is abundant and they often roost together communally. In some cases, concentration areas are used year-round: in summer by southern eagles and in winter by northern eagles.

During the breeding season, bald eagles are sensitive to a variety of human activities. However, not all bald eagle pairs react to human activities in the same way. Some pairs nest successfully just dozens of yards from human activity, while others abandon nest sites in response to activities much farther away. This variability may be related to a number of factors, including visibility, duration, noise levels, extent of the area affected by the activity, prior experiences with humans, and tolerance of the individual nesting pair. The relative sensitivity of bald eagles during various stages of the breeding season is outlined in the following table:

Nesting Bald Eagle Sensitivity to Human Activities

Phase	Activity	Sensitivity to Human Activity	Comments
I	Courtship and Nest Building	Most sensitive period; likely to respond negatively	Most critical time period. Disturbance is manifested in nest abandonment. Bald eagles in newly established territories are more prone to abandon nest sites.
II	Egg laying	Very sensitive period	Human activity of even limited duration may cause nest desertion and abandonment of territory for the breeding season.
III	Incubation and early nestling period (up to 4 weeks)	Very sensitive period	Adults are less likely to abandon the nest near and after hatching. However, flushed adults leave eggs and young unattended; eggs are susceptible to cooling, loss of moisture, overheating, and predation; young are vulnerable to elements.
IV	Nestling period. 4 to 8 weeks	Moderately sensitive period	Likelihood of nest abandonment and vulnerability of the nestlings to elements somewhat decreases. However, nestlings may miss feedings, affecting their survival.
V	Nestlings 8 weeks through fledging	Very sensitive period	Gaining flight capability, nestlings 8 weeks and older may flush from the nest prematurely due to disruption and die.

If agitated by human activities, eagles may inadequately construct or repair their nest, may expend energy defending the nest rather than tending to their young, or may abandon the nest altogether. Activities that cause prolonged absences of adults from their nests can jeopardize eggs or young. Depending on weather conditions, eggs may overheat or cool too much and fail to hatch. Unattended eggs and nestlings are subject to predation. Young nestlings are particularly vulnerable because they rely on their parents to provide warmth or shade, without which they may die as a result of hypothermia or heat stress. If food delivery schedules are interrupted, the young may not develop healthy plumage, which can affect their survival. In addition, adults startled while incubating or brooding young may damage eggs or injure their young as they abruptly leave the nest. Older nestlings no longer require constant attention from the adults, but they may be startled by loud or intrusive human activities and prematurely jump from the nest before they are able to fly or care for themselves. Once fledged, juveniles range up to ¼ mile from the nest site, often to a site with minimal human activity. During this period, until about six weeks after departure from the nest, the juveniles still depend on the adults to feed them.

Disruption, destruction, or obstruction of roosting and foraging areas can also negatively affect bald eagles. Disruptive activities in or near eagle foraging areas can interfere with feeding,

reducing chances of survival. Interference with feeding can also result in reduced productivity (number of young successfully fledged). Migrating and wintering bald eagles often congregate at specific sites for purposes of feeding and sheltering. Bald eagles rely on established roost sites because of their proximity to sufficient food sources. Roost sites are usually in mature trees where the eagles are somewhat sheltered from the wind and weather. Human activities near or within communal roost sites may prevent eagles from feeding or taking shelter, especially if there are not other undisturbed and productive feeding and roosting sites available. Activities that permanently alter communal roost sites and important foraging areas can altogether eliminate the elements that are essential for feeding and sheltering eagles.

In addition to the threat of disturbance, bald eagles may forage in the project area, increasing their chance of colliding with moving blades. Raptors can become acclimated to new structures in their territory. However, until that happens, bald eagles may focus on catching their prey and be unaware of the rotating blades. This has been an on-going concern at the Altamont Pass wind power facility in California.

Wildlife Impacts including Habitat Fragmentation

Habitat fragmentation is an issue for many species of wildlife, particularly for deep forest birds. Habitat fragmentation can result as a consequence of clearing forests for roads or corridors to accommodate vehicular access and transmission lines and site clearing to accommodate wind turbines. Effects could include direct loss of deep forest habitat; an increase in edge habitat; increased nest parasitism and predation; a decrease in abundance and diversity of area-sensitive species with a concurrent increase in habitat suitability for edge and generalist species; and interruption of travel corridors, displacement, and other behavioral effects.

Summary

In summary, the Service is supportive of electricity generation from renewable sources and encourages efficient wind energy projects that are sited and operated to be bird-and-bat friendly. With that in mind, we are concerned about the potential risk that construction and operation of the proposed wind power facility may pose to ESA-listed species, Eagle Act-protected species, MBTA-protected bird species, and non-listed bats residing and migrating through the area, and the resultant cumulative impacts of wind power facilities on ridge tops throughout the eastern United States. <u>There have been few studies in the U.S. that document nocturnal avoidance of wind turbines by songbirds and bats.</u> We, therefore, find a compelling need for these data at the site-specific scale. It would be an unusual situation where data would not be needed to assess the suitability of a site for a proposed commercial-scale wind project in consideration of birds and bats. We strongly encourage you to perform the recommended pre-construction studies at the proposed project site in order to identify use by threatened and endangered species, eagles, and migratory birds and bats. This information will be critical in assessing possible risks to these species as well as designing means to avoid and minimize any impacts. It will also be helpful in designing the scope of post-construction monitoring efforts, which the Service believes should be phased over the life of the project because one hibernaculum for two Federally-listed endangered species of bats and three Virginia big-eared bat locations are within 10 miles of the proposed turbine line. We are not able to know how the bats will use the project space in the future.

The Service strongly recommends further coordination with regard to the Endangered Species Act (ESA). If it is determined that a federal agency is involved in the funding, permitting, or authorization of a proposed project, further consultation between that agency and the Service will be necessary, pursuant to section 7 of the ESA. Absent a federal nexus, if a federally-listed threatened or endangered species may be taken as a result of the construction or operation of the project, a project prospect may opt to apply to the Service to obtain an incidental take permit pursuant to section (10)(a)(1)(B) of the ESA. The Service may issue such a permit upon completion of a satisfactory habitat conservation plan (HCP) for the listed species that would be taken by the project. Outside of a HCP, a bald eagle disturbance permit may be required if the buffers to avoid disturbance cannot be implemented during project construction. It should be noted that the West Virginia Public Service Commission often includes coordination with the Service as part of their Order granting certification.

The Service offers Interim Guidelines to avoid and minimize wildlife impacts from wind turbines. The Service's Interim Guidelines are applicable to terrestrial projects in the Northeast with few exceptions. The Interim Guidelines include recommendations for 1) proper evaluation of wind resource areas; 2) proper siting and design of turbines within development areas; and 3) pre- and post-construction research and monitoring to identify and/or assess impacts to wildlife. We encourage you to reference these guidelines at http://www.fws.gov/habitatconservation/wind.pdf and incorporate as many of the design recommendations as possible. We also recommend that you refer to the U.S. Fish and Wildlife Service's "Birds of Conservation Concern 2002" list in order to identify birds of conservation concern that may breed or migrate through the project area. This list may be accessed on-line at http://migratorybirds.fws.gov/reports/BCC02/BCC2002.pdf.

RECOMMENDATIONS

While the fatalities at Mountaineer and Meyersdale were not predicted during the site evaluation phase or prior to construction, we are predicting them now for the Pendleton and Hardy Counties project. We recommend that wind projects be sited to effectively avoid harm to wildlife.

Based on the available information, it is our opinion that the fatality rates reported by Arnett (2005) for bats at wind turbines should be applied to the proposed project, including for the two endangered bat species known to be in that area. This, and other factors such as the proximity to a known Bald Eagle nest, lead us to conclude that proposed project is proposed on a high risk site. Therefore, we recommend that a wind power facility not be constructed at this site.

However, should your client intend to pursue the construction and operation of a wind power facility at this location, 3 years of pre-construction surveys including mist net surveys, radar studies, acoustic monitoring, as well as surveys for bald eagle foraging areas and shale barren rock cress, should be conducted prior to submitting a site certificate application to the West Virginia Public Service Commission.

If Federally-listed species are found to be present within the project boundaries, or otherwise likely to be affected by the project, then the Service recommends that your client apply for an incidental take permit and affiliated Habitat Conservation Plan.

Ms. Wendy Tidhar
November 16, 2007

The Service also recommends that your client coordinate with the U.S. Forest Service (USFS) regarding the need for a special use permit or similar permit for access to the site and potential impacts to USFS resources. The address is U.S. Department of Agriculture, U.S. Forest Service, George Washington and Jefferson National Forests, 5162 Valleypointe Parkway, Roanoke, VA 24019. The project boundary crosses into Virginia. For that reason, we recommend that you contact the Service's Virginia Field Office, as well. The address is U.S. Fish and Wildlife Service, Virginia Field Office, 6669 Short Lane, Gloucester, VA 23061.

We appreciate the opportunity to provide information relative to wildlife issues, and thank you for your interest in these resources. If you have any questions, please contact Christy Johnson-Hughes of my office at (304) 636-6586.

