

A. GEORGE MASON, JR., PSC
Attorney at Law
841 Corporate Drive, Suite 203
Lexington, KY 40503
Licensed in KY, TN, VA, WV & PA

Office: (859) 224 - 8277
Fax: (859) 296 - 2998

georgeemason@insightbb.com
www.agmpsc.com

October 17, 2011

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

Re: George Washington National Forest – Draft Forest Plan

Ladies and Gentlemen:

On behalf of my clients who have oil and gas operations in Virginia and West Virginia, I am writing in opposition to the proposed ban on horizontal drilling found in the Draft Forest Plan for the George Washington National Forest. The proposed ban is not supported by the kind of scientific data or analysis that would be necessary to declare off-limits a potentially valuable resource that could meet the future energy needs of our nation. Comments like “may impact water quality” are not strong enough reasons to ban techniques that have been incorporated safely and effectively in many other areas of the country for years, including Virginia, without incident.

Hydraulic fracturing is a technique that has been used over one million times since the the 1940’s without a documented instance of contamination, a fact confirmed by the EPA’s own Lisa Jackson when she testified before Congress saying that hydraulic fracturing doesn’t affect water. Therefore there is not one shed of vetted scientific data that would support the proposed plan’s assertion that drilling in the Forest would potentially affect water resources.

Furthermore, the proposed plan specifically bans horizontal drilling, a technique that has been utilized for 20 years in North America with amazing results. Drilling horizontally is the most effective and environmentally friendly way to harvest the resource. Horizontal wells expose more of the formation, which allows for production of a greater percentage of the natural gas. Also multi-well-single-pad drilling, the current dominant technique made possible through horizontal drilling, minimizes surface disturbance by concentrating wells in one location. This concentration of wells also limits the amount of pipelines, which further minimizes surface disturbance.

George Washington National Forest Plan Revision
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October 17, 2011
Page 2

Lastly, the 900,000 acres that comprise the Forest are very close in size to Virginia's current natural gas producing area in the southwest corner of the State. Over the past 20 years, Virginia's natural gas industry has invested over \$2 billion in the Commonwealth, paid over \$600 million in royalties, paid over \$150 million in severance taxes plus millions of additional dollars in real estate taxes and mineral taxes, while currently providing 3,000 good paying jobs. During that same 20-year period over 5,000 wells were drilled, under a very rigorous state-supported regulatory regime, without one water contamination issue. How can the Forest Service consider a ban that would forego all of the above benefits without the science to back it up?

Please contact me if you have any questions or comments.

Sincerely,

A. George Mason, Jr.

A. George Mason, Jr.

by Neal Smith
10/17/2011

From: [A.W. Simmons](#)
To: [FS-comments-southern-georgewashington-jefferson](#)
Subject: comment on GWNF revision plan
Date: Monday, October 17, 2011 2:06:16 PM

I use the GWNF for outdoor activities like hunting and fishing. I understand that our eastern national forest lands including our Appalachian Mountains were purchased to restore our forest. The process of natural gas drilling would negatively affect me and my family's use of the forest. Clear cutting the forest for the acreage needed in gas drilling would break-up wildlife habitat and destroy critical wildlife food sources. The clear cut areas would also allow soil erosion that would badly effect fish and streams in the GWNF. Game would be scared away because of the necessary large numbers of trucks and equipment causing noise and light pollution in the gas removal process. I support the GWNF 15 year proposed plan to ban horizontal drilling. I would prefer the area known as Beach Lick Knob to be designated as Recommend Wilderness Study Area because this undeveloped area needs to remain as natural as possible.

Thanks,

A.W. Simmons

HALLIBURTON

1150 18th Street, NW • Suite 200 • Washington, D.C. 20036
Main: 202.223.0820 • Fax: 202.223.2385 • e-mail: bob.moran@halliburton.com

Robert Moran

Vice President, Government Affairs

17 October 2011

BY ELECTRONIC MAIL

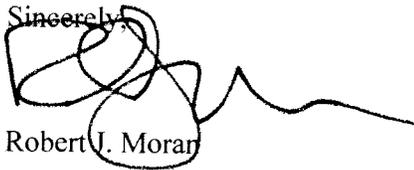
George Washington Plan Revision
George Washington & Jefferson National Forests
5162 Valleypointe Parkway
Roanoke, VA 24019

Re: George Washington National Forest Draft Environmental Impact Statement (EIS
No. 20110174, Draft EIS, USFS 00) and Draft Revised Land and Resource
Management Plan

Dear Sir or Madam:

Halliburton Energy Services, Inc. hereby submits the attached comments on the above-referenced Draft Environmental Impact Statement for the proposed revisions to the Land and Resource Management Plan for the George Washington National Forest. Please let us know if you have any questions concerning our comments or wish to discuss them.

Sincerely,

A handwritten signature in black ink, appearing to read "Robert J. Moran", with a long horizontal flourish extending to the right.

Robert J. Moran

RJM/TCJ:jmd
Enclosure

**Comments of Halliburton Energy Services, Inc.
on the George Washington National Forest Draft
Environmental Impact Statement and Draft
Revised Land and Resource Management Plan**

Halliburton Energy Services, Inc. (“HESI”) hereby submits these comments on the George Washington National Forest Draft Environmental Impact Statement (“Draft EIS”) and Draft Revised Land and Resource Management Plan (“Draft Revised LRMP”). HESI requests that these comments be made part of the record.

Introduction

HESI is a leading provider of services to the oil and gas exploration and production industry, including hydraulic fracturing services. HESI has been an industry leader in providing fracture stimulation services for oil and gas wells since pioneering hydraulic fracturing technology in the late 1940s. Over the past 60 years, HESI has performed hydraulic fracturing services on hundreds of thousands of wells in a wide variety of geographic settings and formations and has developed numerous innovations in hydraulic fracturing operations. This experience includes a significant amount of hydraulic fracturing work for well operators developing oil and natural gas resources in the Marcellus Shale.

At the same time, HESI has been recognized as the leader among oil and gas service companies in product innovation and the development of important solutions for our nation’s energy industry.¹ The development and protection of HESI’s innovative proprietary technologies can yield increased efficiencies both in the production of oil and natural gas resources as well as significant environmental benefits. For example, HESI spends significant research and development dollars understanding the geologic, petrophysical and reservoir parameters of hydrocarbon-bearing formations and their role in order to design stimulation programs that will successfully stimulate a formation in the manner desired, while ensuring the integrity of the production and water-bearing zones. These efforts include significant investment in developing more effective and innovative fracture stimulation fluid systems for increased production efficiency and environmental compliance in conventional and unconventional formations, including coalbeds, shales and tight sands. In light of these major investments and leading innovations, HESI seeks to fully protect all trade secret and proprietary information regarding its hydraulic fracturing formulations and related technologies.

**A Ban on Hydraulic Fracturing of
Horizontal Wells is Unjustified and Is Unsound Policy**

HESI believes that the ban on horizontal drilling and hydraulic fracturing of horizontal wells in the George Washington National Forest (“GWNF”) proposed by the Forest Service through Preferred Alternative G is unjustified and is inconsistent with the current Administration’s efforts to increase U.S. energy security and control emissions of greenhouse gases. HESI supports the comments opposing the proposed ban on horizontal drilling submitted

¹ See Wall Street Journal, *Patent Scorecard* (July 2009).

by the American Petroleum Institute, the Independent Petroleum Association of America and the Virginia Oil and Gas Association; HESI is a member of each of these organizations.

In addition, HESI wishes to stress the following key points:

“Hard look” required. The Forest Service is required under the National Environmental Policy Act (“NEPA”) to take a “hard look” at the environmental consequences of its action. *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 349 (1989) (“*Robertson*”). This “hard look” is particularly critical where, as here, the agency is proposing to take a step such as banning an important economic activity entirely, potentially depriving the region of hundreds or even thousands of jobs. Without carefully assessing the potential environmental impacts of horizontal drilling and hydraulic fracturing, the Forest Service cannot properly “balance [the] project’s economic benefits against [its] environmental effects,” as required by NEPA. *Hughes River Watershed Conservancy v. Johnson*, 165 F.3d 283, 289 (4th Cir. 1999).

Among other things, the “hard look” requirement is designed to ensure that the Agency has thoroughly considered the potential environmental impacts of its action. Moreover, the “hard look” requirement ensures that the Agency “will have available, and will carefully consider, detailed information concerning significant environmental impacts.” *Robertson*, 490 U.S. at 349. While the Forest Service is not required to generate new data regarding the potential impacts of horizontal drilling and hydraulic fracturing on the environment, the Service is obligated to identify and consider reasonably available information in assessing whether a proposed action may result in significant impacts to the human environment. Council on Environmental Quality, *Guidance on NEPA Analyses for Transboundary Impacts* (July 1997).

Studies Demonstrate That Hydraulic Fracturing Does Not Threaten Drinking Water Aquifers. Numerous studies that have not been acknowledged by the Forest Service have confirmed that there is no risk to groundwater due to hydraulic fracturing activities. For example, the U.S. Environmental Protection Agency (“EPA”) undertook an extensive study of the potential impacts of hydraulic fracturing of coalbed methane wells on underground sources of drinking water (“USDWs”).² The fundamental conclusion of EPA’s 2004 report is that hydraulic fracturing of coalbed methane wells poses little or no threat to USDWs. As EPA itself recognized, hydraulic fracturing operations in CBM wells generally take place closer to the surface than fracturing in other types of formations. CBM wells are therefore viewed as a “worst case” in terms of the potential for impacts to drinking water aquifers. Since EPA found low risk associated with fracturing of CBM wells, the risks associated with fracturing other types of formations – such as shales – should be even less.

Subsequent additional studies regarding hydraulic fracturing in the Marcellus Shale have reached similar conclusions. For example, an analysis recently undertaken by the consulting firm ICF International for the New York State Department of Environmental Conservation (“NYSDEC”) concerning the proposed development of the Marcellus Shale concluded that “hydraulic fracturing does not present a reasonably foreseeable risk of significant

² See EPA Office of Water, *Evaluation of Impacts to Underground Sources of Drinking Water by Hydraulic Fracturing of Coalbed Methane Reservoirs* (June 2004).

adverse impacts to potential freshwater aquifers.”³ Similarly, in a study that NYSDEC consultants found was based on reasonable, conservative assumptions, Gradient Corporation likewise concluded that the migration of fracturing fluids from the Marcellus Shale to an overlying groundwater aquifer is “an implausible contamination pathway.” Consistent with the ICF findings, Gradient noted that the Marcellus Shale deposits – such as those underlying the GWNF – have been hydraulically isolated from any overlying shallow aquifers for literally hundreds of millions of years, with many intervening layers of low permeability shales, siltstone and limestone lying between the Marcellus Shale and those shallow aquifers.⁴

Most recently, the Shale Gas Production Subcommittee of the Secretary of Energy Advisory Board found in August 2011 that “[r]egulators and geophysical experts agree that the likelihood of properly injected fracturing fluid reaching drinking water through fractures is remote where there is a large depth separation between drinking water sources and the producing zone.”⁵ These studies and reports confirm the lack of any basis for a ban on horizontal drilling and hydraulic fracturing.

Horizontal Drilling Reduces Surface Disturbances. Drilling horizontally is the most effective and environmentally friendly way to access this abundant domestic source of natural gas. Horizontal wells expose more of the formation, which allows for production of a greater percentage of the natural gas. In addition, drilling multiple wells on a single pad, which is made possible through horizontal drilling, minimizes surface disturbance by concentrating wells in one location. This concentration of wells also limits the amount of pipelines necessary to transport the gas produced from the wells, which further minimizes surface disturbance.

A Ban on Horizontal Drilling Is Inconsistent with Existing Policies. As discussed in API’s comments, natural gas development in the Marcellus Shale is a key part of U.S. energy policy. Similarly, the development of these resources in the GWNF is consistent with existing Forest Service mandates and policies. For example, as part of the Energy Policy Act of 2005 (P.L. 109-58), the U.S. Congress specifically directed that the U.S. Department of Agriculture should provide better access for oil and natural gas leasing on federal lands and to streamline the permitting process for oil and gas development. Contrary to this directive, the Draft EIS and Draft Revised LRMP propose to ban all horizontal drilling and hydraulic fracturing in the GWNF.

Moreover, the proposed ban on horizontal drilling and hydraulic fracturing is inconsistent with the Forest Service’s express mandate to encourage “multiple use” of Forest Service lands, including use for mineral extraction like natural gas drilling operations. Indeed, several of the key federal statutes governing Forest Service operations – such as the Mineral Leasing Act of 1920 and the Multiple-Use Sustained-Yield Act of 1960 –call upon the Forest Service to allow for the effective use and extraction of mineral deposits – including oil and natural gas – from federal lands. These statutory mandates require the Forest Service to balance

³ ICF International, *Technical Assistance for the Draft Supplemental Generic Draft EIS: Oil, Gas and Solution Mining Regulatory Program* (August 2009).

⁴ Gradient Corp., *Human Health Risk Evaluation for Hydraulic Fracturing Fluid Additives, Marcellus Shale Formation, New York* (Dec. 31, 2009). An electronic copy of this study is attached.

⁵ The SEAB Shale Gas Production Committee, *Ninety-Day Report - August 11, 2011*.

competing uses of these lands so that multiple purposes can be achieved without excluding any single use. The Forest Service has failed to satisfy this mandate by proposing instead to effectively ban all efforts to extract natural gas from Marcellus Shale formations underlying the GWNF by prohibiting all horizontal drilling and associated hydraulic fracturing operations within the Forest.

Development at Marcellus Shale Resources In the GWNF Will Yield Substantial Economic Benefits. The 900,000 acres that comprise the Forest are very close in size to Virginia's current natural gas producing area in the southwest corner of the State. Over the past 20 years, Virginia's natural gas industry has invested over \$2 billion in the Commonwealth, paid over \$600 million in royalties, paid over \$150 million in severance taxes plus millions of additional dollars in real estate taxes and mineral taxes, while currently providing 3,000 good-paying jobs. During that same 20-year period over 5,000 wells were drilled, under a very vigorous state-supported regulatory regime, without a single water contamination issue. The Forest Service should not impose a ban that would forego all of these benefits when there is no evidence of any significant threats that would justify such a step.