Sincerely,

Laura Hill

for Thomas R. Chapman
Field Supervisor

REFERENCES

Ahlén, I. 2003. Wind turbines and bats - a pilot study. Final report submitted to Swedish National Energy Administration. 11 December 2003. Translated from Swedish 5 March 2004.

Arnett. E.B., technical editor. 2005. Relationships between bats and wind turbines in Pennsylvania and West Virginia: an assessment of bat fatality search protocols, patterns of fatality, and behavioral interactions with wind turbines. A final report submitted to the Bats and Wind Energy Cooperative. Bat Conservation International. Austin, Texas, USA. 187 pp. (www.batcon.org)

Bat Conservation International. Inc. 2004. Bats and Wind Energy Cooperative. (www.batcon.org)

Britzke, E.R., A.C.Hicks, S.L. von Oettingen, and S.R. Darling. 2004. Description of spring roosting ecology of female Indiana bats in the Lake Champlain Valley of Vermont and New York. In review.

Butchkoski, C. M. and J.D. Hassinger. 2002. Ecology of a maternity colony roosting in a building. *In* Kurta A., and J. Kennedy, eds. The Indiana bat: biology and management of an endangered species. Bat Conservation International, Austin, Texas.

Chenger, J. 2003. One *sodalis* from the Hartman mine: summary results of an electronic tracking study of a single Indiana bat, Unpublished report prepared by Bat Conservation Management. Mechanicsburg, Pennsylvania.

Erickson, W., G. Johnson, D. Young, D. Strickland, R. Good, M. Bourassa, K. Bay, and K. Sernka. 2002. Synthesis and comparison of baseline avian and bat use, raptor nesting and mortality information from proposed and existing wind developments. West, Inc., Cheyenne, WY. 124 pp.

Gardner, J.E., and E.A. Cook. 2002. Seasonal and geographic distribution and quantification of potential summer habitat. *In* Kurta A., and J. Kennedy, eds. The Indiana bat: biology and management of an endangered species. Bat Conservation International, Austin, Texas. 253p.

Gardner, J.E., J.E. Hofmann, and J.D. Garner. 1996. Summer distribution of the federally endangered Indiana bat (*Myotis sodalis*) in Illinois. Transactions of the Illinois State Academy of Science. 89: 187-196.

Humphrey, S.R and J.B. Cope. 1976. Population ecology of the little brown bat, *Myotis lucifugus*, in Indiana and North-Central Kentucky. Special Publication No. 4. The American Society of Mammalogists. 81pp.

Southern Environmental Law Center

201 West Main Street, #14
Charlottesville, VA 22902-5065
(434) 977-4090
(434) 977-1483
SouthernEnvironment.org

May 13, 2008

Linda Brett
Acting Forest Supervisor
George Washington and Jefferson National Forests
5162 Valleypointe Parkway
Roanoke, Virginia 24019
lbrett@fs.fed.us

BY E-MAIL AND U.S. MAIL

Re: Wind Turbine Proposal for Church Mountain, George Washington National Forest

Dear Ms. Brett:

We understand that the George Washington National Forest (GWNF) has received a verbal proposal for an industrial scale wind power project on Church Mountain and Great North Mountain in the Lee Ranger District in Rockingham, Shenandoah, and Hardy (WV) Counties. Based on the information the proponent provided to the Federal Aviation Administration (FAA), the wind project as currently proposed would entail 131 turbines, each 440 feet tall, along 18 miles of ridgeline (see attached map dated 3/21/08). While we support renewable, clean energy development in Virginia, we have serious reservations regarding the use of our limited national forest land as the location for such projects.

We understand that this proposal (or at least a proposal for meteorological testing towers) now is going through the Forest Service's initial screening process for special use permits. We strongly recommend that a special use permit for the wind turbine project on Church Mountain be rejected for the reasons discussed further below. This undisturbed forested ridgetop is highly valued for its wildlife, recreation, and scenic attributes. Because the site is so poorly suited for large scale wind development, even a proposal for testing towers should be rejected in order to avoid further investing time and money in a completely unsuitable site.

Any consideration of a testing tower permit must also examine the potential impacts of full scale wind development. The fact that the existing wind maps for Virginia show this public ridgetop as having substantial wind resources, combined with the federal tax credit for building

the proposed installation, make it reasonably foreseeable that the applicant will proceed with an application to develop the entire facility. The fact that the applicant has already applied to the FAA for clearance of the entire facility reinforces the need to consider the whole project up front.

The following are our initial comments on this proposal based on the limited information we have to date. We urge the USFS to reject the proposal given its failure to meet the screening criteria. Should the agency continue to process any proposal at this or any other National Forest site, we ask the agency to keep us informed so that we may comment further before any decision is made to accept a formal application and proceed with the special use permit review process.

Under the Forest Service special use regulations, proposals for special uses go through two initial screenings prior to the formal application stage.

1. Under the initial screening provided for in 36 C.F.R. §251.54(e)(1), the proposal must meet nine criteria.

Under subparagraph (i) the proposed use **must be consistent with the laws, regulations, orders and policies establishing or governing national forest system lands and with other applicable federal law.**

The proposed wind turbine project is likely to violate the Endangered Species Act (ESA), 16 U.S.C. §1531 et seq.; the Migratory Bird Treaty Act (MBTA), 16 U.S.C. §703-712; and the Golden Eagle Protection Act, 16 U.S.C. §668-668(d). See attached letter from U.S. Fish and Wildlife Service (FWS) to Ms. Wendy Tidhar, November 16, 2007 ("FWS Letter").

The FWS letter stated that a proposed wind turbine project on nearby Shenandoah Mtn. "pose[d] a reasonable likelihood of take of species protected by the ESA, MBTA and Eagle Act." FWS Letter at 1. We expect that these concerns also apply to the Church Mtn. site.

The FWS predicted that wind turbine operations would kill federally-listed bats. FWS Letter at 10. Four bat hibernacula within 10 miles of the Shenandoah Mtn. site support Endangered bats. One is inhabited by both Indiana bats and Virginia big-eared bats and the other three are occupied by Virginia big-eared bats. FWS Letter at 2-3, 9-10.

The FWS also pointed out a known bald eagle nest within 4.3 miles of the Shenandoah Mtn. site. The FWS was concerned that eagles could be killed by collisions with the Shenandoah Mtn. wind turbines (as has been an ongoing problem at a California wind turbine power facility) and that facility operations could disturb the eagles' breeding, roosting and foraging habits. FWS Letter at 7-9. The FWS noted that neither the MBTA nor the Eagle Act permits incidental kills by collision with wind turbines. FWS Letter at 2. The FWS also predicted wind turbine operations could kill migratory songbirds and other soaring birds, like hawks, which would violate the MBTA. FWS Letter at 6.

Bald and golden eagles are known from the Kimsey Run Reservoir near Lost River, about five miles from the Church Mtn. site. This February, a local resident observed about 80

bald eagles and 15 golden eagles in one day at Kimsey Run. Therefore, the Church Mtn. site appears to pose similar threats to protected eagles.

Finally, the FWS noted that the construction of the wind turbines, access roads and support facilities may destroy an Endangered plant, the Shale Barren Rock Cress.

Based on concerns about killing and disturbing Endangered and non-endangered bats, eagles and migratory birds, the FWS viewed the Shenandoah Mtn. site as a 'high risk" site and recommended against constructing a wind power facility there. We believe the Church Mtn. site probably poses similar risks and is not an appropriate location for a wind turbine facility.

Subparagraph (ii) provides the **proposed use must be consistent with standards and guidelines in the applicable forest land and resource management plan.** The existing plan does not provide for commercial wind turbine installations. Some of the land in question (Rockingham County portion) is in the Remote Highlands Management Area (MA 9) under the existing GWNF forest plan. Such a project along 18 miles of ridge line with substantial access roads would be contrary to the desired conditions for remote recreation, near-natural environments and unfragmented habitat and to standards prohibiting new road construction. See 1993 GW Forest Plan at 3-43-45.

In addition, the draft revised forest plan for the GWNF dated February 2007 classifies the Rockingham County portion of the site as unsuitable for commercial wind energy development. See 2/15/07 draft CER at 119-120 and map dated 2/9/2007. The draft revised plan also placed this portion in a Remote Backcountry Special Area. See map dated 2/9/2007.

The wind project also would be inconsistent with the Remote Wildlife Habitat Management Area (MA 14) assigned to the northern portion of the ridge. MA 14 is intended to provide large, contiguous tracts of remote habitat, on its own or together with adjacent remote areas such as MA 9, as in this case. See 1993 Plan at 3-74. The area is managed to provide mature forest habitat and freedom from disturbance for species such as black bear. Id. Public motorized use is restricted, even timber management must be carefully planned to minimize overall disturbance and access roads may be only low-standard and closed to all but administrative use, and overall road density is limited. Id. at 3-74-76. The permanent forest clearing, continuous operation and access roads required for this wind installation would not be consistent with these goals and standards.

Subparagraph (iv) provides that **the proposed use will not create an exclusive or perpetual right of use or occupancy.** The proposed wind turbine installation would require exclusive occupancy of the ridge line for the turbine installations and access roads all along and up to the ridge line in an area where a popular hiking trail now runs. The proposed use would eliminate the hiking trail in any natural setting and be the exclusive use.

Examples of this type of exclusive right or occupancy (or the appearance of such a right) are some major capital improvements by municipal entities. Forest Service Handbook (FSH) 2709.11, 12.21(4)(b). A wind power facility certainly would be a major capital investment.

2. The proposal fails to meet the terms required in the second level of screening provided for under 36 C.F.R. §251.54(e)(5), and must be rejected.

Under 36 C.F.R. §251.54(e)(5) , the authorized officer shall reject a proposal if the officer determines that:

(i) the proposed use would be inconsistent or incompatible with the purposes for which the lands are managed, or with other uses; or

(ii) the proposed use would not be in the public interest; or...

The land in question is currently managed primarily as a hiking trail along the ridgetop, within remote recreation- and wildlife- oriented management areas. The trail is part of the Great Eastern Trail being established by a variety of user groups as an alternative to the Appalachian Trail, running west of the AT from the AL-FL state line to New York state. The location of a substantial road and turbine installations is clearly not consistent or compatible with the current purposes for which the land is managed.

The forest clearing and fragmentation required for the facility is also incompatible with the purposes for which the land is managed. The ridgetop access road would likely require a clearing 50 to 100 or more feet wide based on what has happened at other facilities (as opposed to what the developer suggested might occur). Each turbine clearing would likely average about 2 acres in size. It is also important to recognize that the clearing of forest for roads and powerlines may result in an additional forest loss of about 2-3 acres per turbine (i.e., a wind energy project built atop a forested ridge likely results in the total clearing of 4 to 5 acres of forest per turbine).

The ridgeline in question is also found in two Mountain Treasure areas which the upcoming publication suggests should be inventoried roadless areas. Two Virginia wind land classification efforts both found uninventoried roadless areas to raise significant concern. See Landscape Classification System for Virginia, at p.17, 4/21/05, at www.VAwind.org (listing uninventoried roadless areas as "unsuitable unmapped"); and VWEC, Landscape Classification System for Virginia, at p. 15, May 2005 (listing uninventoried roadless areas as "Flagged for Potential Use Conflict").

In addition, the proposed use, despite its clean energy benefits, is not in the public interest given the broad and growing interest of the public in the recreational attributes of this 18-mile ridge line.

At this stage, the applicant must also **demonstrate why the use of National Forest lands is necessary.** Under the Forest Service Handbook implementing the special use regulations, FSH 2709.11, 12.32(a), the appropriate use of National Forest lands is one aspect of these second-level screening requirements for consistency and compatibility with land management purposes and the public interest.

The FSH provides that "[t]he proponent must explain the selection of the location of the proposed use and, in particular, why use of National Forest System lands is necessary and why lands under other ownership cannot be used. Deny proposals for use of national forest system lands when the request is based solely on affording the proponent with a lower cost or less restrictive location than can be obtained on non-Federal lands." FSH 2709.11, 12.32a.

A review of wind energy maps in Virginia and neighboring states shows that wind resources exist on private ridgetops throughout the Appalachian region. The applicant will have difficulty providing any legitimate reason for pursuing this project on public lands other than the hope that dealing with one landowner, the U.S. Forest Service is easier and could be less expensive than dealing with multiple private landowners.

A preliminary review of wind potential maps in western VA reveals that private land ridgetops account for more than half of the class 3+ wind potential in the western part of the state, assuming national parks and national wilderness areas are off limits to wind development. Thus, there is no reason to degrade national forest ridgetops to pursue renewable energy development in western VA. The applicant cannot demonstrate it is necessary to locate wind turbines in the George Washington National Forest.

Demonstrating the need to use National Forest lands is part of the second-level screening criteria and the FSH repeatedly instructs that proposals which cannot meet this and the other criteria must be denied. FSH 2709.11, 12.32, 12.4.

Because a wind turbine project on Church Mtn. does not meet these screening criteria, the Forest Service should reject the proposal. See 36 C.F.R. § 251.54(e)(2), (5) (any proposed use that does not meet all of the screening requirements "shall not receive further evaluation and processing" and the agency "shall reject" it); see also FSH 2709.11, 11.22 ("authorized officer shall return to the proponent without further consideration any proposal that does not meet the initial screening criteria"); FSH 2709.11, 11.24 ("authorized officer shall deny any proposal that fails to meet the second-level screening criteria").

3. BLM and FWS guidelines

The Bureau of Land Management (BLM) and FWS guidelines for wind energy development also suggest that the Church Mtn. site should be avoided. The draft revised GW forest plan(p.75) and CER(p.118-19) (2/15/07) state that the USFS will follow the BLM's October 16, 2002, interim guidance for wind development until the USFS has its own. The BLM guidance, in turn, encourages the use of the FWS guidelines for evaluating potential sites.

The BLM guidance states that the "overall wind energy policy is to minimize negative impacts to the natural, cultural and visual resources on the public lands. Negative impacts can be minimized by avoiding special management areas with land use restrictions, avoiding major avian (bird) migration routes and areas of critical habitat for species of concern. . .." BLM Guidance p.2.

The FWS guidance recommends that wind development avoid, among other sites: documented locations of federally-listed species; local bird migration pathways or areas where birds are highly concentrated; sites near bat hibernation, breeding and maternity colonies and in bat migration corridors or flight paths; areas known to attract raptors, including eagles; and avoid fragmenting large, contiguous tracts of wildlife habitat. FWS, Interim Guidance for Avoiding and Minimizing Wildlife Impacts from Wind Turbines, pp. 3-4 (5/13/03). Based on the known or likely presence of these resources in the area, as discussed above, these guidelines suggest that the Church Mtn. site should be avoided completely.

Thank you for your consideration. Please contact us if you have any questions.

Sincerely,

David W. Carr, Jr.
Senior Attorney
Public Lands Director

Sarah A. Francisco
Staff Attorney

Enclosures

cc: Kenneth Landgraf, USFS

Virginia Forest Watch
14031 Independence Road, Ashland, VA 23005
804-798-0988
www.VirginiaForestWatch.org

January 29, 2009

Maureen Hyzer, Supervisor
George Washington and Jefferson National Forests
USDA Forest Service
5162 Valleypointe Parkway
Roanoke, VA 24019

RE: Land and Resource Management Plan Revision Process for the George Washington National Forest and Timber Management

Dear Supervisor Hyzer:

With this letter we request a meeting with you to discuss timber management on the George Washington and Jefferson National Forests, particularly in the context of the plan revision process for the George Washington National Forest. In support of our request for a meeting and for the purpose of making a record on the issue of single-tree uneven-aged management in the plan revision process, we offer the following and the enclosed documents in support of our request to meet with you.

Members of Virginia Forest Watch have been engaged in the planning process and requesting that the restrictions on uneven-aged management be eliminated from the revised Land and Resource Management Plan for the George Washington National Forest. Virginia Forest Watch also hosted a field trip to the Fernow Experimental Forest where decades of uneven-aged management research has been conducted. Several Forest Service staff attended the field trip and we are grateful for their interest and participation.

Immediately following the field trip, Virginia Forest Watch learned of a recent Technical Report published by the Forest Service titled *Pioneer Forest: A Half-Century of Sustainable Uneven-Aged Management in the Missouri Ozarks*. I have enclosed an electronic copy of the 136-page report downloaded from the internet at <http://www.forestguild.org/model_forest/PioneerForest/gtr_srs108_ss.pdf>. Tammy Belinsky forwarded a link to the report to some of the field trip participants.

In particular, the article found at page 53 of the Technical Report titled *Silviculture and the Long-Term Dynamics of Single-Tree Selection on the Pioneer Forest* documenting the research of Edward F. Loewenstein concludes as follows:

> Despite a widely held belief that oaks regenerate most easily using clearcutting or shelterwood methods, this knowledge leads many to discount the use of uneven-

> aged methods to manage oaks. However, the data in this paper show that the staff of the Pioneer Forest has successfully used single-tree selection over the past 50 years. The efficacy of the Pioneer system was evaluated in four ways:
>
> 1. The age structure of the oak component was found to be uneven-aged across 70 percent of the area sampled.
>
> 2. The diameter structure was found to exhibit a stable, reverse J-shaped distribution that has not changed over time. Such a distribution is considered indicative of a balanced, uneven-aged stand.
>
> 3. The species composition on the forest has changed little over the past 50 years and shows no evidence of a compositional shift toward shade-tolerant species. The oak component has been maintained in the overstory and understory, and the white oaks are increasing in prominence.
>
> 4. Finally, the forestwide diameter structure appears stable at a spatial scale of 0.6 acres. This scale strongly suggests that the entire range of size/age classes is well distributed across the landscape and not occurring in distinct even-aged groups.