Chemical Disclosure. Should the Forest Service decide – as it should – to allow horizontal drilling to go forward subject to reasonable stipulations, HESI believes that portions of the Operations Control Stipulation should be clarified. In particular, the Operations Control Stipulation states that an applicant for Surface Use Plan of Operations “shall supply a list of the quantity and chemical composition of all materials proposed for use in drilling and hydraulic fracturing.” The formulations of many of these materials are highly proprietary. HESI recommends that the required disclosure be consistent with the FracFocus Chemical Registry developed by the Ground Water Protection Council and the Interstate Oil and Gas Compact Commission, which incorporates appropriate protections for trade secrets. HESI are many other industry members are actively participating in the Registry.

Conclusion

The consensus of federal and state regulators is that horizontal drilling and hydraulic fracturing can be conducted in a manner that is protective of human health and the environment. The states have effectively regulated hydraulic fracturing for many years and are moving forward with modifications of these regulatory programs where appropriate to address public concerns. Rather than proposing to effectively ban shale gas development within the GWNF – with the attendant loss of jobs and other economic benefits – the Forest Service should be focused on reasonable conditions for managing shale gas development in an appropriate manner.

October 17, 2011

Maureen T. Hyzer, Forest Supervisor
ATTN: George Washington Forest Plan Revision
George Washington National Forest
5162 Valleypointe Parkway
Roanoke, VA 24019
comments-southern-georgewashington-jefferson@fs.fed.us

**BY U.S. MAIL – CERTIFIED MAIL,
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Re: George Washington National Forest Plan Revision: Comments on Draft Environmental Impact Statement and Draft Revised Land and Resource Management Plan.

Dear Ms. Hyzer:

Please accept the following comments on the Draft Environmental Impact Statement (DEIS) for the George Washington National Forest's Revised Land and Resource Management Plan and on the Draft Revised Plan, on behalf of the Southern Environmental Law Center (SELC), the Southern Appalachian Forest Coalition (SAFC), The Wilderness Society (TWS), the Virginia Chapter of the Sierra Club, Virginia ForestWatch, and Wild South.

The notice of the availability of the DEIS was published in June, and subsequently the notice was amended to extend the comment period to October 17, 2011. See 76 Fed. Reg. 32197, 32198 (June 3, 2011) (notice of availability); 76 Fed. Reg. 53453, 53454 (Aug. 26, 2011) (amended notice).

Introduction and Summary

Overall, preferred Alternative G and the proposed draft plan contain substantial improvements from prior preliminary proposals and drafts, such as the March 2010 preliminary proposal which became Alternative B. However, a number of changes or additions are still needed and should be made. There are also several areas where the DEIS needs additional analysis. Below is a summary of key issues. These and other topics are discussed further in the detailed comments that follow.

- Inventoried Roadless Areas – Alternative G is intended to manage all Inventoried Roadless Areas (IRAs) consistently with the 2001 Roadless Area Conservation Rule. This excellent proposal is necessary to protect roadless areas and their many important

values, and we strongly support it. Unfortunately, this intent has not yet been carried through in all aspects of the draft plan. As drafted, several of the management prescriptions allocated to IRAs are not consistent with the 2001 Rule, because they would allow road construction and timber harvest that would not be permitted by the rule. Several IRAs also would be available for oil and gas leasing with surface occupancy and attendant access road construction, which also would contravene the rule and is particularly concerning. A forest-wide standard for IRAs is needed to ensure that IRAs are protected and managed as intended.

- Newly identified roadless areas – Alternative G is intended to manage all of the newly identified roadless areas (i.e., the Potential Wilderness Areas (PWAs) which were not IRAs) in a manner that would protect their roadless/PWA status. DEIS at 3-247. However, again this intent has not been carried through in the draft plan. A forest-wide standard to this effect is needed, as well as a standard which generally prohibits new permanent (system) roads in PWAs.
- Recommended Wilderness Designations – The GW evaluated and considered 37 areas, encompassing a total of about 378,229 acres, for recommended wilderness designations, but proposes to recommend only about 20,400 acres in four areas. For the reasons discussed below, this tiny recommendation is based on inadequate and improper evaluations and is not sufficiently justified. The Forest Service should recommend at least the following designations: recommended wilderness areas for Little River, Rich Hole Addition, Rough Mountain Addition, St. Mary’s West, Ramsey Draft Addition (aka Bald Ridge and Lynn Hollow), Beech Lick Knob, High Knob (aka Skidmore Fork), and Three Ridges Additions; and recommended National Scenic Area for Gum Run/Oak Knob/Hone Quarry/North River Gorge (aka Shenandoah Mountain) (see further comments below re specific acreages). Laurel Fork also should be recommended for wilderness designation.
- Oil and Gas Leasing – We welcome and greatly appreciate the Forest Service’s recognition of the significant impacts of gas development using high-volume hydraulic fracturing, particularly in horizontal wells. Alternative G, however, would make almost the entire forest available for leasing for vertical drilling, which also normally involves hydraulic fracturing. The DEIS does not adequately analyze and disclose the impacts of the drilling that would be allowed. Further analysis is needed before a decision on leasing availability is made. At a minimum, certain important and sensitive areas should be unavailable for leasing and drilling, including: the Forest Service-identified priority watersheds; all watersheds supplying local drinking water as identified by Wild Virginia; IRAs and Potential Wilderness Areas; Semi-Primitive Areas; Matrix Forest Blocks identified by The Nature Conservancy; and the following management prescriptions: Eligible Wild and Scenic River areas (2C2 and 2C3), Geologic Areas (4C1), Special Biological Areas (4D), Key Natural Heritage Community Areas (4D1), Highlands Scenic Byway (7A1), Scenic Corridors (7B), Concentrated Recreation Zones (7D), Dispersed Recreation Areas (7E), Blue Ridge Parkway (7F), Indiana Bat Secondary Cave Protection Areas (8E4b), Shenandoah Mountain Crest (8E7), certain Pastoral Landscape (7G) areas, and Riparian Corridors (11).

- Wind Energy – The proposed approach to wind energy represents an improvement over some prior preliminary proposals. However, the entire GW should be presumed to be unsuitable for wind energy development, as explained further below. At a minimum, additional areas (listed below) should be identified as not suitable for consideration of wind energy development.
- Species Diversity and Management Indicator Species – Although the DEIS and DEIS Appendices discuss species diversity issues fairly extensively, the Draft Plan fails to translate this into effective direction for conserving and enhancing species diversity and for providing for the viability of fish and wildlife species. Proposed MIS are inadequate indicators of management actions. The Final Plan should contain specific objectives and standards to address a broader range of species, particularly those associated with mature native forests. The Final Plan should also establish MIS that will be relevant indicators of the effects of management activities and that represent the full range of species diversity and MIS categories.
- At-Risk Species – The Forest Service should formally consult with the U.S. Fish and Wildlife Service regarding the impacts of the revised plan on federally-listed species, including the Indiana Bat, West Virginia Northern Flying Squirrel, and James Spiny mussel. Additional Special Biological Areas and expanded Key Natural Heritage Community Areas, particularly those recommended by the Virginia state Division of Natural Heritage, should be designated to protect other species of viability concern, such as the wood turtle, and to protect rare large tracts of old growth forest.
- Water Resources and Aquatic Species and Habitats – We are concerned that Alternative G would have the second-highest amount of ground disturbance among all alternatives. Further explanation of the cause and need for this disturbance and further analysis of the effects of resulting sedimentation, particularly on the Forest Service-identified priority watersheds, watersheds supplying local drinking water, and at-risk aquatic species, is needed. The EIS and plan also do not yet consider and incorporate the national direction regarding the Watershed Condition Framework or address the Watershed Condition Classifications for the GW, which were completed for the framework and which found that many watersheds in the GW already are functioning at risk. Questions also remain regarding the forest-wide Transportation Analysis Process (TAP) and the incorporation of the TAP results into the plan, especially regarding plans to achieve an environmentally and economically sustainable system that meets access needs and that addresses adverse impacts, such as impacts on water quality.
- Old Growth Protection – The Draft Plan and DEIS do not demonstrate how possible and future old growth constitute the old growth network required by the Southern Region's old growth guidance. The old growth network should be made explicit and a strategy established that builds toward an old growth network that will have good representation and distribution of existing old growth. The Draft Plan and DEIS fail to adequately distinguish in the strategy between existing, possible, and future old growth. This leads to an overestimation of existing old growth with unjustified allowances for harvesting old growth in certain forest types. The Plan should establish a better strategy for evaluating

possible old growth and selecting the best candidates to incorporate into the existing old growth and the old growth network. The Plan also should not permit logging in identified existing old growth of any type.

- Ecological Restoration – The Draft Plan and DEIS do not fully account for natural disturbance and consider the departure of the current, largely even-aged forest from reference conditions. This leads to the lack of a framework for true ecological restoration of forest composition and structure. The Final Plan should account for some habitats created by natural disturbance and should consider and plan for the restoration of the forest to appropriate ecological goals informed by reference conditions.
- Climate Change – The fairly extensive discussion of climate change in the Draft Plan and DEIS does not lead to concrete direction outlined in the plan. The Final Plan should include strategies with objectives and standards that address climate adaptation and mitigation. Monitoring tasks should also be established that can inform an adaptive climate strategy.
- Identification of lands unsuitable for timber production – A number of errors were made so that, unfortunately, all required elements in determining lands unsuitable for timber production have not yet been followed or considered. These must be corrected in order to disclose an accurate Allowable Sale Quantity and projected acres of harvest.
- Social and economic analysis – The data used in IMPLAN modeling was incorrect and out-of-date and must be updated in order to adequately disclose social and economic effects. The agency should focus on more clearly describing these effects so the public can better understand the extent to which GW management can influence the local economy.

Finally, we must note that we have been very disappointed with the number of errors in the draft planning documents released to the public. They significantly complicated efforts to review the DEIS, draft Plan and supporting materials. We understand these are draft documents and some errors will occur, but the sheer volume of factual errors and erroneous math calculations made us leery of all numbers presented. The fact that corrections had to be made to corrections and that some errors still have yet to be corrected only compounded those doubts and made it difficult for the public to trust the information in the agency's documents. We believe the mistakes far exceeded the definition of errata and in the end the Forest appeared to agree by reissuing corrected versions of the two largest chapters in the DEIS. It will be critical to get all of this right in the final planning documents.

Perhaps the most troubling example is the error in reporting the 1993 plan's estimate of annual timber harvest acreage. For years throughout this planning process, GW planning documents stated that the 1993 plan estimated about 3,000 acres per year of timber harvest. Then the GW staff discovered that the 1993 plan actually estimated only about 2,400 acres of harvest per year. This was a major error, and it still has not been fully corrected. For example, the Frequently Asked Questions dated "May 2011 with Errata" still states that "The objective for

timber harvest would change from 3,000 acres per year” and suggests that the draft plan would ~~maintain~~ maintain the same level of timber harvest” as the 1993 plan. FAQ, May 2011 with Errata, at 1 and 5.

That said, we certainly do appreciate Forest staff efforts to make corrections, answer our questions, provide requested material, and extend the comment period. We look forward to reviewing the revised social and economic data when it is corrected and hope that it will be provided for public comment, so that we have an opportunity to comment on the correct information, which is necessary for the well-informed, meaningful public participation afforded under NEPA.

TABLE OF CONTENTS

I.	FEDERAL OIL AND GAS LEASING AVAILABILITY	6
II.	WIND ENERGY DEVELOPMENT	33
III.	ROADLESS AND WILDERNESS AREAS	36
IV.	FURTHER ANALYSIS OF IMPACTS ON THREATENED AND ENDANGERED SPECIES IS NEEDED, AND THE FOREST SERVICE MUST FORMALLY CONSULT WITH THE FISH AND WILDLIFE SERVICE (FWS)	58
V.	CERULEAN WARBLER	64
VI.	SPECIAL BIOLOGICAL AREAS	66
VII.	SPECIES DIVERSITY AND MANAGEMENT INDICATOR SPECIES	67
VIII.	THE ANALYSIS OF THE IMPACTS OF THE DRAFT PLAN AND ALTERNATIVES ON WATER RESOURCES IS INADEQUATE UNDER NEPA	71
IX.	CLEAN WATER ACT	80
X.	OLD GROWTH	84
XI.	ECOLOGICAL RESTORATION	90
XII.	CLIMATE CHANGE	97
XIII.	TIMBER SUITABILITY AND VEGETATION MANAGEMENT	99

XIV.	SOCIAL AND ECONOMIC ASSESSMENT	110
XV.	CONCLUSION	113

I. FEDERAL OIL AND GAS LEASING AVAILABILITY

We much appreciate the strong concerns the Forest Service has shown over the water withdrawal and water quality impacts inherent in natural gas drilling using hydraulic fracturing (“fracking”), as well as the agency’s obvious interest in fulfilling its obligations to protect the GW’s water resources and other natural values and uses. The proposal to prohibit horizontal drilling on any future federal oil and gas leases arose from these concerns and interests, and we understand that the agency intended this to prevent or limit high-volume fracking. However, the Forest Service also has proposed to make approximately 990,000 acres of the GW available for leasing for vertical drilling operations. Given that about 90% of U.S. gas wells are fracked,¹ such vertical drilling would, in all likelihood, also involve hydraulic fracturing.

Therefore, we believe that further analysis and public disclosure of the impacts of fracking in horizontal and vertical wells is needed. The DEIS describes several reasons why allowing horizontal drilling and associated large-volume fracking would be extremely risky and unwise. However, we believe the Forest Service should provide more comprehensive analysis of the environmental risks and cumulative impacts of the overall potential oil and gas development scenario under the proposed alternative, including impacts to the landscape, and should consider additional protective measures, including those discussed further below.