USDA- Forest Service, General Technical Report SRS-108 *Pioneer Forest: A Half-Century of Sustainable Uneven-Aged Management in the Missouri Ozarks*, p. 47 (July 2008).

Not only can oak regeneration be achieved through single-tree selection, the Pioneer Forest is a model for multiple-use forest management with other ecosystem values featured such as endangered species protection, recreation, and outstanding surface water quality. In addition and perhaps most impressively

> The real impact of the business of Pioneer Forest is measured by the accumulation of effects as the direct income produced is trickled back through the forest to its employees and their families, as well as from the forest directly through the sawmills to their crews and families. Pioneer Forest employs six full-time staff, but including the crews responsible for contract sales, the direct collective economic activity reaches from 60 to 82 people each year []. Secondary impacts include the taxes paid, equipment purchased, and the living expenses of employees and contract personnel. Businesses in the community and surrounding areas benefit directly and indirectly from purchases of gasoline, food, recreation.

Id. at 90. Despite the now well-known success in the use of uneven-aged management in the Oak-Hickory forests of the Missouri Ozarks, Virginia Forest Watch is disturbed that the practice

of uneven-aged management has been dismissed out-of-hand by the staff of the George Washington and Jefferson National Forests.

In the EA for the proposed Big Run project released in April 2008 (North River Ranger District), the staff stated "An alternative using only uneven-age management system of individual tree selection was considered but eliminated from detailed study because the primary stand species (oaks) cannot be regenerated in the same proportion using individual tree selection harvest techniques as they will not regenerate under low-light conditions associated with this harvest method." No scientific authority was cited for the conclusion.

In the EA for the proposed Laurel Run/Rd. project on the Lee Ranger District also released in 2008, the staff stated "Single tree selection and seed tree cutting were eliminated because of the discussion on Affected Environment p. 3-118 thru 3-137 of the GWNF FEIS and Forest Plan Appx. H. The pages discuss that seed cutting and single tree selection will not reproduce a new stand in which oak will be perpetuated." Virginia Forest Watch asserts that this authority in the Land and Resource Management Plan for the George Washington National Forest has been proven wrong and is grossly out-of-date.

In a recently released EA for the proposed Fry Hill project on the Mount Rogers NRA, the staff concluded that uneven aged logging would result in a decrease in historical oak composition, hard mast production, and reduced tree diversity based on a study conducted on the Fernow Experimental Forest, specifically Schuler 2004, *Can. J. For. Res.* 34:985-997 and on Smith 1995, *Regional Silviculture of the US* 3rd Ed, pp 173-225.

Tammy Belinsky requested the cited study from Thomas Schuler by electronic mail dated December 30, 2008, to which Dr. Schuler responded on January 5, 2009. A paper copy of the electronic mail communication is enclosed. Dr. Schuler transmitted an electronic copy of the study cited by the GW-Jeff staff in the Fry Hill EA in addition to two other published papers. All three papers transmitted by Dr. Schuler are included here on the enclosed CD.

Most notably, Dr. Schuler stated the following in his response:

> Their assertion about my work is basically correct. However, their [sic] are important ecological differences between the Fernow and the GW. The Fernow is much wetter and cooler and we have not explored lower levels of stocking coupled with other measures (prescribed fire, herbicides, deer management, etc.) to improve retention of tree species diversity in our uneven-aged management.
>
> Other research on uneven-aged management in more xeric environments has been reported to retain oaks and other species. See the following paper.

> The problem is complex and even-aged management is not always the fix either as was demonstrated in this paper. It may seem that doing nothing is the safest route but that doesn't seem to work either. . . *Ultimately, retaining diversity will*
>
> *probably require mimicking the historical disturbance regime, controlling invasive species, and managing the deer population effectively.* I personally believe that we will have to keep stocking lower than what we typically do and then do other things to maintain diversity. [P]roductivity is likely to be higher as a result as well. The drawback could be managing invasives.

Dr. Thomas Schuler, electronic mail to Tammy Belinsky, January 5, 2009 (emphasis added).

The Technical Report on the Pioneer Forest in part credits the successful uneven-aged management to the mimicking of the historic disturbance regime. USDA- Forest Service, General Technical Report SRS-108, p. 31. Virginia Forest Watch asserts that the staff of the George Washington and Jefferson National Forests has baselessly dismissed single-tree uneven-aged management as a valid methodology in mimicking historic disturbance regimes while it has embraced prescribed fire under a rational of mimicking historic disturbance regimes. Nonetheless, the modified shelterwood logging is definitely not a prescription for mimicking historic disturbance regimes.

Virginia Forest Watch respectfully requests the opportunity to discuss uneven-aged management with you and your staff in the context of the plan revision process for the George Washington National Forest and will contact you to schedule such a meeting.

Sincerely,

Bud Watson

Bud Watson
Executive Director

Enclosures: CD with electronic documents noted herein
Photocopy of electronic mail messages

Tammy Belinsky

From: Thomas M Schuler [tschuler@fs.fed.us]
Sent: Monday, January 05, 2009 10:35 AM
To: Tammy Belinsky
Subject: Re: copy of citation or link?
Attachments: 50yrs_study02_final.pdf; loewenstein_unevenaged_mgmt.pdf; brashers_clearcutting.pdf

Ms. Belinsky,

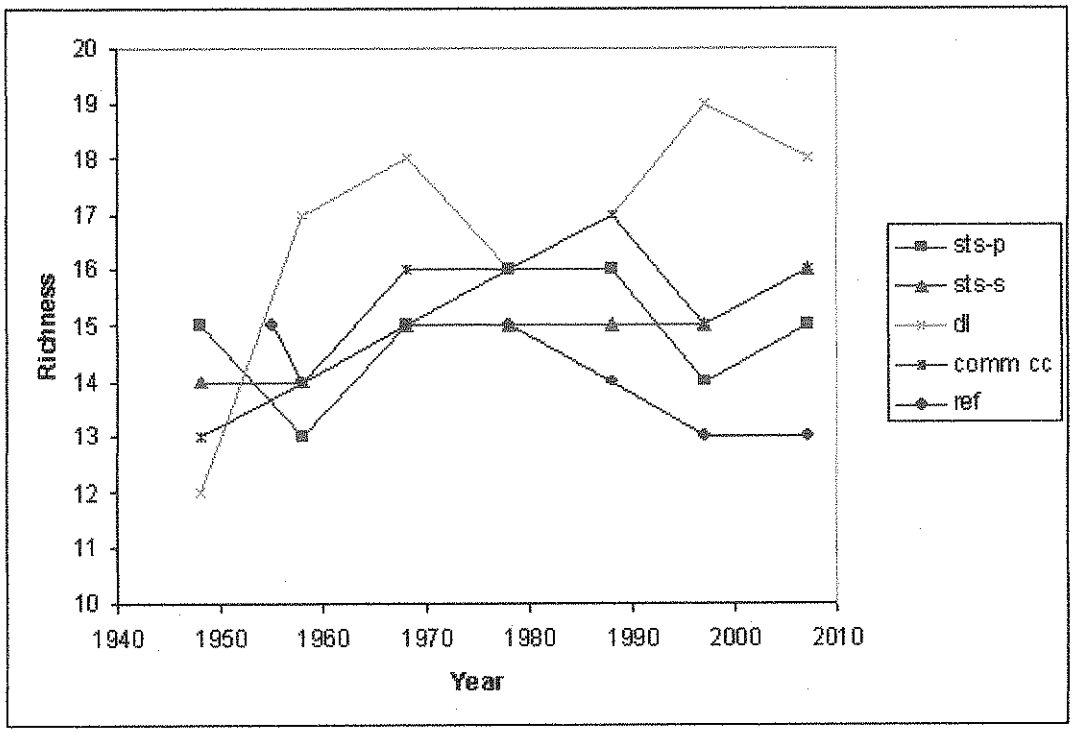
The "Schuler" paper is attached.

Their assertion about my work is basically correct. However, their are important ecological differences between the Fernow and the GW. The Fernow is much wetter and cooler and we have not explored lower levels of stocking coupled with other measures (rx fire, herbicides, deer management, etc.) to improve retention of tree species diversity in our uneven-aged management.

Other research on uneven-aged management in more xeric environments has been reported to retain oaks and other species. See the following paper.

The problem is complex and even-aged management is not always the fix either as was demonstrated in this paper.

It may seem that doing nothing is the safest route but that doesn't seem to work either (see Schuler above and the attached graph below from the CPL demo on the Fernow). The "ref" refers to unmanaged control area, STS are variants of uneven-aged management we visited on your last visit, DL is diameter limit, and comm CC is a commercial clearcut in 1948/49. I am working on a write up of these areas currently.



Ultimately, retaining diversity will probably require mimicking the historical disturbance regime, controlling invasive species, and managing the deer population effectively. I personally believe that we will have to keep stocking lower than what we typically do and then do other things to maintain diversity. productivity is likely to be higher as a result as well. The drawback could be managing invasives.

I hope you find some of this information useful. The folks I have met from t he GW seem well intentioned and well informed.