While the DEIS mentions many of the environmental impacts generally associated with drilling and fracking, and acknowledges that the extensive, high-volume fracking associated with horizontal drilling amplifies some of these impacts, it does not adequately analyze the specific likelihood and significance of impacts from the vertical drilling that would be allowed, including the impacts of fracking in vertical wells and the impacts of surface disturbance on national forest resources, and plan to avoid them. A more thorough analysis and public disclosure of the effects of the drilling proposed to be allowed is needed before making any decision on leasing availability.

At a minimum, the plan should make unavailable for leasing all watersheds that supply local drinking water (as identified in Wild Virginia’s State of Our Water report), priority watersheds (identified by the Forest Service in the draft plan), and other important natural, recreational, or scenic areas (specific areas discussed further below).

A. Additional and New Information on Impacts of High-Volume Hydraulic Fracturing Should Be Incorporated into the EIS.

While there are legitimate environmental concerns associated with both vertical and horizontal drilling, the risks to water and aquatic resources of high-volume hydrofracking are

¹ BLM RFD at K-11.; see also Statement of V. Carrillo, Chairman, RR Commn. of TX, representing Interstate Oil & Gas Compact Commn., Hearing on Energy Policy Act of 2005, Before House Subcomm. on Energy and Air Quality, Comm. on Energy and Commerce, 109th Cong. (2005). This and many other cited references are attached, but all references and other documents cited in these comments are fully incorporated herein by reference.

especially grave. To further build on the analysis in the DEIS, additional information, including findings released after the DEIS, should be included in any revised or final EIS to present a more complete picture of the environmental impacts of high-volume hydrofracking.

The Forest Service explained:

The Forest places a very high priority on water quality. Horizontal drilling and the associated hydrofracturing of the Marcellus shale formation may impact water quality. Given the questionable nature of the development potential on the Forest, along with the high level of concern for water quality, the Plan does not allow horizontal drilling.

Draft Plan at 3-15. Further, there has been no development of the Marcellus or other shale formations in Virginia,² so the Forest Service and state agencies lack experience with this type of gas development in Virginia. Draft Plan FAQ at 10–11. The Marcellus formation in the Forest is folded and fractured, unlike the flat beds of shale in other regions that are more conducive to horizontal drilling, so ~~the~~ ability to develop it using horizontal drilling is questionable.” Id.

Even less is known about the Utica formation, though it does seem to cover even more of the Forest than the Marcellus. (Lest the agency think Utica shale development is an unlikely future possibility, development of the Utica is already proceeding in PA. See attached map of Utica shale formation.)

It is important to recognize the widespread local opposition to horizontal hydrofracking in the GW. Last fall, elected officials in three counties (Augusta, Rockingham, and Shenandoah) and two cities (Staunton and Harrisonburg) asked the FS to prohibit or place a moratorium on horizontal drilling to protect public drinking water and rural lands.³ The Rockingham County Farm Bureau adopted a resolution this spring opposing high-volume hydrofracking until its impacts on agriculture are well understood. Id. Many local citizens and conservation organizations, including signatories to this letter in several prior comments, have voiced concerns about the risks associated with high-volume hydrofracking.

The DEIS describes numerous ways in which high-volume hydrofracking may adversely affect water resources. Additional information on these risks should be incorporated into the EIS. For example, regarding water quantity issues, the DEIS mentions the vast amounts of water needed for high-volume hydrofracking and describes some of the potential impacts from withdrawal generally, but more information and detail can and should be included. The EIS

² There have never been any active, producing gas wells on the GW (exploratory wells drilled in the 1970s and 1980s were dry holes). DEIS, Appendix K, BLM, RFD Scenario, at K-6 to 7. Moreover, there is little history of gas extraction on private lands surrounding the forest in Virginia. Id. The federal government owns the vast majority (84%) of mineral rights on the GW. DEIS at 3-312. Most of these rights have not been leased—only 12,412 acres (1.4% of the GW’s federal mineral ownership) are subject to federal oil and gas leases. Id.

³ Statement of Kate Wofford, Executive Director, Shenandoah Valley Network, at Joint Hearing on Challenges facing Domestic Oil and Gas Development: Review of Bureau of Land Management/U.S. Forest Service Ban on Horizontal Drilling on Federal Lands, Before the House Subcomm. on Conservation, Energy, and Forestry, Comm. on Agriculture, and the House Subcomm. on Energy and Mineral Resources, Comm. on Natural Resources, 112th Cong. (2011).

should emphasize that much of the water used for hydrofracking is not recycled for future use⁴, and further explain (see DEIS at 3-335) how such consumptive high-volume withdrawals can seriously stress local drinking water supplies and existing and future downstream agricultural or other industrial uses. The reduction of water levels in aquifers may also necessitate lowering pumps or deepening or replacing wells. EPA, Draft Plan to Study the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources (2011). Depletion of aquifers may also affect water quality by exposing naturally occurring minerals to an oxygen-rich environment, causing chemical changes to the minerals that can affect solubility and mobility and lead to salinization of the water and other forms of contamination. Id. Lowered water levels may also stimulate bacterial growth. Id. High-volume withdrawals can also lead to subsidence and destabilization of the geology. Id.

The heightened risks of water contamination associated with hydrofracking are even more substantial than indicated in the DEIS. One significant risk that the DEIS does not discuss is natural gas migration into drinking water supplies. Natural gas migration is dangerous due to the combustible and asphyxiant nature of the gas, especially if it accumulates in an enclosed space such as a well shed, house or garage.⁵ Gas migration can result from improper casing, e.g., (1) inadequate depth and integrity of surface casing to form a barrier between potable water resources and gas-bearing shale formations; (2) inadequate cement in the annular space around the surface casing, which may be caused by gas channeling or insufficient time for cement setting; and (3) excessive pressure in the annulus between the surface casing and intermediate or production casing leading to the creation of subsurface pathways outside the surface casing. Id. at 6-40 to 6-41. However, gas may also migrate up through fractures in the shale formation and overlying rock layers into groundwater, as documented by a recent Duke University study. See Osborn et al., Methane Contamination of Drinking Water Accompanying Gas-Well Drilling and Hydraulic Fracturing, supra note 5.. This Duke study, released after the DEIS was completed, found that methane concentrations were on average 17 times higher in drinking water wells located near natural gas drilling and hydrofracking sites in PA and NY than in drinking water wells not located within 1km of a gas well. The average concentration in gas extraction areas was high enough to be a potential explosion hazard.⁶ State environmental agencies have reported incidents of drinking water contamination resulting from methane leaks from fracked

⁴ Current industry practice is to use 80% - 90% fresh water and only 10% - 20% recycled flowback water for high-volume hydrofracking. New York State Department of Environmental Conservation, Preliminary Revised Supplemental GEIS [hereinafter "NY PRDSGEIS"] at 6-13.

⁵ NY PRDSGEIS at 6-41; see also Stephen G. Osborn, et al., Methane Contamination of Drinking Water Accompanying Gas-Well Drilling and Hydraulic Fracturing, 108 PNAS 8172 (2011) (dissolved methane in drinking water "is an asphyxiant in enclosed spaces and an explosion and fire hazard"); Abraham Lustgarten, *Officials in Three States Pin Water Woes on Gas Drilling*, Pro Publica, Apr. 26, 2009, available at www.propublica.org/article/officials-in-three-states-pin-water-woes-on-gas-drilling-426 (Gas "becomes dangerous when it evaporates out of the water and into people's homes, where it can become flammable. It can also suffocate those who breathe it. According to the Agency for Toxic Substances and Disease Registry, a part of the U.S. Department of Health and Human Services, as the concentration of gas increases it can cause headaches, then nausea, brain damage and eventually death.").

⁶ Id.; see also Abraham Lustgarten, Buried Secrets: Is Natural Gas Drilling Endangering U.S. Water Supplies?, ProPublica, Nov. 13, 2008, <http://www.propublica.org/article/buried-secrets-is-natural-gas-drilling-endangering-us-water-supplies-1113>.

gas wells.⁷ More research on the potential mechanisms for methane contamination of groundwater (mechanisms other than poorly constructed casing) is needed.⁸

In addition to concerns about gas contamination, there are concerns about contamination of groundwater supplies and drinking water wells with fracking fluid and the multiple chemicals it contains. Many of these chemicals are known to be toxics, human carcinogens, or otherwise hazardous to human health.⁹ The DEIS states that as much as 60 to 80 percent of fracking fluid can return to the surface, leaving 20 to 40 percent underground. DEIS at 3-336. These fluids may ultimately migrate into aquifers.¹⁰ The existing evidence and pending scientific studies of fracking fluid contamination should be fully acknowledged in the EIS. Many citizens have reported that their drinking water appeared to be contaminated with fracking fluid.¹¹ Studies are being conducted to determine whether and how this could occur and how it could be prevented. Although the Duke study did not find evidence of contamination of water wells with deep brines or fracturing fluids, Osborn at 8175, EPA's more comprehensive study of the potential impact of hydrofracking on drinking water resources continues. In fact, EPA has investigated at least one documented case of fracking fluid contamination, as reported in the New York Times.¹² This is a risk which should be acknowledged.

The DEIS briefly addresses some of the benefits and risks of using centralized surface impoundments for disposal of massive amounts of flowback water, stating that any proposal for their use requires the recognition and mitigation of potential impacts. DEIS at 3-337. However, the New York DEC draft SGEIS from which this information was gathered also concludes that controlling leakage from impoundments is a "difficult task" and "even the smallest defect [in the impoundment liner] can release significant volumes of contaminated liquid over short periods of time." NY PRDSGEIS at 6-38 to 6-39.

⁷ For example, the Pennsylvania DEP has brought a series of enforcement actions against Cabot Oil & Gas for drinking water well contamination. See Abrahm Lustgarten, Cabot Oil & Gas's Marcellus Drilling to Slow After PA Environment Officials Order Wells Closed, ProPublica, Apr. 16, 2010, <http://www.propublica.org/article/cabot-oil-and-gas-ordered-to-shut-down-problem-wells-and-pay-massive-fine-a>. See also Ohio Dept. of Natural Resources, Report on the Investigation of the Natural Gas Invasion of Aquifers in Bainbridge Township of Geauga County, Ohio (2008).

⁸ Robert B. Jackson et al., Duke University, Research and Policy Recommendations for Hydraulic Fracturing and Shale-Gas Extraction, at 6 (2011).

⁹ See Chemicals Used in Hydraulic Fracturing: Hearing Before the House Committee on Energy and Commerce, 112th Cong., at 1-2 (Apr. 18, 2011) (report prepared by committee staff).

¹⁰ NRDC, Comments on Draft Supplemental Generic Environmental Impact Statement on the Oil, Gas and Solution Mining Regulatory Program (Dec. 31, 2009) (submitted to the New York State DEC).

¹¹ See, e.g., Randy Woock, EPA Gathers Input on Hydraulic Fracturing, The Trinidad Times, July 16, 2010, <http://trinidad-times.com/epagathers-input-on-hydraulic-fracturing-p617-1.htm>; Tom Wilber, Activist challenges DEC Claim of Few Gas Drilling Problems, pressconnects.com, Apr. 4, 2010, <http://www.pressconnects.com/article/20100404/NEWS01/4040356/Activist-challenges-DEC-claim-of-few-gas-drilling-problems>; Jon Hurdle, Pennsylvania Lawsuit Says Drilling Polluted Water, Reuters, Nov. 9, 2009, <http://www.reuters.com/article/2009/11/09/us-fracking-suit-idUSTRE5A80PP20091109>; Josh McDaniel, Boom in Gas Drilling Fuels Contamination Concerns in Colorado, Christian Science Monitor, Feb. 5, 2009, <http://www.csmonitor.com/Environment/2009/0205/boom-in-gas-drilling-fuels-contamination-concerns-in-colorado>.

¹² Ian Urbina, A Tainted Water Well, and Concern There May Be More, New York Times, available at http://www.nytimes.com/2011/08/04/us/04natgas.html?_r=1 (Aug. 3, 2011).

Because of the massive amount of water and flowback waste that must be transported to and from the drilling site, the high level of truck traffic associated with high-volume hydrofracking is also a major concern. The DEIS estimates that between 2,920 and 4,445 truck trips are necessary for a three well multi-well pad. DEIS at 3-338. The EIS should add more information on the gravity of the impacts from such intense trucking activity. Narrow dirt roads may need to be widened or even paved to accommodate the high volume of traffic, increasing stormwater runoff. NYDEC PRDSGEIS at 6-49. The risk of accidents and spills may also be significantly higher, and the consequences can be dire. Id. at 6-50.

The DEIS also should address the potential impacts of solids disposal. The total volume of drill cuttings from drilling a horizontal well may be one-third greater than for a conventional vertical well. NYDEC PRDSGEIS at 6-63. The greater volume of drill cuttings from development of multiple horizontal wells may necessitate a larger reserve pit that may be present for a longer period of time. Id. These hundreds of tons of drill cuttings can contain heavy metals and naturally occurring radioactive materials.¹³ High-volume hydrofracking would also have a greater impact on ecosystems and wildlife than is described in the DEIS. Surface water withdrawals have much greater potential to transfer invasive aquatic species because of the massive amounts of water used. In addition, the increased amount of truck traffic associated with high-volume fracturing, as well as increasing the risk of accidents and spills, presents a greater risk of transfer of terrestrial invasive species. NYDEC PRDSGEIS at 6-84. The DEIS also does not discuss the potential impacts of using centralized surface impoundments on wildlife, and waterfowl in particular. Migrating birds may use the impoundments, filled with contaminated flowback water, during migration or during winter if the water remains unfrozen and the impoundment is near feeding areas. NYDEC DSGEIS at 6-48. Vegetation growing around the impoundment could serve as an attractive nuisance to waterfowl. Id. Some sort of surface cover might have to be used as a mitigation measure. Id.