Thomas M. Schuler, Ph.D.
Research Forester
Timber and Watershed Laboratory and the Fernow Experimental Forest
US Forest Service, Northern Research Station
Parsons, WV 26287

304-478-2000, x. 110
email: tschuler@fs.fed.us
webpage: http://www.fs.fed.us/ne/parsons/schuler_Tom.htm

"Tammy Belinsky" <tambel@hughes.net>

12/30/2008 09:54 PM

To <tschuler@fs.fed.us>
cc
Subject copy of citation or link?

Hi Mr. Schuler,

A recent EA drafted by the GW&Jeff NF staff asserts that uneven aged logging on the GWNF would result in a decrease in historical oak composition, hard mast production, reduced tree diversity based on "a study" in Fernow - and specifically

Schuler 2004, Can. J. For. Res. 34:985-997 and Smith 1995, Regional Silviculture of the US 3rd Ed, pp 173-225. Can you direct me to a copy of the publication cited?

Thank you,
Tammy Belinsky
9544 Pine Forest Road
Copper Hill, VA 24079
540/929-4222

"Austin Garber" <timbervilletm@comcast.net>

01/30/2009 10:13 AM

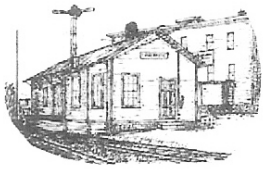
To: <comments-southern-georgewashington-jefferson@fs.fed.us>
cc: <Ksandum1@gmail.com>
Subject: Town of Timberville Resolution

To Whom It May Concern:

Please find attached a resolution adopted by the Timberville Town Council regarding the George Washington National Forest Management Plan. Should you have any questions feel free to contact me either by e-mail or by phone at 540-896-7058.

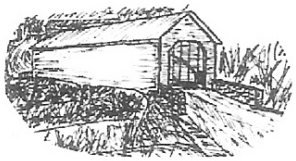
Sincerely,
Austin C. Garber II

Timberville Town Manager GWNFMP Resolution.pdf



Town of Timberville

392 S. Main Street
Timberville, VA 22853
540-896-7058
Fax 540-896-7055
www.town.timberville.va.us



GEORGE WASHINGTON FOREST MANAGEMENT PLAN
RESOLUTION FOR DRINKING WATER RESOURCE MANAGEMENT

WHEREAS, the U.S. Forest Service is in the process of revising its 1993 Land and Resource Management Plan for the George Washington National Forest; and

WHEREAS, one of the six goals identified in the U.S. Forest Services' agency-wide strategic plan is to "Improve watershed condition"; and

WHEREAS, the availability of clean, safe drinking water is one of the primary benefits that the George Washington National Forest provides to the communities that surround it; and

WHEREAS, approximately 44 percent of the land in the George Washington National Forest lies within watersheds that make available public drinking water to more than 260,000 Virginia residents in 22 adjacent communities, by means of reservoirs and surface waters; and

WHEREAS, the watersheds of surface waters that flow from the George Washington National Forest, such as the North Fork of the Shenandoah River, also provide a source for drinking water to residents in Rockingham County and the inclusive communities; and

WHEREAS, there can be threats to water quality within the George Washington National Forest from ground disturbing activities, such as timber harvesting and road construction, which result in erosion and sedimentation if not properly managed by the Forest Service staff or contractors thereof; and

WHEREAS, in the 1993 George Washington National Forest Management Plan most of the land in drinking water reservoir watersheds (72 percent) is managed without ground disturbing activities, and the U.S. Forest Service reports the water quality in the reservoir watersheds is substantially better than in surface watersheds in other parts of the George Washington National Forest; and

WHEREAS, the 1993 George Washington National Forest Management Plan provides for ground disturbing activities on most of the land (64 percent) in surface watersheds that provide drinking water through river intakes.

NOW, THEREFORE, be it resolved that the Timberville Town Council supports the following actions to implement an objective as a part of the George Washington National Forest Management Plan to promote the quality and quantity of drinking water sources within the forest boundaries:

- The U.S. Forest Service identify the watersheds and the surface water resources within the George Washington National Forest that feed the North Fork of the Shenandoah River;

- The U.S. Forest Service establish management objectives that support the health of the drinking watershed and which encourage conditions within the watershed that maintain, protect and enhance drinking water quality;

- The U.S. Forest Service continue to permit ground disturbing activities in these areas; however, such activities shall be properly managed and controlled by the Forest Service to protect the health of the watershed;

- The U.S. Forest Service gather sufficient information to assess watershed conditions, develop a plan to systematically monitor water resource programs, and obtain data pertinent to water quality and watershed conditions, in cooperation with other agencies, organizations, local communities and volunteers;

- The U.S. Forest Service communicate in a timely manner with the localities that obtain drinking water from sources within the George Washington National Forest to ensure that the drinking watersheds are managed effectively, appropriately and for the public good;

- The U.S. Forest Service shall work with local communities, agencies and the larger public to establish policies and develop management plans for the drinking watersheds to properly maintain, protect and enhance drinking water quality.

BE IT FURTHER RESOLVED, that the Timberville Town Council recommends that, the U.S. Forest Service retain all management techniques and options in the approved Forest Management Plan that are necessary to protect the drinking water quality, and

BE IT FURTHER RESOLVED, that the Timberville Town Council recognizes that trail-based recreational activities in the George Washington National Forest are valuable and wholly compatible with water quality management.

Done in and for the Town of Timberville, Virginia this 29th day of January 2009.

Timberville Town Council

By: _____
Donald DeLaughter, Mayor

Attest:

_____
Wilda Wine, Clerk

"Smith, Michael G" <michael_g_smith@merck.com>

01/30/2009 07:15 PM

To: <comments-southern-georgewashington-jefferson@fs.fed.us>
cc:
Subject: Comment on George Washington Nat. Forest revision

Dear Sir,

I would like to comment on the future of the National forest:

Emphasize backcountry recreation.
Ensure that all watersheds are fully protected.
Fully protect all inventoried roadless areas . Identify and fully protect all other remaining roadless tracts.
Fully protect all areas identified in the publication "Virginia's Mountain Treasures".
Respond to the threat of climate change by restoring and protecting wildlife migration corridors.
Fully protect all existing old growth and maintain sizable uncut buffers and natural linkages around these areas.
Fully protect all areas recommended by the Va. Div. of Natural Heritage for the designation as Special Biological Areas.

Fully protect all rare, threatened, and endangered species listed by the U.S. Fish & Wildlife Service.
Fully protect and buffer rare and sensitive habitats.
Create recovery and reintroduction plans for native species no longer found in the GW.
Halt below cost logging that loses millions of American taxpayers' dollars.
Identify and recommend all areas that qualify for Wilderness Study area and Wild & Scenic River designation.
Address the encroachment of non-native invasive species.
Only when absolutely necessary, use logging to open cleared, shrubby areas used by wildlife to lessen the impact of forest fragmentation.

Avoid using "prescribed" burns in moist areas and other areas where they are not appropriate, and allow lightning ignitions to burn in a contained manner.

Fully recognize the vital role lightning ignitions and other natural disturbances play in promoting biological diversity and new growth and maintaining forest health.

Thanks,
Mike Smith
Elkton, Va.

Notice: This e-mail message, together with any attachments, contains
information of Merck & Co., Inc. (One Merck Drive, Whitehouse Station,
New Jersey, USA 08889), and/or its affiliates (which may be known
outside the United States as Merck Frosst, Merck Sharp & Dohme or
MSD and in Japan, as Banyu - direct contact information for affiliates is
available at http://www.merck.com/contact/contacts.html) that

February 6, 2009

Ms. Maureen Hyzer
George Washington/Jefferson Natl. Forest Supervisor
5162 Valleypointe Pkway
Roanoke, VA 24019-3050

Dear Ms. Hyzer,

I attended the Thursday February 5, 2009 meeting in Woodstock on the revision of the George Washington/Jefferson National Forest management plan. I was very impressed with the knowledge and professionalism of the staff and very pleased to know so much effort is put into effectively managing this very precious resource.

The most discussed topic was the use of the National Forest for commercial wind energy development. The overwhelming number of comments made by those in attendance were clearly against any use of the National Forest for commercial wind development. The proposed management plan seeks to identify areas that are not suitable for wind energy development. It does unfortunately keep open the possibility of allowing wind turbines in some areas of the National Forest.

Several questions were posed to your staff as to why any such development would be allowed. Their response was that the National Forest Service was not "comfortable" with making it policy that no part of the forest would be used for commercial wind development and that any such applications would be closely reviewed and decisions made on a case by case basis. When pressed further to offer just one advantage or positive result to the National Forest that would result from allowing commercial wind development not one benefit could be identified. That is because there simply would be no positive impact on the National Forest if commercial wind development were allowed.