Impacts on scenery and recreation from horizontal drilling could be greater than those from vertical drilling in several ways not discussed in the DEIS. It is true that visual impact may be mitigated by the use of multi-well pads. But drilling rigs used for horizontal drilling may be larger in size and will have more supporting equipment. Id. at 6-132. The amount of land cleared for the well pad will also be larger. Id. The process of drilling and hydrofracking a horizontal well takes weeks longer than the time required for vertical drilling, prolonging any impacts on scenery. Id.¹⁴

When considering any type of natural gas drilling, it is important to disclose and consider that drilling is usually a 24-7 operation with lights and gas flaring and noisy equipment and compressor stations, etc., all of which would significantly harm the scenic views, natural beauty, quiet, often remote recreational experience visitors expect in the national forest.

Gas development on national forest lands is very likely to have significant, indirect adverse impacts on nearby lands and communities. These indirect impacts (including environmental, social and economic impacts) should be further discussed in the EIS. As

¹³ Presentation by Daniel J. Soeder, National Energy Technology Laboratory (NETL), at 35, available at http://www.mde.state.md.us/programs/Land/mining/marcellus/Documents/Marcellus_GeoEnv_Soeder.pdf.

¹⁴ Note that the NY draft and preliminary revised draft SGEISs, while they contain relevant and useful information, are drafts in process.

explained further below, the impact of gas development on local roads, farms, other lands, communities, and public/social services (e.g., fire, rescue, police, medical, and education), has been studied and shown to be adverse and significant.

Finally, it is important to recognize that the extent of certain risks is unknown. The EPA has recognized the importance of fully understanding the danger that hydrofracking poses to drinking water resources by commissioning a study on the subject. The FS should recognize that allowing development that includes hydrofracking would be unwise, or at best premature, given the evidence of the risks that do exist and the uncertainty and general scarcity of information on certain risks (e.g., on questions such as how to dispose of contaminated drilling waste¹⁵).

B. Analysis of Environmental Impacts of Allowing Oil and Gas Leasing for Vertical Drilling Inadequate under NEPA.

To be adequate under NEPA, an EIS must provide a “full and fair discussion of significant environmental impacts and shall inform decisionmakers and the public of the reasonable alternatives which would avoid or minimize adverse impacts or enhance the quality of the human environment.” 40 C.F.R. § 1502.1. The agency must take a “hard look” at the environmental consequences of its proposed action to make possible informed decision making and dissemination of relevant environmental information. Robertson v. Methow Valley Citizens Council, 490 U.S. 332, 350 (1989); Strycker’s Bay Neighborhood Council v. Karlen, 444 U.S. 223, 231 (1980).

While the DEIS acknowledges many of the potential impacts from gas drilling generally, it does not adequately consider and disclose the expected extent and significance of the vertical drilling that would be allowed under the proposed plan. See 40 C.F.R. § 1502.16 (stating an EIS must discuss environmental consequences “and their significance”). A generic statement that a certain action might result in certain environmental impacts, without further discussion of the likelihood or significance of those impacts within the affected area under the proposed plan, does not provide the type of precise information necessary for informed decision making.

By proposing a prohibition on horizontal drilling, the FS clearly recognizes the significance of the risks involved. However, it is important to understand that vertical drilling and hydrofracking pose many of the same risks as the high-volume fracking typically used in horizontal drilling (water quality and quantity concerns, land disturbance from well pads and access roads, solid and liquid waste disposal, etc.). While the individual impacts of conventional vertical wells usually have been on a smaller scale than horizontal wells, it may be somewhat unknown whether fracking vertical wells in unconventional plays, such as the Marcellus shale, would be substantially smaller scale as well, and in any event their impacts likely would be cumulatively significant. Therefore, the EIS should provide a more thorough analysis of the

¹⁵ As the DEIS acknowledges, local wastewater treatment plants may not be able to effectively treat contaminated flowback. DEIS at 3-336. See also Ian Urbina, Regulation Lax as Gas Wells’ Tainted Water Hits Rivers, N.Y. Times, Feb. 26, 2011, at A1, available at <http://www.nytimes.com/2011/02/27/us/27gas.html?pagewanted=all> (“Yet sewage treatment plant operators say they are far less capable of removing radioactive contaminants than most other toxic substances. Indeed, most of these facilities cannot remove enough of the radioactive material to meet federal drinking-water standards before discharging the wastewater into rivers, sometimes just miles upstream from drinking-water intake plants.”).

specific likelihood and significance of impacts from the amount and location of vertical drilling and hydrofracking expected to occur under the proposed plan.

The DEIS does provide some comparison of impacts between leasing alternatives, indicating that certain alternatives will have greater impacts than others, but it should provide more discussion of the likelihood and significance of those impacts. For example, it is conceivable that, compared to all alternatives, the amount of vertical drilling under the proposed plan would have the least impact on a particular forest resource, but this impact could still be severe. It is not surprising that Alt. G may have less extensive impacts than alternatives that allow both vertical and horizontal drilling, but again, this does not mean those impacts are insignificant.

Under Alt. G, the DEIS estimates that each vertical well would require, on average, about 425,200 gallons of water for drilling and fracking. DEIS, Table D5, at 3-320. (Note that the average amount of water needed per well varies in the different alternatives, even for the same type of well (vertical or horizontal). Why? The Forest Service should explicitly disclose the formulas used in estimating the amount of water used, land disturbance, etc. under each alternative.)

To put in context the water use figures provided, the New York DEC has proposed to classify any hydraulic fracturing operation that uses at least 300,000 gallons of water as “high-volume,” regardless of whether the well is horizontal or vertical. NYDEC PRDSGEIS at 3-7. Applicants proposing to conduct high-volume hydrofracking would be subject to additional analysis and regulatory requirements. *Id.* This approach recognizes that it is the scale of the operation, not simply the direction of the wellbore that determines the extent and significance of the environmental impacts.

We encourage the FS to consider a similar volume cap on the GW, prohibiting or further restricting any high-volume hydraulic fracturing operation, i.e. operations that would use more than a specified volume of water.¹⁶ If the Forest Service sticks with its proposed approach of prohibiting horizontal drilling, any such volume cap should be in addition to that prohibition.

Further, the Forest Service should be mindful of the potential unintended consequences of the proposed approach of prohibiting horizontal drilling while making almost the entire forest available for vertical drilling and should take steps to prevent them. For example, the risk that many more vertical wells would be built than estimated in the DEIS and BLM RFD. A proliferation of vertical wells across the GW obviously would significantly harm many national forest resources (as discussed further below) and must be avoided through careful forest planning.

The agency also must discuss ways of mitigating adverse environmental impacts caused by gas drilling. 40 C.F.R. § 1502.16(h). This discussion must be sufficiently detailed and complete to enable the public to properly evaluate the severity of the environmental consequences. *Robertson*, 490 U.S. at 351–52. “A mere listing of mitigation measures is insufficient to qualify as the reasoned discussion required by the NEPA.” *Idaho Sporting Cong.*

¹⁶ Of course, this distinction between high- and low-volume hydrofracking is not intended to suggest that the environmental impacts of gas drilling that does not involve high-volume fracking, such as the effects of land clearing and road construction, are insignificant.

v. Thomas, 137 F.3d 1146, 1151 (9th Cir. 1998) (quoting Northwest Indian Protective Ass'n v. Peterson, 795 F.2d 688, 697 (9th Cir. 1986), rev'd on other grounds). The proposed mitigation measures must be supported by analytical data. Idaho Sporting, 137 F.3d at 1151. The DEIS frequently invokes plan standards and lease stipulations as means of mitigation without discussing specific constraints that would be put in place, how such constraints would be effective at mitigation, how they will be monitored and enforced, and to what extent they will offset adverse environmental impacts.

Water Resources

The DEIS acknowledges many of the potential impacts of oil and gas leasing on water resources and aquatic species. For example, the DEIS explains that water withdrawals from streams “could adversely impact fish and wildlife health due to exposure to unsuitable water temperature and dissolved oxygen concentrations.” DEIS at 3-334. Downstream wetlands also could be impacted, depending on the amount of water within the wetland, the amount of water withdrawn from the catchment area of the wetland, and water flow dynamics. Id. Moreover, aquifer depletion is the “primary concern” of groundwater withdrawal. DEIS at 3-335. However, there is no GW- or local area- specific analysis of how likely and significant these effects will be under the current proposal for gas leasing availability. The FS should provide that analysis. While Table D5 shows the projected water use for hydraulic fracturing for each alternative, the EIS should further include estimates of how much of this water will be obtained from forest water supplies, which forest water resources are most likely to be tapped (e.g., small streams that act as headwaters for drinking water supplies), and what levels of withdrawal would trigger the potential impacts mentioned.

Similarly, the description of the potential effects from surface water and groundwater contamination is devoid of any language about the specific magnitude of the risks in relation to the proposed plan and alternatives. The EIS must do more than just rank the alternatives by projected water use or amount of ground-disturbing activity. In other words, what would be the impacts of the drilling allowed by the proposed plan and how significant would they be?

In a specific example, the DEIS provides estimates of truck traffic for horizontal multi-well pads, but does not address the level of truck traffic, and the likelihood and significance of the associated risks of non-point source pollution and surface water contamination, that would occur under the proposed plan.

The EIS should also disclose how many acres would be available for leasing and how much drilling and hydrofracking would be expected to occur in each of the watersheds that supply local drinking water and other priority watersheds, which the FS defines to include watersheds that support sensitive aquatic species or have impaired streams. Draft Plan at 2-2. How would the proposed leasing availability affect the conditions and resources in these areas that led to them being designated as priority watersheds? Many threatened, endangered, and sensitive aquatic species are located in watersheds overlying Marcellus and Utica shales and thus would be potentially affected by gas development, including the James spinymussel, Roughhead shiner, Orangefin madtom, Cow Knob salamander, Brook floater, Yellow lance, and Green floater. DEIS at 3-347 to 352.

We are especially concerned about the impacts of drilling in the forest's most important, most sensitive watersheds. Our GIS analysis of Alternative G shows that, in the Forest Service-identified priority watersheds and in the Wild Virginia-identified watersheds supplying local drinking water, about 87% of the national forest land in those watersheds would be available for oil and gas leasing. See attached map of Federal Oil and Gas Leasing Availability in Important Watersheds, Draft Revised GWNF Plan, by SELC (9/2/2011) and attached chart showing proposed leasing availability in each important watershed. This information must be disclosed in the DEIS and the effects of drilling in these watersheds must be analyzed, disclosed and considered.

As documented in Wild Virginia's report *The State of Our Water*, the GW is a direct source of drinking water for more than 260,000 local residents. Wild Virginia, *The State of Our Water*, at 1, available at <http://www.wildvirginia.org/?p=190> (2008). This further highlights the need to conduct a careful and thorough analysis of impacts on drinking water supplies.

The revised EIS should also expand on the risks and planned methods of flowback disposal. For instance, would open pits be used to hold flowback or only storage tanks? We understand from a conversation with FS staff that the FS intends for flowback to be placed in storage tanks, rather than in open pits, but this does not seem to be documented and committed to in the DEIS and leasing stipulations—it should be. Would these storage sites be located adjacent to stream channels or in drinking water watersheds? What are the plans for monitoring and oversight? It is also unclear whether applicants proposing to drill and frack vertical wells would have to disclose the quantity and composition of chemicals that would be used, or whether land application of flowback waste would be allowed for vertical wells.¹⁷ The FS should attach to any future leases stipulations requiring disclosure of chemicals and prohibiting land application, regardless of the type of drilling to be used. The planning documents should also explicitly state whether flowback can be discharged into surface waters—would an NPDES permit be required?

The DEIS recognizes that ground disturbing activities associated with oil and gas development can increase runoff and sedimentation rates, but it should go further by discussing the expected change in these rates and the extent of the resultant impacts under Alt. G. Steep access roads, well pads on hill slopes, and well pads constructed by cut-and-fill operations make containment of runoff (which may be contaminated by spills) especially difficult. DEIS at 3-337. The planning documents should be clear on the expected extent of these riskier construction activities as well as any relevant constraints.

In any areas available for leasing and drilling, the Forest Service should consider prohibiting surface occupancy on steep slopes, to avoid ground disturbance on steep slopes and the erosion and sedimentation likely to result. For example, the Forest Plan for the National Forests in Alabama recently was amended to add a forest-wide standard providing that "Surface occupancy during minerals leasing operations is limited to slopes \leq 40 percent." National Forests in Alabama, Decision Notice for Forest Plan Amendment #2 – Minerals Operation

¹⁷ The DEIS, at 2-27, provides the terms of the Horizontal Drilling Operations Control Stipulation applied to some alternatives, which would require chemical disclosure for applicants proposing to drill horizontal wells, and would ban the authorization of surface disposal of hydrofracking materials on forest lands. There does not appear to be any such stipulations that apply to vertical wells though.

Standard, available at http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5274553.pdf (Dec. 27, 2010).

The discussion of cumulative impacts on water quality and quantity is also lacking. Under NEPA, the cumulative impacts analysis must assess “past, present, and reasonably foreseeable future actions” and the incremental impact of the proposed activities when added to that baseline. 40 C.F.R. § 1508.7. In order to properly consider cumulative impacts, “some quantified or detailed information is required.” Neighbors of Cuddy Mountain v. U.S. Forest Serv., 137 F.3d 1372, 1379 (9th Cir. 1998). It is not enough to make general statements about “possible effects” and “some risk.” Id. at 1380; see also Natural Res. Def. Council v. Hodel, 865 F.2d 288, 299 (D.C. Cir. 1988) (stating that, in considering cumulative impacts, “perfunctory references do not constitute analysis useful to a decisionmaker”).

First, the EIS should consider the cumulative impacts from concentration of vertical wells in particular watersheds. Second, it should provide a more thorough analysis of potential regional cumulative impacts. The section on regional cumulative impacts is prefaced with an observation about the difficulty in accurately estimating the level of such impacts, dependent as they are on the amount and rate of oil and gas development. There is no explanation as to why the FS does not rely on BLM projections of gas activity, as it does elsewhere in the DEIS, in analyzing regional cumulative impacts. Instead, the entire analysis is limited to examples of cumulative effects of multiple water withdrawals in *other* regions. The EIS must address potential cumulative impacts in detail in the context of the GW and proposed plan. And this analysis must go further than an observation that Alt. G would prohibit horizontal drilling and therefore would result in less water use and potential for contamination than alternatives that would allow it.