The negative consequences of such development ran the gambit of impact on soil, water, wildlife, and humans. Each wind turbine would require a minimum clear cut area of five or more acres of land. This area would then need to be excavated at a depth of two to three stories deep to support these 400 foot tall towers. This does not even include the miles of roads 50 to 100 feet wide that would be needed to build and access the turbine sites. Once this damage to the soil is created and concrete is poured it would be decades before that same soil could ever be productive again if ever. There are documented studies on the danger to ground water and the sedimentation of streams that would occur due to run off from this soil devastation. Many types of wildlife would be disrupted and even killed by these turbines. Many protected and endangered species such as birds, bats, and bald eagles have been documented to have been killed by the blades of wind turbines. In 2003 over 4000 endangered bats were killed by 44 turbines at the Mountaineer West Virginia plant. Hundreds of golden eagle deaths have been reported in California due to wind turbines on ridge crests.

Wildlife such as black bears would be driven from their habitat as they prefer to build their dens two to three miles from humans and human activity. Whitetail deer and other species as well would also be driven from their natural habitat by the clearing, construction, and noise these wind turbines would create. The human population would also be at risk to suffer heath related issues such as chronic sleep disturbance, headaches, dizziness, irritability, ringing of the ears, and problems concentrating. All of these health issues have occurred in areas that have wind turbines.

The National Forest is a natural asset with both economic and social value. It is habitat for over 200 species of birds, 55 species of mammals, welcomes millions of visitors each year, and provides clean water and air to dozens of communities. Public law 86-517 states that "It is the policy of the Congress that the national forests are established and shall be administered for outdoor recreation, range, timber, watershed, and wildlife and fish purposes." The National Forest was not created to allow commercial wind farm developers to get rich by not having to purchase the land to put their turbines on. There is ample private land available for that purpose.

The George Washington and Jefferson National Forests are precious natural resources that must be preserved and protected. The benefits of commercial wind development are minimal. Due to the intermittent nature of wind the turbines operate at only 30% of capacity. This dips to about 10% in the summertime when wind is its weakest and demand for energy is high. This means that any wind turbines must be backed up by coal or some other fuel. The number of houses that could be supplied with power from the wind farm currently proposed by Freedom Works LLC. is approximately 11,000 and this would only be during peak wind periods. This is a very small trade off for such devastating impact on the National Forest.

As more and more demands are placed on the National Forest by the public the Forest Service should seek ways to expand the National Forest, not reduce its use by allowing minimally effective commercial wind farm development. The loss of forest acreage to wind farm development can never be recouped. There is more than ample private land available for Freedom Works LLC and any other commercial wind developer to purchase to build their wind farms. The owners of the National Forest, the tax paying citizens, should not have to accept giving their land away for this purpose.

I ask you Ms. Hyzer as I asked on Thursday night, can you give me one positive benefit, anything that would be an asset to the George Washington and Jefferson National Forests by allowing commercial wind development. I would appreciate receiving your reply either by e-mail at jswiggett@comcast.net or U.S. mail to James Swiggett, 264 Clearview Drive, Clear Brook, VA 22624. I implore you in the strongest possible terms to please as you prepare the management plan for the George Washington and Jefferson National Forests that you include language in that plan that prohibits any use of the forest for wind turbine development. Thank you.

Sincerely,

James Swiggett

United States Department of Agriculture | Forest Service | George Washington & Jefferson National Forests | 5162 Valleypointe Parkway Roanoke, VA 24019-3050 540/265-5100

File Code: 1920
Date: February 18, 2009

Mr. James Swiggett
264 Clearview Drive
Clear Brook, VA 22624

Dear Mr. Swiggett:

Thank you for your letter and for attending our Forest Plan Revision meeting. You asked that I identify one positive benefit to the National Forest from allowing wind energy development.

As you note, wind energy is not one of the multiple uses for which the Forest must be managed. However, we do have provisions for allowing uses such as highway right-of-ways, transmission lines, and pipelines. These uses can be permitted if the project is in the public interest.

The question becomes whether or not this public interest is best served by using National Forest System lands. This question can best be answered through site-specific analysis of a wind energy proposal. Without knowing the size of the project, the energy needs to be served, the specific environmental impacts and what options might be available on non-National Forest System lands, it is difficult to answer the question.

We have heard a lot of concerns regarding potential for wind energy development on the Forest. We will carefully consider your comments and the others we have received as we further examine this issue. Again, I thank you for your comments.

Sincerely,

MAUREEN T. HYZER
Forest Supervisor

POTOMAC APPALACHIAN TRAIL CLUB
118 PARK STREET SE, VIENNA VA 22180
(703) 242-0693
Fax (703) 242-0968

February 10, 2009

George Washington Plan Revision
George Washington & Jefferson National Forests
5162 Valleypointe Parkway
Roanoke, VA 24019

Dear Planning Team:

The Potomac Appalachian Trail Club (PATC), has enjoyed a partnership with George Washington National Forest since the 1930's. We are writing to you today regarding the Proposed George Washington Revised Land Management Plan that is currently undergoing review and development. We have some suggestions for improving forest protections in order to enhance the forest for low-impact recreational opportunities, and we hope that you will consider these in your planning process.

PATC recommends that the following areas receive special protection in the new forest plan:

Shenandoah Mountain Proposal

The Club endorses the proposal submitted by Friends of Shenandoah Mountain on October 30, 2008, that calls for protection of the following areas:

Shenandoah Mountain National Scenic Area - approx 115,000 acres in Augusta, Rockingham, and Highland Counties. Within the National Scenic Area, the following proposed Wilderness areas:

- **Skidmore Fork Wilderness** - 5,228 acres in Rockingham County
- **Little River Wilderness** - 12,490 acres in Augusta County
- **Lynn Hollow Wilderness** - 6,168 acres in Highland County
- **Bald Ridge Addition** to Ramseys Draft Wilderness - 6,550 acres in Augusta County

Kelley Mountain-Big Levels National Scenic Area - 12,895 acres in Augusta County

- **Laurel Fork Wilderness** - 10,153 in Highland County

PATC supports protection of these areas because of their natural beauty and the extensive network of trails in remote backcountry. The Wild Oak National Recreation Trail and the Shenandoah Mountain Trail, which is part of the Great Eastern Trail, are particularly important. The entire length of Shenandoah Mountain Trail provides a critical link for this long distance north-south trail, which will be a more primitive alternative to the heavily used Appalachian Trail. The club supports the Ramseys Draft Wilderness boundary adjustment that would make the Shenandoah Mountain Trail a shared-use trail as a part of this larger protection strategy that would involve National Scenic and Wilderness designations.

The proposal by Friends of Shenandoah Mountain was developed in a collaborative way, and members of PATC's Southern Shenandoah Valley Chapter were involved in discussions about it over the past few years. PATC asks that you give it serious consideration as you decide which areas should be recommended for permanent protection.

Northern Areas in the George Washington National Forest

The northern part of the George Washington National Forest is endowed with wildlands that have a high recreational value. These areas should be off limits to timber cutting, road building, and other development. The club supports strong protection for the following areas that fall within PATC's area of responsibility for trail maintenance or interest in future trail development:

Massanutten Mountain Area: This area includes five areas of almost 49,000 acres on the Lee Ranger District including Signal Knob, Catback Mountain, Northern Massanutten Mountain, Southern Massanutten Mountain, Short Horse Mountain and Duncan Knob. The network of trails in this area is the area most accessible to residents of the DC Metropolitan area. This area should be protected in a manner that emphasizes hiking and other low impact recreational opportunities (including trail maintenance with motorized equipment) while ensuring the protection and preservation of scenic and environmental quality.

Big Schloss Cluster: This area includes approximately seven areas in the Lee Ranger District totaling around 71,000 acres including: Jonnies Knob, Great North Mountain, Falls Ridge, Church Mountain, Big Schloss, Long Mountain, and Cove Mountain. A particularly notable feature is the rock outcrops that the area is named for. These outcrops are sites for hacking stations where peregrine falcons are reintroduced to the wild. The area also includes 6,000 acres of old growth and the Salus Spring Special Biological Area. This cluster should be protected in a manner that emphasizes hiking and other low impact recreation opportunities (including trail maintenance with motorized equipment) while ensuring the protection and preservation of scenic and environmental quality.

Three High Heads: This 5,200-acre area lies on Paddy Mountain on the northeastern corner of Big Schloss Roadless Area. Large rock outcrops are a notable geologic feature. The club supports designation of this area as Wilderness. It would be the only Wilderness area in the entire Lee District. The only trail within this area is the 1.1-mile Sulphur Springs Gap Trail.

Beech Lick Knob: Located in the North River District, this 11,000-acre roadless area in northern Rockingham County is a real gem with over 4,000 acres of old growth. The Carr Mountain Trail, recently approved by the Forest Service for construction, bisects the Beech Lick Knob area and will serve as a critical connector trail for the Great Eastern Trail. The club supports Wilderness designation for the portion of Beech Lick Knob that lies east of the Carr Mountain Trail. Wind development threatens this area; in December 2008, the Rockingham County Board of Supervisors approved a meteorological tower on private land on Shenandoah Mountain directly west of Beech Lick Knob. The club requests special protection of this beautiful area from any development that would mar its natural character.