With respect to the cumulative impacts of water withdrawals, there is an acknowledgement that a proper analysis must include a consideration of existing water usage, the non-continuous nature of withdrawals, and the natural replenishment of water resources. DEIS at 3-339. We agree with the FS that these considerations are important, and they should be factored into its cumulative impacts analysis. The EIS also should make clear that gas leases do not confer the right to withdraw water from streams or groundwater supplies.

Moreover, the EIS must consider the cumulative impacts of water contamination and sedimentation from gas activities expected to occur under the proposed plan in light of other past, present, and reasonably foreseeable future activities in the region, both public and private. The FS acknowledges that many other activities may have similar negative effects on water resources, such as road and trail construction, timber management, and fire management, DEIS at 3-48, but no detailed cumulative impacts analysis is presented. For example, the cumulative impacts of sedimentation from the existing road system plus that from new oil and gas development and logging access roads should be disclosed and considered.

The aquatic viability determinations should factor in impacts from vertical drilling. We agree that for a given species, separate viability determinations should be made for each watershed it occurs in under each plan alternative. The DEIS states that in order to account for the effects from oil and gas leasing, the stressor of horizontal drilling was considered for species that occur over Marcellus shale. DEIS at 3-340. It appears, however, that a stressor for vertical drilling was not included. (Nor was any analysis conducted for the Utica shale which underlies

much more of the GW.) This assumes that the oil and gas drilling that would be allowed under preferred Alt. G would have no impact whatsoever on aquatic species. The effects of vertical drilling must be included in any aquatic species viability calculations—it is highly doubtful that vertical drilling and hydrofracking would not have any impact on the viability of any aquatic species.

The revised EIS should also contain a more meaningful discussion of mitigation of adverse environmental effects on water resources resulting from vertical drilling and hydrofracking. Despite discussion of various effects from water withdrawals, only one mitigation measure is mentioned (screening intake pipes to avoid entrainment of aquatic organisms). DEIS at 3-334. On the threat of surface spills and releases near drilling wells, the DEIS states that the odds of an accident are heightened “if mitigation measures are not sufficiently durable,” but gives no hint at what these mitigation measures might be. DEIS at 3-335. No means of mitigating effects from non-point source pollution resulting from ground-disturbing activities associated with vertical drilling are mentioned either.

Soils

Vertical gas drilling allowed under Alt. G would disturb soils by way of displacement, compaction, and erosion resulting from vegetation removal. DEIS at 3-327. Fluid leaks or spills could sterilize soil or reduce soil productivity. Without explanation, the DEIS uses a 15% reduction in soil productivity across the entire leasing availability area as a threshold for significance. *Id.* This ignores potentially significant localized impacts in sections of the forest from concentrated gas activities. Further, while the DEIS lists the number of acres affected by each alternative, it does not discuss the expected significance of the impacts in these areas, even if, as the DEIS states, 98% of the forest will retain its soil productivity. DEIS at 3-329.

As explained in the Water Resources section of our comments, the planning documents should unambiguously state whether land application of flowback waste would be prohibited for *vertical* hydrofracking. If it would be allowed, the expected environmental impacts on soil, vegetation, and water need to be fully disclosed and incorporated into the soil productivity analysis. We strongly urge the FS to explicitly ban land application of contaminated flowback for all types of drilling. This practice has been shown to damage and kill vegetation and the DEIS acknowledges the effects that drilling wastes can have on soil productivity. DEIS at 3-327; USDA-FS, Northern Research Station, Mary Beth Adams et al., *Effects of Development of a Natural Gas Well and Associated Pipeline on the Natural and Scientific Resources of the Fernow Experimental Forest*, General Technical Report NRS-76 (2010) (hereinafter *Fernow Study*).

Geologic Resources and Hazards

While acknowledging that ground disturbance from oil and gas activities may adversely affect geologic resources, the FS should provide more detail about the nature, likelihood, and significance of these effects that would result from vertical drilling allowed by Alt. G. The DEIS notes that karst areas “generally do not overlap” with Marcellus shale in the forest, but there is barely any discussion of the probable impacts in areas where there is such overlap (and again, no discussion of the Utica shale which underlies a larger portion of the GW). DEIS at 3-325. Moreover, karst is widely distributed across the entire forest, DEIS at 3-51. Its precise

boundaries are not clearly defined and the ways that water percolates through these karst systems is not well understood. Therefore, the relatively small overlap suggested by GIS data should not be relied upon to conclude that karst is unlikely to be affected by vertical drilling. The analysis of cumulative impacts from other management activities merely declares the cumulative impact to be the combination of impacts discussed in this section with those discussed in the Physical Environment section. DEIS at 3-327. There should be an evaluation of the gravity of the combined impacts. As previously mentioned, the EIS should provide maps, tables, or data showing the prospective overlap of expected oil and gas development and other management activities.

The light discussion of impacts seems to be due to the assertion that various environmental laws and regulations, in conjunction with Forest Plan standards, would “avoid or reduce potential effects on the Forest’s geologic resources . . .” such as caves and karst. DEIS at 3-325. Specific laws and regulations are not cited. Some of the Forest Plan standards do impose substantive requirements that are protective of geologic resources. For example, FW-63 prohibits soil-disturbing activities within 200 feet of cave entrances and sinkholes. Draft Plan at 4-7. Underground cave systems and/or their drainage catchments, however, could extend beyond this 200-foot buffer around the entrance and be affected by drilling. Other standards are substantive in nature, but general or soft (e.g., FW-214 gives direction to locate and design facilities and management activities to minimize impacts on geologic resources; FW-215a gives direction to locate and design projects to minimize potential adverse effects on groundwater; FW-216 mandates that activities be conducted so as to avoid or minimize geologic hazards and potential impact on infrastructure and public safety; FW-65 states management activities within any area draining into a cave should be “limited” if they may affect the cave’s ecosystem). Other relevant standards are merely procedural (e.g., FW-216 gives direction to “consider” a geologic hazard and risk assessment for ground-disturbing projects on slopes of 50% or greater near the Forest external boundary). The general or non-binding nature of these standards casts some doubt on the conclusion that they will be effective in mitigating impacts on geologic resources and the risk of hazardous events from any kind of drilling. Cave and karst geology is complex, and an understanding of fluid movement and connectivity within karst systems is essential to protecting groundwater and other geologic resources. See Fernow study. Sedimentation and hydrofracking fluid releases or spills could have particularly serious consequences in karst areas. Further, in light of its reliance on plan standards, the FS should also discuss how rigorously these standards are enforced, or whether the FS has adequate resources for oversight and enforcement.

Special Biological Areas and Rare Communities

There is very little mention of the potential effects of oil and gas development on rare communities, caves, and Special Biological Areas (SBAs). DEIS at 3-342. The DEIS should consider in more detail the expected impacts of vertical drilling under Alt. G on rare communities, caves, and SBAs. The DEIS relies on plan standards and project and site-specific analysis to prevent or mitigate damage to the integrity of these areas and the species of concern that depend on them. DEIS at 3-342. Again, the DEIS does not sufficiently demonstrate how these standards and project-level analyses will be effective in avoiding or mitigating adverse environmental impacts. If impacts will only be mitigated and not completely prevented, what will be the extent of those lesser impacts?

Standard FW-62 calls for surveying of areas for rare communities prior to implementing projects with potential to negatively affect them, but there is no indication that a determination that a rare community will be adversely affected imposes any further substantive requirements to protect it. The draft plan provides that SBAs are available for federal oil and gas leasing with controlled surface use to protect threatened, endangered, sensitive, and locally rare species, but there is no elaboration in the plan or DEIS on what the CSU restrictions are and how they would protect these species. Therefore, the conclusion that SBAs and the species in them would be protected under any of the alternatives is unsupported. Surface occupancy for any kind of oil or gas drilling in SBAs seems incompatible with the Plan's goal of protecting these areas from "human-caused detrimental habitat change." Draft Plan at 4-53 (see further discussion in Section IV, *infra*).

Wildlife

Vertical drilling activities may impact wildlife by killing animals that cannot leave habitats affected by construction of access roads, clearing and leveling of drill pad sites, or construction of pipelines and facilities. DEIS at 3-357. The DEIS asserts that adverse impacts from the creation of forest edge from construction activities are not expected to be significant because the areas where most leasing is expected to occur are in generally forested landscapes. *Id.* This conclusion is unsupported by data about the projected amount of forest clearing and edge effects that would occur under the alternative proposals. Would on-the-ground surveys for threatened, endangered, and sensitive species be required for each individual leasing decision? The DEIS downplays possible edge effects, but research has shown that measurable impacts often extend at least 330 feet into the forest area adjacent to the edge. The Nature Conservancy, Nels Johnson et al., Pennsylvania Energy Impacts Assessment Report 1: Marcellus Shale Natural Gas and Wind (2010). Alt. G is expected to result in construction of 38 wells on federal leases, disturbing 380 acres of land, plus edge effects and other disruption of surrounding areas. DEIS at 3-320. The FS must also consider cumulative impacts on wildlife from other forest management activities such as timber harvesting.

We also want to note that the basis for this estimate of future development is unclear. The BLM RFD anticipates a somewhat greater level of development, at 20 vertical exploration wells and 50 vertical development wells. RFD, DEIS at K-14. However, the RFD does not explain how this estimate was developed. Based on the well spacing figures provided in the RFD and on the vast acreage Alternative G would make available for drilling, we are concerned that Alternative G could result in significantly more wells than estimated in the DEIS.

The DEIS is not clear on the significance of habitat loss, stating, for instance, that habitat for the ovenbird, a management indicator species, will be reduced for all alternatives. DEIS at 3-357. The extent of this loss is not quantified or otherwise evaluated, and negative impacts on other specific species are not mentioned. While Table D17 lists numerous sensitive species that "could potentially be affected" by gas leasing, the expected impacts on these species specifically from gas leasing under the proposed plan should be described in detail. DEIS, Table D17, at 3-347. The endangered Indiana bat and Virginia big-eared bat are among the species potentially affected by oil and gas leasing. *Id.* The DEIS also states that creation of edge and early seral habitat will actually benefit some species. *Id.* It is difficult to imagine how these openings will benefit any species considering they will be occupied by industrial gas facilities and equipment. There is no mention of mitigation measures in the wildlife analysis either.

Non-Native Invasive Plants

The DEIS enumerates potential environmental impacts from invasive plants, and severity of impact is correlated with the amount of ground-disturbing activity associated with each alternative. No explanation is given other than a general statement that ground disturbance creates habitat suitable for invasive plant infestations. DEIS at 3-358. The fact that some alternatives are more conducive to infestations than others does not say anything about the overall significance of the potential impact of Alt. G or any other alternative. Cumulative impacts from development around the forest, creation of forest edge, and other forest management activities must be addressed as well.

Potential Wilderness Areas and Inventoried Roadless Areas

The DEIS asserts that those Potential Wilderness Areas and Inventoried Wilderness Areas allocated to the Remote Backcountry Management Prescription would be leased with a no surface occupancy (NSO) stipulation and thus suffer no impacts under any alternative. DEIS at 3-358. But there is no discussion whatsoever of potential impacts to portions of these areas *not* assigned to the Remote Backcountry prescription. The EIS must consider and disclose the impacts of vertical drilling on these areas and the final plan should make these areas entirely unavailable for leasing or, at a minimum, protect their surface with a No Surface Occupancy stipulation, as discussed further below.

As a general matter, it is important to recognize that NSO drilling may still entail risks to water quality, so an NSO stipulation may not be completely protective. Directional drilling (especially if there are well casing problems) could still affect water resources beneath NSO areas, especially in karst, potentially leading to methane and fracking fluid contamination of seeps, springs, and streams. This should be considered regarding the proposed NSO areas, such as the Remote Backcountry, Research Natural Areas, and Appalachian Trail prescriptions.

Recreation, Scenery, and Cultural Resources

The DEIS states that the negative impacts of oil and gas leasing on roaded natural areas, such as short-term use pattern changes by recreationists, can be mitigated through lease stipulations or conditions on surface use, and long-term site restoration. DEIS at 3-361. But again, there is no elaboration on how probable or effective these mitigation strategies would be under Alt. G. Oil and gas development is said to be incompatible with the desired experience in semi-primitive recreation settings, but substantial parts of these settings would be open to leasing, even in some cases on standard lease terms. In fact, under the proposed plan, about 140,400 acres of semi-primitive land would be available for leasing, almost all of it with standard terms. DEIS at 3-361. The EIS should discuss the expected extent of potential impacts on trails and trail users from road and pipeline construction and the sights and sounds of round-the-clock gas development activities. The discussion of mitigation strategies for impacts on trails is limited to a reference to lease stipulations and conditions on surface use approval, and a general statement that effects “may be mitigated, to varying degrees, through rehabilitation, management controls, and/or trail relocation.” DEIS at 3-362. Would these measures actually be implemented? How would they operate and how effective would they be? This assessment again falls short of the “reasoned discussion” that NEPA requires.

The DEIS describes short-term impacts on scenery from oil and gas development in areas where visitors expect to enjoy natural settings, and the amount of road, pipeline, and well pad construction is provided for each alternative. DEIS 3-362 to 363. This description of impacts should present a more complete picture of how physically, auditory and visually invasive the process of gas extraction is in a national forest, whether it involves vertical or horizontal drilling—it is a major industrial activity involving large drilling equipment, brine and flowback pits, compressions tanks, scores of operating generators and potentially heavy truck traffic. Once drilling is complete, pipelines can create long linear openings that alter the visual setting. Compressor stations to maintain pipeline pressure and gas flow add negative auditory impacts to the recreation experience. More analysis is needed of the potential long-term cumulative impacts on scenery from gas drilling under the proposed plan and alternatives, which, as the DEIS acknowledges, “could, over time, result in the degradation of scenery,” perhaps in ways that are irreversible or resistant to restoration. Mitigation measures should be discussed too.

The EIS should discuss in greater detail the potential effects on cultural resources. Because analysis of the effects must be performed programmatically in compliance with existing laws and regulations, the effects would purportedly not vary by alternative. DEIS at 3-364. This does not excuse the Forest Service’s obligation to delineate those impacts. Existing laws and regulations would not necessarily prevent *any* significant impacts on cultural resources. For example, the FS cites to federal regulations for the protection of archaeological resources, but these regulations do not require any permit for activities that are exclusively for purposes other than excavation or removal of archaeological resources, but “might incidentally result in the disturbance of archaeological resources.” 36 C.F.R. § 296.5(b). The revised EIS should flesh out the expected impacts on cultural resources under the proposed plan.

Surrounding Areas

The EIS should fully disclose the anticipated indirect and cumulative impacts of gas development, including the drilling proposed to be allowed by Alt. G, on farms and rural communities neighboring the forest. See 40 C.F.R. § 1502.16(b) (stating an EIS must consider “[i]ndirect effects and their significance”). “Indirect effects” are defined as effects “which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable” and may include “effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems.” 40 C.F.R. § 1508.8.

Gas development can lead to a significant strain on local communities’ public resources and services. For example, an increase in heavy truck traffic on small, rural, often gravel roads quickly deteriorates those roads and increases congestion, raises the risk of accidents and spills, and requires more maintenance and repair funds.¹⁸ Citizens in other areas where shale gas drilling has taken place have complained about the dust, noise, and road damage caused by truck

¹⁸ Susan Christopherson and Ned Rightor, Cornell University, Working Paper Series: How Should We Think About the Economic Consequences of Shale Gas Drilling? (2011), available at http://www.greenchoices.cornell.edu/downloads/development/marcellus/Marcellus_SC_NR.pdf (hereinafter Working Paper); see also Susan Christopherson, Cornell University, Marcellus Shale Gas Drilling: What Does it Mean for Economic Development? Preliminary Findings on the Economic Consequences of Natural Gas Extraction in the Marcellus Shale (Dec. 13, 2010 update) (hereinafter Presentation); Christopherson, et al., in CaRDI Report.

traffic. Working Paper at 15-16.¹⁹ Many rural roads in the Marcellus and Utica regions are not built to withstand such heavy use. *Id.* Local governments may attempt to regulate trucking routes to minimize damage, but this could require planning, engineering studies, and legal consultation that proves too much for these governments' budgets. *Id.* Additionally, gas development generally leads to increases in demand for fire, rescue, police, health, education, and other public administrative services. Working Paper at 13-14; Presentation at 8.

The EIS should also discuss the broader regional industrialization that accompanies any kind of gas development, including vertical drilling. Various facilities, including depots for equipment, staging areas, gravel quarries, water extraction sites, wastewater treatment plants capable of treating drilling waste, and gas storage facilities, are needed to carry out gas extraction operations. Working Paper at 16-18. These industrial facilities not only negatively affect the environment, but can threaten competing industries relied on by local communities, such as tourism and agriculture (*id.*)—the backbone of existing local economies in the region around the GW. These impacts could be particularly severe in the area around the GW because this area has no history of commercial gas development, therefore, it has no infrastructure, local workforce, etc. in place to support this industry.²⁰

The Forest Service Should Consider Separating the Oil and Gas Leasing Availability and Consent Decisions and Deferring the Consent Decision for Further Analysis.

The Forest Service should consider separating the oil and gas leasing availability and the consent to leasing decisions, and deferring the consent decision for further, site-specific analysis. Oil and gas leasing is a two-step process of deciding, first, which lands are available for leasing and, second, whether to give BLM consent to sell leases. See 36 C.F.R. § 228.102. The revised plan may make lands available for leasing without also giving consent to leasing. For example, the 1993 GW plan apparently made the second, consent decision only for lands in the so-called –Alleghany Front Lease Area.” 1993 FEIS at 2-76 to 77.

The Forest Service typically wishes to make both decisions in the forest plan and to analyze and support both of them in the EIS for the plan. However, it is important to understand that this is not required.

The Forest Service oil and gas leasing regulations and the Forest Service Manual (FSM) recognize that additional environmental analysis may be necessary before making the consent decision. At this stage, when specific lands are being considered for leasing, the Forest Service must review the leasing availability decision. 36 C.F.R. § 228.102(e). This review must include a verification that –oil and gas leasing of the specific lands has been adequately addressed in a NEPA document If NEPA has not been adequately addressed, or if there is significant new information or circumstances . . . requiring further environmental analysis, additional environment analysis shall be done before a leasing decision for specific lands will be made.” See § 228.102(e)(1).

¹⁹ See also <http://marcellus-wv.com/more-impacts/trucks> for more information and photos of the impacts of oil and gas development truck traffic on mountain roads in West Virginia.

²⁰ For further discussion of this issue, see the comments of the Shenandoah Valley Network. The Catskills Citizens for Safe Energy website, at http://catskillcitizens.org/learn_one.cfm?t=2&c=22, also has useful resources on social and economic impacts.

The FSM contains additional direction for this pre-leasing review, instructing that the Forest Service “shall conduct an environmental analysis” using the agency’s NEPA procedures “to evaluate what impact the proposed action would have on the surface resources and other users.” FSM 2822.41. This “study should include and consider the following factors, where applicable:

1. Statutory authorities.
2. Existing and planned uses.
3. Dedications.
4. Impact on surface resources.
5. Damage to watershed.
6. Degree of surface disturbance and difficulty in restoration.
7. Special values, such as wilderness character, archeological sites, cultural resources (FSM 2361), and endangered wildlife habitat.
8. Access needs, including system roads to be used or constructed.
9. Term of the lease and probable nature of operations.
10. Economic considerations, such as relative values of minerals and surface resources and scarcity of and demand for minerals.
11. Range of alternatives available for operations and land uses and for environmental protection.”

Id.

It is difficult, if not impossible, for a forest-wide EIS to adequately consider these factors and the site-specific impacts of leasing and drilling specific parcels, as required by NEPA and these rules and directives. For example, many parcels would require field survey and other site-specific analysis to identify and consider, for example, steep slopes, fragile soils, karst geology, caves, important streams and springs, TES species and/or their habitat, trails, other recreation sites, degree of surface disturbance and difficulties in restoration, access needs and impacts, etc. As discussed above, it is already clear that the DEIS does not adequately analyze many of these types of impacts of the gas leasing and drilling proposed in the draft plan.

Therefore, it would be quite appropriate (and perhaps necessary) to separate the availability and consent decisions, so the necessary analysis can be done at a more site-specific level in the future, before any leases are sold. Under this scenario, if companies express interest to BLM in leasing certain tracts on the GW, the Forest Service could respond by conducting a proper, site-specific environmental analysis (probably an Environmental Assessment or Environmental Impact Statement) of the likely effects of gas development on those tracts and then deciding whether to consent to lease them. This approach also would enable the Forest Service to identify more precisely the stipulations necessary to protect national forest resources on those parcels (e.g., forests; soil and water resources; fish, wildlife, and plants; recreation opportunities; scenic views; etc.). Deferring the consent decision would allow the GW to retain

much greater control and authority over future leasing and use of the GW lands and would ensure that all site-specific environmental impacts could be identified and considered before leases are irretrievably sold.

C. Additional Factors to Consider Pursuant to NFMA Regulations.

The 1982 NFMA Regulations state that in considering mineral exploration and development, the Forest Plan should recognize “to the extent practicable” the following factors:

- (a) Active mines within the area of land covered by the forest plan;
- (b) Outstanding or reserved mineral rights;
- (c) The probable occurrence of various minerals, including locatable, leasable, and common variety;
- (d) The potential for future mineral development and potential need for withdrawal of areas from development;
- (e) Access requirements for mineral exploration and development; and
- (f) The probable effect of renewable resource prescriptions and management direction on mineral resources and activities, including exploration and development.

36 C.F.R. 219.22 (1982). The Reasonably Foreseeable Development Scenario provides a baseline for estimates on the amount of oil and gas development activities that would occur under each alternative, but as explained in Part II, *supra*, the analysis of impacts expected to occur under Alt. G is lacking. For instance, the significance of the impacts in certain prescription areas needs to be more rigorously examined to determine whether those areas need to be withdrawn from future federal leasing. See FSM 2822.41 (consider impacts on special values, such as wilderness character and endangered wildlife habitat); see Section III, *infra*. In another example, the access needs for gas development, and the direct, indirect and cumulative effects of road construction and traffic on both national forest and surrounding rural lands should be considered.

NFMA regulations require forest planning to provide for “general estimates of current water uses, both consumptive and non-consumptive, including in-stream flow requirements within the area of land covered by the forest plan” as well as an “estimation of the probable occurrence of various levels of water volumes, including extreme events which would have a major impact on the planning area.” 36 C.F.R. § 219.23. These estimates are not found in the draft plan or DEIS. As discussed in Section II, *supra*, hydraulic fracturing can require an immense amount of water, even for vertical wells. Even under the Forest Service’s preferred alternative, which would not allow issuance of new leases for horizontal drilling, the agency estimates over 16 million gallons of water would be used for drilling and hydraulic fracturing on federal leases. DEIS at 3-320, Table D5. While we fear this estimate is much too low, even 16 million gallons is significant. Much of this water would likely be withdrawn from streams or aquifers in the forest. DEIS at 3-334. More analysis is needed of how the expected level of withdrawal would affect the environment in light of the hydrological needs of the Forest.

Extensive drilling and hydrofracking on the GW, whether it involves horizontal or vertical wells, seems likely to conflict with the Forest Service’s ability to meet its obligations under the NFMA to conserve water and soil resources and provide for diverse plant and animal

communities, viable populations of fish and wildlife species, and recreational opportunities and scenic quality. See, e.g., 16 U.S.C. § 1604(g)(3)(A); 36 C.F.R. § 219.19 (fish and wildlife); § 219.21 (recreation); § 219.23 (water and soil); § 219.26 (diversity of plant and animal communities); § 219.27(a)(1) (all management prescriptions shall conserve soil and water resources). Section 219.27 sets forth management requirements to guide the development, analysis, and approval of forest plans. It calls for all management prescriptions to, among other things, conserve soil and water resources and avoid significant impairment of land productivity, provide for and maintain diversity of plant and animal communities, prevent adverse modification of critical habitat for threatened and endangered species, and protect the integrity of streams and riparian areas. The availability of oil and gas leasing in certain management prescription areas conflicts with these requirements, and is often inconsistent with the Forest Plan's own stated desired condition for the area. The flawed nature of these leasing availability decisions is laid out in further detail below.

D. Incompatibility of Proposed Oil and Gas Leasing Availability for Vertical Drilling with Management Prescription Area Goals and Protection of Important Resources.

The proposed draft revised forest plan would make several sensitive and important management prescriptions and other areas available for vertical drilling on federal leases, despite the conflict between the effects of drilling and the desired condition of these areas. While some of these areas would only permit leasing with controlled surface use (CSU) stipulations, neither the plan nor DEIS disclose the nature of these stipulations or how they would ensure harmony with the desired condition of particular prescription areas. While the DEIS discusses the effects of oil and gas leasing on specific forest resources, it does not specifically analyze and disclose impacts to management prescription areas and the particular resources (e.g., rare species, scenic views, recreation, etc.) that are the basis for these prescriptions. In fact, the DEIS does not explicitly disclose how many acres would be available for oil and gas leasing in each prescription area under the proposed plan, nor does it display the current distribution of existing federal and private leases by prescription area. More information is needed on the overlap of areas with high conservation priorities and areas where gas development is likely to occur to fully understand the environmental ramifications, ensure the forest plan is internally consistent, and comply with NEPA, the NFMA, and federal oil and gas leasing regulations.

These sensitive and important areas should be unavailable for leasing. The Forest Service directives instruct the agency to consider avoiding leasing when mineral development would ~~(1)~~ seriously interfere with other resource values, (2) be incompatible with the purposes for which the area is being used or administered, or (3) permanently destroy or render useless the land for the purpose for which used or dedicated,” as well as when the value of the land for its current use outweighs the benefits of mineral extraction and the existing use cannot be adequately protected by stipulation. FSM 2822.45; see also FSM 2761.03 (consider withdrawing areas where management direction is not compatible with mineral development, for example, ~~research~~ research natural areas, interpretive or cultural sites, scenic areas, geologic areas, critical habitat of endangered species having a very limited range and specific habitat requirements not found elsewhere, and botanical areas.”). Even if the proposed ban on horizontal drilling is adopted, we recommend that, at a minimum, the FS should make Inventoried Roadless Areas (IRAs),

Potential Wilderness Areas (PWAs), priority watersheds, watersheds that supply local drinking water, and the following management prescription areas completely unavailable for leasing.

Roadless Areas

Inventoried Roadless Areas – As discussed at length elsewhere in these comments and as shown on the attached map of Federal Oil and Gas Leasing Availability and Roadless Areas (9/2/2011), several Inventoried Roadless Areas (IRAs) are allocated to prescriptions that would be available for federal oil and gas leasing with surface occupancy, including Special Biological Areas, Shenandoah Mtn. Crest/Cow Knob Salamander Areas, and Eligible Scenic and Recreational River Corridors. This would not be consistent with the 2001 Roadless Rule. These prescriptions should not be available or, at a minimum, should not be available with surface occupancy, for the reasons discussed below. If they remain so available, no IRAs should be allocated to them.

Newly Identified Roadless Areas – Also as shown on the attached map, many of the newly identified roadless areas (the PWAs which are not IRAs) are allocated to prescriptions which would be available for leasing with surface occupancy. This would be contrary to the FS stated intent for Alt. G:

–Alternative G includes an objective to assure that management activities in Potential Wilderness Areas (including areas allocated to these Other Resource‘ management prescription areas) will only be done if they will not affect the Potential Wilderness Area to the point that it would no longer meet the definition of a Potential Wilderness Area.” DEIS at 3-247.

Oil and gas drilling with surface occupancy almost certainly would affect these areas to the extent that they would no longer meet the road density and naturalness aspects of the PWA definition. Therefore, these areas should be allocated to other prescriptions which are not available for leasing or the prescriptions should be changed so they are not so available (or, at a minimum, are available only NSO).