The club looks forward to continuing our longstanding and productive partnership with the George Washington National Forest, and we appreciate the opportunity to provide input on the new forest plan. Protection of these areas that are of high recreational value and that have exceptional scenery will ensure that future generations will be able to hike in beautiful, wild places and enjoy them as much as our generation has. This is a good legacy for the George Washington National Forest and its many partners to leave.

Thank you for considering our comments.

Sincerely,

Lee Sheaffer
President

cc. Maureen Hyzer, Forest Supervisor

Virginia Society of Ornithology
Committee for Bird Conservation
8904, Narem Place
Annandale, Va. 22003

February 16, 2009

Land Use Planning Team
George Washington & Jefferson National Forests
5162 Valleypointe Parkway
Roanoke, VA 24019

RE: National Forest Planning Process and Wind Plants

Dear Planning Team:

The Virginia Society of Ornithology, founded in 1929, exists to encourage the systematic study of birds in Virginia, to stimulate interest in birds, and to assist the conservation of wildlife and other natural resources. Our members include every level of interest, from professional scientific ornithologists to enthusiastic amateurs.

Please consider this letter as a formal comment in the process of revising the Land and Resources Management Plan for the George Washington National Forest (GWNF).

Our interest in birds and conservation leads us to believe, on the basis of abundant scientific evidence, that industrial wind installations along ridges in the George Washington National Forest (GWNF) and Jefferson National Forest (JNF) will be highly detrimental to birds and other wildlife that use those habitats, especially the dozens of endangered, threatened, rare, and uncommon species as wells as species of concern on federal, state, and local lists.

The highest numbers of bird and bat kills in the world from wind turbines are occurring at new wind plants on private lands just across the state line in West Virginia, as documented in The Wildlife Society's 49-page Technical Review 07-2, **Impacts of Wind Energy Facilities on Wildlife and Wildlife Habitat**, published in September, 2007. This report further notes that the cumulative impacts from the rapid deployment of turbines now occurring on private lands constitute a serious danger. Adding turbines on national forest ridges will compound the impact significantly.

Specific impacts to endangered and rare species, including bald and golden eagles, that use Shenandoah Mountain along the VA/WV border are detailed in a twelve-page letter dated November 16, 2007, by the U.S. Fish & Wildlife Service (Elkins, WV field office), which strongly recommends against wind turbines on Shenandoah Mountain due to the likelihood of killing endangered species. Yet several projects are underway there apparently on or near national forest land.

Dr. Clair Mellinger, a retired professor of biology at Eastern Mennonite University in Harrisonburg who conducts research on saw-whet owls in northern Rockingham County, has publicly expressed concern over the impacts of the FreedomWorks wind plant proposed on Church/Great North Mountain in the GWNF. "We're concerned about the turbines because we think that the owls must migrate fairly low over Church Mountain to be close enough to hear the taped calls that attract them to our mist nets," he said in an article in the ***Harrisonburg Daily News-Record***'s weekly supplement, the ***North Fork Journal***, last September.

It is well established that Blue Ridge and Allegheny Mountain ridges are major migratory flyways for raptors and neotropical migrants. In addition, development of the highest, coolest, and most remote ridges for wind plants will destroy the opportunity for land-based species that cannot travel rapidly to avoid climate warming by moving to higher elevations.

Current wind plant proposals on the GWNF would destroy the integrity of several areas that are defined by the Forest Service itself as having unusual wilderness values and are also noted in **Virginia's Mountain Treasures**, a recently published compilation by Virginia members of The Wilderness Society of the most undisturbed and valuable wildlife habitat remaining in the GWNF.

The threat to wildlife in general and birds and bats in particular from wind plants on national forests in Virginia is extreme. The VSO joins many other organizations and individuals in opposing the wind energy development projects that are proposed in the GWNF and potentially in the JNF. We also oppose widening or other alterations of national forest roads and property to facilitate wind plants on nearby private property, where wildlife values are similar.

Thank you for the opportunity to comment.

Sincerely,

Stephen D. Eccles
Chairman

300 Ridgewood Circle
Covington, Virginia 24426
March 3, 2009

Ms. Maureen Hyzer
Forest Supervisor
George Washington & Jefferson National Forests
5162 Valleypointe Parkway
Roanoke, Virginia 24019

Dear Ms. Hyzer:

Re: GW Forest Plan Revision

As you consider management objectives for the GW Forest, I would like to comment as an individual citizen who grew up enjoying the Dry River Ranger District in the 1960's through the mid 1970's. I was so impressed with what I observed on the GWNF that it had a profound influence upon the line of work I would eventually pursue. I was and am an avid deer, turkey, and squirrel hunter, trout fisherman, hiker, and camper. I enjoy exploring the back country. Trout fishing in the Dry River area was a special time I looked forward to each spring, but deer hunting in the fall was the event that really kept me awake in anticipation of opening day. I hunted in Skidmore Fork, Timber Hollow, Railroad Hollow, Dunkle Hollow, Kephart Run, Hopkins Hollow, Hone Quarry, and Frank's Bottom. There were many hunters camping at various places throughout the Forest and access roads were outstanding, particularly if you had a 4-wheel drive. Forest Service sportsman's guides stated that "the Forest is liberally sprinkled with camping areas and no special permit is required to use most of the facilities – camping is permitted in any reasonable place in the Forest which does not impede traffic." A document published in June 1963 by the Virginia Commission (now Department) of Game and Inland Fisheries, George Washington National Forest, and Jefferson National Forest about the Cooperative Wildlife Management on Virginia National Forests praised the fact that timber markets were finally developing where desired manipulation of wildlife habitat could be achieved through carefully planned forestry practices. Today I find it somewhat amusing to read that the writers were praising the fact that a pulpwood market was finally giving the Forest managers a more economical means of accomplishing wildlife management goals. The areas I hunted contained well-maintained wildlife clearings dispersed throughout and the publication promoted the idea of forest edge through these various clearings. Even though I thoroughly enjoyed the outdoor experiences I had visiting the National Forest, I really did not understand and appreciate what efforts made it possible.

Fast forward 34 years – I went on to study Forestry and Wildlife at VA Tech and have enjoyed a career as a natural resource professional. I have had the opportunity to see first hand how dynamic forests really are. Today, I have to look closely to find evidence of timber harvests that I administered 30 years ago. They have literally disappeared from

detection. Unfortunately, many of the wildlife clearings are practically gone also and access to the areas are disappearing as time has a way of changing forest conditions positively or negatively depending upon one's point of view of desired conditions. The point of my preceding comments is not about the declining timber sales program we have experienced on the National Forests over the past 15 years and the effect it has had on the local economies in those areas. Instead, it's about the deteriorating recreational future on National Forests that I think we face.

Currently, if all goes according to plan, I am within six years of retirement from my present job. My personal interest is in continuing to pursue outdoor activities of hunting, camping, hiking, and trout fishing. As we age, we need better access to the National Forest, not less. To enjoy hunting and wildlife watching, we need better wildlife habitat – not rapidly disappearing habitat. I am appalled at the lack of age class distribution across the National Forest and the influence I believe it is having on the wildlife population. I do not favor more wilderness on National Forest as it severely limits a forest manager's options as conditions change, and I am convinced conditions will change. Wilderness designation is not needed to protect areas of special interest. One only needs to reference Ramsey's Draft prior to its designation as wilderness in 1984 to see that it remained an area of protected management by the Forest Service since 1935. I actually lament the loss of the CCC road in the Draft that gave less able hikers the opportunity to enjoy some of its unique scenery realizing Mother Nature finally destroyed the road in the Flood of 1985. I don't know of wildlife that is threatened because we don't have enough wilderness but many species are threatened without early successional habitat. It has also been my observation that the use of wilderness is highly exaggerated. One need only read the visitor logs at the trail heads to see the infrequent visits.

At one time, the highest use of the National Forest was sightseeing. That may still be the case. Regardless, the public needs access to sightsee. Sightseeing was followed by hunting. I would expect that has declined. My observation is that fewer hunters come to the National Forest. I no longer see the hunter-related camping that I observed on the National Forests in the '60's and '70's. Granted, hunting seems to be declining in general, but could it be that hunting on the National Forest has declined because of poor hunter success? Is poor hunter success a result of deteriorating habitat and access? Decline in all of these activities brings fewer people to the area, which in turn brings less income to the local economy and less support to continue the programs that encouraged forest visitors in the past. For those of us that depend upon public land for those recreational opportunities, this is of great concern.

So for my dream of enjoying the National Forest during my retirement years under forest conditions similar to the '60's and '70's, I believe it's too late for me. It is impossible to attain the forest age class distribution across the National Forest in my lifetime that is needed to improve the wildlife habitat. We have lost too much time in the past 20 years debating wilderness designation, appealing proposed timber sales, and de-emphasizing the techniques required to maintain optimum wildlife habitat.

If I was restricted to only one recommendation, I would encourage the reinstatement of the Cooperative Wildlife Management Agreement on the Virginia National Forests that existed prior to 1990's or pursue a similar vision for the results that program produced. I understand that the budget became strained and Virginia withdrew many of its resources. Likewise, the timber management programs declined at the same time further hampering wildlife management opportunities.