Priority Watersheds

Water quality, especially water quality in important watersheds supplying drinking water to local communities and supporting at-risk aquatic species, is one of the significant issues identified in the plan revision process and studied in the DEIS. DEIS at 1-9. The DEIS and draft plan emphasize the importance of water resources, especially sensitive/at-risk aquatic species habitat and drinking water supplies. In response, Alternative G and the proposed revised plan would identify certain watersheds as priority watersheds, including those supporting intact brook trout populations, supporting other at-risk/sensitive aquatic species, designated for use as public water supplies by the state of Virginia, watersheds of impaired streams, and watersheds of exceptional waters. Draft Plan at 2-2 and at Appendix D; DEIS at 3-154. These watersheds would be priorities for restoration to improve soil and water resources, DEIS at 2-16, although unfortunately they are not protected by binding standards.

Despite the recognized importance of the priority watersheds and these goals to maintain and improve water quality there, the draft plan would make most of these watersheds available for oil and gas leasing for vertical drilling, as shown in our attached map of Federal Oil and Gas

Leasing Availability in Important Watersheds in Draft Revised GWNF Forest Plan (9/2/2011) and accompanying chart. As explained in Section II, *supra*, many threatened, endangered, and sensitive aquatic species are located in watersheds overlying the Marcellus and Utica shales and thus would be potentially affected by gas development. DEIS at 3-347 to 352. In these priority watersheds, about 87% of the national forest land is proposed to be available for oil and gas leasing.

Combining these priority watersheds with the Wild Virginia-identified local drinking watersheds yields the same result. As noted above, in total about 87% of the national forest land in both types of watersheds is proposed to be available for oil and gas leasing.

Making these areas available for oil and gas leasing would likely adversely affect water quality here, rather than improve it, and therefore would run counter to the goals and objectives identified for these watersheds. Instead, all priority watersheds and other watersheds which supply local drinking water,²¹ as identified in Wild Virginia's report, should be unavailable for federal oil and gas leasing to protect drinking water sources, sensitive species, and impaired streams. As discussed above, if these watersheds are available for oil and gas leasing for vertical drilling, the effects of such drilling on water quality, sensitive/at-risk aquatic species, and public drinking water supplies must be more thoroughly analyzed, disclosed, and considered before a decision is made.

Eligible Scenic and Recreational Rivers (2C2 and 2C3)

The goal of the management prescription for Eligible Scenic Rivers is to protect and enhance their "outstandingly remarkable scenic and geologic values" and "perpetuate the undeveloped setting and non-motorized access that led to the 'scenic' classification." Draft Plan at 4-35. The characteristics of the river are not to be reduced below the standards for Scenic River classification and the corridor should exist in a "natural to near-natural setting and possess outstanding scenic quality." *Id.* Modification of the river or its channel is prohibited except for fisheries habitat improvements. *Id.* at 4-36. Visitors should "have the opportunity to experience some solitude and enjoy the primitive character of the surrounding landscape." *Id.* Timber harvest and road construction are prohibited in this area, *id.* at 4-37 to 4-38, but oil and gas development with surface occupancy would entail forest clearing and access road construction. Oil and gas leasing with CSU stipulations would conflict with the scenic objectives of this management area, despite a vague plan standard that calls for consistency between management activities and the "outstandingly remarkable" values of the river. *Id.* at 4-36. The draft plan and DEIS provide no criteria to be used for approving lease requests or imposing conditions on leases to ensure consistency with the plan.

For eligible recreational rivers, the FS asserts that the sight of mineral development is acceptable and the goal is to "blend these uses into the background so that they remain visually subordinate to the natural landscape." *Id.* at 4-39. We disagree that the sight of gas development is acceptable in these areas. While the Wild & Scenic Rivers Act states generally that recreational river areas "may have some development along their shorelines," 16 U.S.C.

²¹ The DEIS list of public water supply watersheds is incomplete: the Buffalo, Maury, and James Rivers should also be included. *See id.* at 3.

1273(b)(3), the Act withdraws all land within one-quarter mile of the bank of any designated river from federal mineral leasing. 16 U.S.C. § 1280(a)(iii). The Act calls for regulations to “provide safeguards against pollution of the river involved and unnecessary impairment of the scenery.” 16 U.S.C. § 1280. A river’s recreational value is in large part derived from its scenic beauty, and the sight of major industrial gas development activities would surely make a river less attractive for recreation and jeopardize its eligibility for recreational river designation under the Act. The DEIS does not explain how CSU stipulations would protect the characteristics of these rivers that make them eligible for recreational river designation. The eligible scenic and recreational river corridors should not be available for leasing and drilling, because those activities would impermissibly degrade and potentially destroy the outstanding values that make them eligible for designation, and there is no evidence that the proposed CSU stipulations can protect those values. See FSH 1909.12, Ch. 82.51(3) (For eligible or suitable wild, scenic, or recreational rivers, any mineral leases ~~are~~ subject to conditions necessary to protect the values of the river corridor in the event it is subsequently included in the National System.”).

Geologic Areas (4C1)

Management focus in these areas is on the protection and showcasing of unique and scenic geologic resources. Draft Plan at 4-50. Management activities are designed to meet or exceed a High Scenic Integrity Objective. Id. at 4-51. Timber harvest and new road construction are not allowed, but as in the eligible scenic and recreational river areas, this rule would necessarily be broken if gas leasing were permitted. Id. Oil and gas development in these areas would be especially threatening to sensitive geologic conditions associated with karst, including groundwater sources. Plan standards call for the protection of karst areas from detrimental human-caused hydrologic and habitat modification. Id. at 4-50. It is unclear how this would be accomplished if oil and gas leasing were permitted.

Special Biological Areas and Key Natural Heritage Community Areas (4D and 4D1)

Special Biological Areas (SBAs) “serve as core areas for conservation of the most significant and rarer elements of biological diversity identified to date on the Forest.” Draft Plan at 4-53. The goal is to protect and increase the number of species and communities that are threatened, endangered, sensitive, or locally rare. Id. Yet plan standards would still allow for oil and gas leasing in SBAs, including construction of roads, wells, and other infrastructure necessary for leasing activities. Id. at 4-56. The disturbance and even elimination of habitat caused by leasing activities would be inconsistent with the desired condition of SBAs, and the plan and DEIS do not explain how lease stipulations would prevent or mitigate adverse impacts on species and communities.

Further, the DEIS asserts that the needs of many rare species/communities will be addressed by protecting them in SBAs. DEIS at 3-77 and at App. H, Table H-1. The DEIS also relies on the Maple Flats SBA to protect the Eastern Tiger Salamander and on the Paddy Run “emphasis area” to protect the Wood Turtle. DEIS, App. G, at G-54-57. Yet these areas are proposed to be available for gas leasing for vertical drilling, which would, in all likelihood, adversely affect the species these areas ostensibly were created to protect. In order to justifiably rely on the SBAs and emphasis areas to meet legal requirements to maintain species viability and diversity, these areas must be unavailable for leasing and drilling.

The emphasis in Key Natural Heritage Community Areas is on “[h]igh quality examples of vegetation communities that . . . have distinctive characteristics needing management direction to maintain their character” *Id.* at 4-58. These existing old growth areas are managed to maintain the unusual character of the vegetation and protect against human-caused detrimental habitat change. The draft plan standards are identical to those issued for SBAs. Surface occupancy for drilling activities and associated forest clearing and access road construction obviously would destroy the old growth that is the very basis for the Key Natural Heritage Community designation and clearly would be totally incompatible with the goal of preserving that rare old growth habitat.

Highlands Scenic Byway and Scenic Corridors (7A1 and 7B)

The Highlands Scenic Byway is a 19.6-mile loop that “showcases the natural scenery, forest vegetation, cultural and geologic resources, and FS management of these resources that were the basis for the scenic byway designation.” Draft Plan at 4-69. Management activities are intended to maintain or improve biological communities and the scenic qualities of the area to make it attractive to visitors. *Id.* Scenic corridors are characterized by “high quality scenery in an environment conducive to a variety of recreational experiences.” *Id.* at 4-72. Any human alterations to the environment should “fit well with the character of the surrounding landscape. Other management activities are not evident to the average visitor.” *Id.* at 4-73. The presence of gas development activities in these areas would plainly conflict with the desired scenic conditions.

Concentrated Recreation Zones and Dispersed Recreation Areas (7D and 7E)

Both of these areas are intended to provide a variety of recreational opportunities. In Concentrated Recreation Zones, facilities are visually subordinate to the land and plan standards call for a landscape that is “natural appearing, pastoral, or historic with variations created by the recreational facilities.” Draft Plan at 4-84. As with the Scenic Corridors, oil and gas development would conflict with the preservation of scenic values in these areas. Dispersed Recreation Areas should also “showcase high quality scenery,” though the sights and sounds of cars and other visitors are to be expected. *Id.* at 4-86. In these areas, oil and gas leasing is not even limited by CSU stipulations, but is made available on standard lease terms. While cars and other visitors are to be expected in recreation areas, high volume truck traffic and industrial work zones obviously fall outside the expected, appropriate uses here. Finally, while scenic integrity might not be quite as high a priority in Dispersed Recreation Areas, there should still, at the very least, be lease stipulations to protect against compromising the recreational value of these areas.

Blue Ridge Parkway Visual Corridor (7F)

Views from the Blue Ridge Parkway should “appear natural and retain a High to Very High scenic integrity.” Draft Plan at 4-89. Road corridor improvements and interpretive facilities are allowed, but must blend in with the natural environment. *Id.* Forest management activities should not be evident to the average visitor. *Id.* It seems likely that access roads, well pads, pipelines and other infrastructure associated with natural gas extraction would inevitably be visible from the parkway, ruining the scenic value of the corridor.

Indiana Bat Secondary Cave Protection Areas (8E4B)

The draft plan calls for habitats in this prescription area to be managed to maintain, restore, and enhance Indiana Bat populations. Draft Plan at 4-98. There will be a 1.5-mile buffer around each primary cave protection area with “limited disturbance,” the definition of which is unclear. Id. at 4-99. Oil and gas leasing is allowed with a timing stipulation to protect bat habitat from September 15 to November 15. Id. at 4-104. Yet gas development that occurs outside of this window could still adversely modify bat habitat and the areas surrounding such habitat due to forest clearing and access road construction. Also, as the DEIS acknowledges, “[a]utumn swarming and spring staging typically occur in woodlands near the hibernacula,” when the timing stipulation would be inoperative. DEIS at 3-83.

Shenandoah Mountain Crest (8E7)

This area is managed to “protect and/or enhance habitat for the Cow Knob salamander and for other outstanding natural biological values.” Draft Plan at 4-105. The desired condition includes minimizing areas without vegetation except where desired to benefit certain species or ecological systems. Id. The standards also call for all management activities to meet a High Scenic Integrity Objective. Id. at 4-108. Given the threat of adverse habitat modification posed by forest clearing and construction activities associated with gas development, CSU stipulations seem inadequate to protect this area and the at-risk species it supports.

Pastoral Landscapes (7G)

Several of the Pastoral Landscape prescription areas are located along important rivers which should not be available for oil and gas leasing. For example, the pastoral areas alongside the South Fork of the Shenandoah River (on the east side of Massanutten Mountain), are proposed to be available for leasing. Gas development would likely be very damaging to this area, particularly to water quality, the multiple Forest Service recreation sites, and the high recreation use here, and would be totally inappropriate for this important riverside land. The pastoral areas along the Cowpasture River (the highest quality river of its size in the state of Virginia) and in the headwaters of the North Fork of the Shenandoah River (which supplies the town of Broadway with drinking water) should also be unavailable for leasing.

Riparian Corridors (11)

Riparian corridors should be managed to “retain, restore, and/or enhance the inherent ecological processes and functions of the associated aquatic, riparian, and upland components within the corridor.” Draft Plan at 4-109. While evidence of human activity may be present, human-caused modifications that cause environmental degradation are promptly rehabilitated or mitigated. Id. The corridor should be maintained as a travelway for aquatic and terrestrial organisms that maintains gene flow, keeping populations genetically viable. Id. at 4-110. In-stream connectivity is preserved, as is habitat suitable for riparian animal species and vegetative communities that are diverse and productive. Id. The landscape appearance is mostly natural, with limited exceptions for pastoral settings and recreation development. Id. The maintenance of high water quality, physical integrity of aquatic systems, and biological integrity are of utmost importance in these areas, and would all be threatened by gas leasing. The standards mandate that human-caused disturbances that cause erosion or sedimentation be rehabilitated or mitigated

to reduce or eliminate impacts. Id. at 4-112. But this directive to offset impacts after the area is disturbed hardly ensures the corridor's ecological integrity. CSU stipulations are intended to ~~protect~~ riparian resources and values," but there is no further explanation of how riparian resources could be adequately protected if these areas are leased for gas development. Id. at 4-115.

Semi-Primitive Areas and Other Large, Unfragmented Forest Blocks.

The semi-primitive areas inventoried by the GW and the matrix forest blocks identified by The Nature Conservancy should be unavailable for oil and gas leasing, or should be available only NSO. These unfragmented, core, interior forest areas are important for wildlife habitat, as well as remote recreation, and the lack of disturbance in these areas generally results in high-quality streams. The absence or infrequency of fragmentation, edge effects, ground disturbance, roads, and motorized use in these areas often results in low incidence and spread of non-native invasive species (NNIS) as well. All these values would be degraded by oil and gas development in these areas.

E. The Alternative "Horizontal Drilling Moratorium Stipulation," As Drafted, Would Not Adequately Protect GW National Forest Resources.

We want to comment briefly on the so-called ~~horizontal drilling moratorium stipulation~~" in Alternatives B, D and F. This draft moratorium stipulation is the same as the preliminary draft stipulation circulated in the fall of 2010. As we noted in our November 5, 2010 letter, this so-called ~~moratorium~~" is, in fact, no real moratorium, because it would not preserve the status quo on the GW.