In today's economic climate, you would probably need to be creative in finding the financial means to accomplish what was accomplished in years past but it could be done with cooperators. It just needs to be a priority.

If you got started today with more focus on wildlife management in the new GW plan, maybe in 20 years, the young hunters and sightseeing public could be enjoying what I enjoyed in Dry River during my youth.

Thank you for the opportunity for input.

Sincerely,

Ollie W. Kitchen, Jr.

Ollie W. Kitchen, Jr.

cc: The Honorable Rick Boucher
The Honorable Bob Goodlatte

March 4, 2009

Maureen Hyzer
Forest Supervisor
George Washington &
Jefferson National Forests
5162 Valleypointe Parkway
Roanoke, VA 24019

Dear Ms. Hyzer:

Let me start by introducing myself. I am Charles Bartley. I have lived most of my life in Covington, VA and Alleghany County. I have used and enjoyed the GWNF since the late 1950's. I am a fourth generation worker at the Covington Papermill and it has provided a good living for me up to this day. I realize in these hard economic times jobs are a blessing and I realize that it is important to keep the jobs we already have. For nearly ten years I have been a member of the PPRC, Pulp and Paperworkers Resource Council, a grass roots labor coalition concerned with fiber supply, the ESA, and the environment in a way that promotes knowledge and political activism so we may influence legislation and policies that affect our jobs.

The PPRC did represent 1.5 million workers but that number has fallen in recent months and years. The PPRC was formed as a result of the thousands of jobs that were lost in the Pacific Northwest due to overzealous environmental rule and regulations. The environmental community has been successful in pressuring lawmakers and regulators to severely hamper multiple use of our lands. If we do not slow down environmental opposition, all of our jobs could be in jeopardy. Wood products industry workers support active forest management. Healthy forests have the vitality to perpetually provide clean air, clean water, wood products, wildlife and fishery habitat and scenic values. We ask that you manage the GW by thinning and clear cutting to maintain species composition, stand density and a diverse natural forest made up of all ages of forest stands from old growth to new growth.

I have asked Congress and we ask you to remove diseased, dead and dying timber to reduce the potential release of hundreds of thousands of tons of carbon dioxide and other green house gases into the atmosphere as the timber decays. Wood products and paper hold carbon dioxide for years and new growing trees consume more pollution while making oxygen.

You must run the GW as intended to provide multiple use and sustainable forestry to meet the area and America's wood product needs now and for future generations.

Simply stated, no logs, no mills, no jobs. Each of our jobs impacts six other jobs such as sales people, truck drivers, teachers, police, etc. While the demand for paper products continues to rise, our mills continue to close. In fact, wood offered for sale from our national forests has been reduced by over 75% in the past decade, contributing to the closure of more than 300 mills in our nation. The new GW plan needs to address the timber harvesting goals more aggressively because the numbers set are never attained.

As an individual, I have witnessed the decline of forest health, deer, grouse, and turkey populations. A balance must be met but with more wood harvested in the GW, the chances of our survival as a local mill will be much greater.

I sincerely believe from my observation over the last 40 years that managing our forest correctly and allowing multiple use will help alleviate bad forest health and provide good paying jobs and help with world pollution.

Thank you for allowing my comments.

Sincerely,

Charles Bartley
Special Projects Director at Large
Pulp and Paperworkers Resource Council
5014 Midland Trail
Covington, VA 24426

MeadWstvaco Corporation
104 E. Riverside Street
Covington, VA 24426

+1 540 969-5000 T
meadwestvaco.com

March 6, 2009

Maureen Hyzer
Forest Supervisor
George Washington & Jefferson National Forests
5162 Valleypointe Parkway
Roanoke, VA 24019

Dear Ms. Hyzer:

As you and your staff finalize the Forest Plan for the George Washington National Forest, please consider the following comments and suggestions.

MeadWestvaco (MWV) has been operating for 110 years in Covington, Virginia. Our commitment to this area is evidenced by more than $1 billion in capital invested over the last two decades and our 1,500 employees. We are proud of our record of environmental stewardship, and our use of natural resources as the basic raw material for the products we produce. Our Covington plant is a substantial contributor to the rural economies that include the footprint of the George Washington &Jefferson National Forests. We also use wood that comes from the areas that include the Monongahela National Forest. A reliable supply of raw material is crucial to the future of our operations.

In 2008, our mill used over 3 million tons of fiber: 2,260,000 tons were purchased as pulpwood, with the balance purchased as sawmill residue or in-woods chips. Like other wood users, we are exploring using even more biofuels than we currently use as we work to improve our plant efficiency and reduce our carbon footprint. We were pleased to have the opportunity to partner with the GW on its experimental biofuels sale located near our Covington mill in the James River District, and look forward to working on similar projects in the future.

We believe the GW plan can be strengthened in one specific area: provide for increased use of biofuels to produce green energy. The forest has an opportunity to commit to provide new tonnage if this demand does materialize. If the government, through legislative and Presidential efforts, is going to demand that the private sector shift fiber resources into alternative energy production to meet the energy demands of the American public, the National

Forests need to help provide that material. Proposed new biomass facilities in this region, should they be put in place, will dramatically increase the amount of wood being used as a primary raw material. If we are to be less dependent on foreign oil sources, lower CO_2 emissions, and provide new alternative renewable energy, we cannot just say that the National Forests are off limits. An additional positive is increased harvesting on these forests can help achieve other forest health and biodiversity goals at the same time. The new GW plan needs to make provisions for this eventuality.

Last year, the three National Forests in our area combined to produce 45,600 tons of wood that was delivered by wood suppliers to Covington, or 2% of our roundwood needs. This is an increase of 53% from 2007, and is the highest volume produced since 2000. We would like to recognize and commend your staff for this progress. While an improvement, these volumes are still about one-third those produced back in the late 1980s and early 1990s. Given the size of the National Forests, and their proximity to our mill, this volume is quite low, and far below the forests' potential. In addition, it is below the amount that should be harvested to improve the health of the forest. It should also be noted that National Forests produce logs that go to sawmills, and then some of that fiber comes back to our mill as sawmill residue chips.

MWV, like all businesses and agencies in the current economy, is under pressure to lower costs and improve efficiency. Because of our raw material needs, we regularly reach great distances to procure wood for our mill. Transportation costs comprise well over half of what we spend to procure wood for our mill. Increased production from local Forest Service lands would help communities closer to Covington, save our business money, and reduce fossil fuel consumption during transportation.

At Covington, we purchase pulpwood from 250 logging businesses and chips from 90 sawmills. These businesses provide jobs for at least 5,000 people. For the sawmill owners and loggers in these areas, the USFS timber sale program is extremely important. Because we depend upon these small businesses for much of our raw material supply, Forest Service influence on this critical part of our supply chain is of great concern.

Back in 2003, MWV commented on the Jefferson National Forest plan. Those comments are still valid for both the Jefferson and George Washington (GW). During a time when the forest is aging and the public demand for wood products is increasing, the quantity of timber harvested from national forests is at far lower levels than it could be. The Jefferson National Forest Timber Staff Study for the Forest's zone of influence found there was a demand for 300 million board feet of wood. The Jefferson share, based on land ownership, would be 68 million board feet. The current forest plan has a total timber sale program of 22 million board feet; however, the forest is currently only harvesting a portion of the allowable quantity.

In the GW, the 1993 objective was to harvest 3,100 acres per year, but the actual average has only been about half that. The new plan tentatively calls for harvests of 1,000 to 1,800 acres/year, a tiny amount when compared to the forest as a whole. The new plan should allow the forest managers to prescribe practices to sustain the forest's health and the diversity needed to support wildlife. Maintaining both a high suitable-acreage base and an appropriate allowable cut level are the first steps.

MWV recognizes that National Forests provide multiple benefits including clean air, water, habitat for wildlife, recreational opportunities, and the preservation of sensitive ecosystems and rare species. We also feel it is important to provide these benefits while providing forest products needed by society. We do not feel that additional areas should be set aside in the new GW plan. Indeed, to maintain forest health and biodiversity, a broader range of age classes is needed. This can best be achieved by responsible harvesting. It is important that timber sale volumes be provided as planned and that current roads are maintained. We realize that this is a challenge when budgets are tight, but should be given more priority than it currently receives since we can all agree that the long term health of the forest is important.

Forest products will be generated somewhere to meet demand, and it is logical and environmentally responsible that some of these products come from wood produced on Forest Service lands. As society focuses even more on using renewable resources, it will become even more important in the years ahead that the Forest Service contribute wood products along with the multitude of other benefits provided by forested landscapes.

Thank you for the opportunity to comment. Please let any of us at MWV know if you would like to discuss further our common interest in the sound and balanced management of these public lands.

Sincerely,

Mark R. George

Mark R. George
VP, Covington Operations

cc: The Honorable Frederick C. Boucher
The Honorable Robert W. Goodlatte