This moratorium stipulation, as drafted, would provide no meaningful moratorium and study period, thus entirely defeating the purpose of a moratorium. Under this stipulation, the Forest Service would attempt to analyze the impacts of fracking now, in this EIS, rather than waiting to conduct an EIS for oil and gas leasing on the GW when the agency can consider the results of EPA's study of impacts on drinking water, other scientific studies, and additional information. The Forest Service would make the availability and consent decisions now and BLM could sell leases during the ~~moratorium~~" period. The moratorium merely would delay the processing of permits to drill on those leases. The stipulation makes no mention of the Forest Service retaining the authority to prohibit any gas drilling or to impose additional restrictions on the location, density, type or volume of drilling and/or hydraulic fracturing in leased areas. In fact, the stipulation implicitly suggests that horizontal drilling and high-volume fracking would be allowed in leased areas, stating that the purpose of the moratorium is to consider additional information when processing applications to drill horizontal wells with multi-stage fracking. DEIS, App. I, at I-1.

Then, on May 1, 2013, the moratorium automatically would end, regardless of the status of EPA's study, federal regulations, or needs for further environmental study of the impacts on the GW in light of the scientific and other information developed in the intervening two years.

Plainly this stipulation cannot ensure that the Forest Service has the information needed to adequately analyze and consider the effects of fracking on GW resources before making forest

plan and leasing decisions the agency may later regret. For these reasons, this approach would be unacceptable.

Similarly, the draft ~~horizontal drilling control stipulation~~” also leaves many questions unresolved and would be inadequate, for the reasons discussed in our November 2010 comments, p. 6.

F. The DEIS does not consider an adequate range of alternatives for oil and gas leasing availability for vertical drilling, does not consider reasonable alternatives limiting such availability, and the alternatives are skewed away from limiting availability without justification.

Under NEPA, an EIS must consider and discuss reasonable alternatives to the proposed action. 42 U.S.C. § 4332(2)(c)(iii); § 4332(2)(E). The discussion of alternatives is ~~the~~ heart of the environmental impact statement.” 40 C.F.R. § 1502.14. It should sharply define the issues and provide a ~~clear~~ basis for choice among options by the decisionmaker and the public.” *Id.* Agencies must ~~rigorously~~ explore and objectively evaluate all reasonable alternatives. . . .” § 1502.14(a). The EIS must ~~provide~~ full and fair discussion of significant environmental impacts and shall inform decisionmakers and the public of the reasonable alternatives which would avoid or minimize adverse impacts or enhance the quality of the human environment.” § 1502.1.

Accordingly, ~~a~~n agency must look at every reasonable alternative, with the range dictated by the nature and scope of the proposed action, and sufficient to permit a reasoned choice.” *Idaho Conservation League v. Mumma*, 956 F.2d 1508, 1520 (9th Cir. 1992) (internal citations omitted); *see also Headwaters, Inc. v. Bureau of Land Management*, 914 F.2d 1174, 1180-81 (9th Cir. 1990) (~~appropriate~~ range of alternatives” must be considered); *Methow Valley Citizens Council v. Regional Forester*, 833 F.2d 810, 816 (9th Cir. 1988), *rev'd on other grounds*, 490 U.S. 332 (1989) (consider reasonable range of alternatives framed by purposes of the project). The ~~existence~~ of a viable but unexamined alternative renders an environmental impact statement inadequate.” *Idaho Conservation League*, 956 F.2d at 1519 (internal citations omitted).

The NFMA regulations also require consideration of alternatives, providing that the IDT ~~shall~~ formulate a broad range of reasonable alternatives according to NEPA procedures. . . . Alternatives shall be distributed between the minimum resource potential and the maximum resource potential. . . .” 36 C.F.R. § 219.12(f)(1).

To satisfy these requirements, the Forest Service must consider a range of alternatives, and all reasonable alternatives, for addressing all significant planning issues.

The Forest Service (FS) must consider the full range of reasonable alternatives for federal oil and gas leasing availability for vertical drilling. While several alternatives would ban or place a moratorium on horizontal drilling, every alternative except one (Alt. C) would make over 600,000 acres available for vertical drilling. Most of the alternatives would allow drilling on somewhere between 600,000 and 700,000 acres of forest land, while the no-action alternative

(Alt. A) would leave 960,000 acres open for leasing. Realistically this provides only two alternatives for vertical drilling: no availability and wide availability.

Further, Alt. C is the sole ~~no~~ availability” alternative, yet, as discussed further below, we believe that the Forest Service viewed Alt. C as infeasible for other, unrelated reasons. Therefore, the ~~no~~ availability” option was not seriously considered. This is a reasonable alternative that should be seriously considered and analyzed.

The alternatives that were considered do not represent the full spectrum of reasonable alternatives for oil and gas leasing availability for vertical drilling on the forest. The alternatives are unjustifiably skewed away from environmental protection. All alternatives (except Alt. C) would allow drilling in areas that are environmentally sensitive or have high conservation priorities. With the exception of Alt. C, no alternative would make unavailable several management prescription areas and other special areas with objectives and desired conditions that are incompatible with gas drilling.

The Forest Service should consider reasonable alternatives that would significantly restrict leasing availability, in the interest of protecting the forest’s natural resources, particularly in areas that have high conservation priorities or other management purposes which would be compromised by gas development activities. As discussed in our above comments on oil and gas leasing availability, several management prescriptions would allow leasing in spite of the clear incompatibility of any type of gas drilling with the goals and desired conditions of those areas. These management prescriptions include Eligible Wild and Scenic River Areas (2C2 and 2C3), Geologic Areas (4C1), Special Biological Areas (4D), Key Natural Heritage Community Areas (4D1), Highlands Scenic Byway (7A1), Scenic Corridors (7B), Concentrated Recreation Zones (7D), Dispersed Recreation Areas (7E), Blue Ridge Parkway (7F), Indiana Bat Secondary Cave Protection Areas (8E4b), Shenandoah Mountain Crest (8E7), and Riparian Corridors (11). Leasing would be permitted in these areas under *any* alternative besides Alt. C. Moreover, these alternatives would allow drilling in drinking water watersheds and other priority watersheds. Given the Forest Service’s stated goals and desired conditions for these areas, including its emphasis on the importance of protecting water quality and aquatic habitat, it seems unreasonable to fail to consider alternatives that would make them completely unavailable for oil and gas leasing. Oil and gas leasing and drilling, particularly with surface occupancy, would also obviously be detrimental to the roadless areas (IRAs and PWAs). Making these areas unavailable would help further the agency’s goals of ecological sustainability and natural resource protection, and is a reasonable alternative which must be considered.

The Forest Service should also consider reasonable alternatives for the terms or conditions upon which it makes management prescriptions available for oil and gas leasing—every management prescription is available for oil and gas leasing on the same terms under each alternative. Even if the Forest Service is determined to make certain areas available for leasing, the agency should consider and discuss the option of imposing a Controlled Surface Use or No Surface Occupancy stipulation—most management prescriptions that allow leasing do so on standard lease terms for all alternatives. DEIS at 3-306, Table D2. The DEIS states that the determination of lands administratively available is based on the ~~benefit mix~~” designed for each management prescription, DEIS at 3-305, but this offers little clarity into how these determinations were made. The ~~benefit mix~~” determinations seem particularly irrational in prescriptions where oil and gas drilling likely would seriously harm the very resources those

prescriptions were designed to protect (e.g., Shenandoah Mtn. Crest (Cow Knob Salamander) Areas, Geologic Areas, Special Biological Areas, Key Natural Heritage Community Areas, etc.). The DEIS should have considered alternative benefit mixes for these areas that would protect these other important natural values.

II. WIND ENERGY²²

The Forest Service has significantly improved its approach to wind energy during the planning process, but we still have concerns about the proposed approach under Alternative G. The draft plan identifies 11 management prescription areas, totaling approximately 456,000 acres, as unsuitable for utility scale wind energy development (3-28). This leaves roughly 610,000 acres of the GWNF available for consideration of wind energy projects. Of this, 39,236 acres of ridge crest, is classified as in wind power classes 3 through 7, and thus might be seen as potentially viable for wind energy development. Summary of DEIS at S-14.

While we support the development of clean, renewable energy in Virginia, we have serious concerns about using our limited public national forest land for such projects. Wind energy installations would occupy entire ridgetops, *to the exclusion of other uses*. The wind energy maps for Virginia and neighboring states show that wind resources exist on private ridgetops throughout the Appalachians. In western Virginia, assuming that national parks and Wilderness areas are off-limits to wind development, more than half of the remaining areas with class 3+ wind potential are on private land. There is no significant need to allow this development on national forest land.

It has long been Forest Service policy to deny special uses on public national forest land that are not necessary and could be provided on private land. It is positive that the draft plan explicitly recognizes and incorporates this concept in proposed Forest Wide Standard 244 (Draft Plan at 4-24).

We are pleased to note that the draft plan identifies several prescription areas as ~~unsuitable~~ for wind energy development (Draft Plan at 3-28). We are also pleased to note that the preferred plan does not identify particular areas as ~~suitable~~ for wind energy development. However, we believe that more prescription areas should be designated as ~~unsuitable~~. In general all ridge crest areas that are currently unfragmented should be designated as ~~unsuitable~~ for wind energy development. As a general matter, larger-scale renewable development, such as industrial wind power arrays, should be concentrated and confined to areas that are already disturbed, and areas that are already degraded such as cleared forestlands with substantial roads. This criterion and justification for it was previously submitted in the joint letter dated December 29, 2008 (attached).

In particular, at least the following areas and prescriptions also should be designated as not suitable for wind energy development: all roadless areas (including inventoried roadless areas (IRAs) and the additional ~~potential wilderness areas~~ (PWAs); Virginia Mountain

²² Virginia ForestWatch is submitting separate comments on wind energy issues and disclaims the wind section of these comments.

Treasure areas; watersheds that are sources of drinking water to local communities (as identified by Wild Virginia); Shenandoah Mountain Trail, Great Eastern Trail and other significant trails, and a reasonable buffer along such trails; existing old growth forest; state- or federally-recognized cultural or historic sites; conservation sites recommended for SBA or special interest area designation by the VA Division of Natural Heritage; the foreground and mid-ground (up to four miles) of outstanding scenic resources, such as Reddish Knob and the High Knob fire tower in Rockingham County; and the following management prescription areas: Key Natural Heritage Communities, Highland Scenic Tour Byway, Scenic Corridors and Viewsheds, Concentrated and Dispersed Recreation areas, and Scenic and Recreational Rivers.

Companies already have expressed interest in two sites on the forest – one on Shenandoah Mountain, along the VA/WV line in Rockingham, Pendleton and Hardy counties, and another on Church Mountain and Great North Mountain, also on the VA/WV line in Rockingham, Shenandoah and Hardy counties. These sites illustrate the significant, adverse potential impacts of wind energy development on national forest lands.

Initial analysis of those sites has revealed that construction and operation of the turbines and related facilities, such as access roads, are likely to cause significant adverse impacts on multiple national forest resources, including birds, bats, plants and terrestrial animals (some of which are federally protected), trails, other recreation opportunities and high-quality scenery.

The U.S. Fish and Wildlife Service (“FWS”) reviewed the Shenandoah Mountain site and concluded the site is a “high risk site” due to likely take of protected species, including bats listed under the Endangered Species Act (ESA); migratory birds protected by the Migratory Bird Treaty Act (MBTA); and eagles protected by the Bald and Golden Eagle Protection Act. See, e.g., Letter from FWS to Ms. Wendy Tidhar, WEST, Inc., November 16, 2007 (“FWS Letter”) (attached).

The FWS summarized the results of a study of two existing wind facilities on Appalachian ridges similar to the Shenandoah Mountain site, which documented direct kills of birds and bats by turbines. See FWS Letter at 4-5. In addition, wind turbine operations may disturb bird and bat migration, breeding, roosting and other behaviors. FWS Letter at 3, 6-9. Other migratory songbirds and soaring birds, like hawks, which migrate along Appalachian Mountain ridgelines, are likely to be affected as well. FWS Letter at 6.

The construction of the turbines and access roads at the Shenandoah Mountain site may result in the loss of populations of an endangered plant, the Shale Barren Rock Cress. FWS Letter at 5-6. Although the FWS letter did not address the Cow Knob Salamander, we are concerned that turbines in the Shenandoah Crest special biological area could also harm the salamander, a Forest Service Locally Rare species managed under a Conservation Agreement between the GW and the FWS.

We believe similar impacts on bats, eagles and other birds could be expected at the wind energy site proposed on Church Mountain and Great North Mountain in the Lee District. See Letter from SELC to Acting Supervisor, GWNF, May 13, 2008 (attached).

In addition to impacts on plant and animal species, wind energy facilities in the GW could significantly impair important recreational and scenic resources on the forest, such as the use and enjoyment of ridgetop trails, remote backcountry experiences and high-elevation lookouts. We are particularly concerned about potential impacts to the Appalachian Trail, the Shenandoah Mountain Trail, the Great Eastern Trail (which is routed along Shenandoah and Great North Mountain) and other trails of national or regional significance.

These ridgetop areas also serve an important role in mitigating the effects of climate change, acting as refugia for species as they escape southern and lower elevation areas and providing connected corridors for adaptation and migration. National forests must be managed to provide the public benefits and values that cannot be guaranteed in the long run on private lands, such as habitat for threatened, endangered and sensitive species, other remote habitats, recreation, carbon sequestration, natural areas that enable climate adaptation, etc.

For these reasons, we supported the Forest Service's decision not to accept an application for a permit for meteorological towers on the proposed Church Mountain/Great North Mountain site.

Based on the predicted impacts of wind development on the sites discussed above, the proposals to identify the Shenandoah Mtn. Crest and Remote Backcountry areas as unsuitable for wind energy development and to apply a Remote Backcountry prescription to protect the ridge from Church Mountain along the state line up to and through Big Schloss seem very sound.

The impacts discussed above also would harm, and would be inconsistent with, the uses and values for which the special areas and prescriptions discussed above are being managed or are proposed to be managed (the additional special areas and prescriptions that we recommend be identified as unsuitable for wind energy development).

For these reasons, we believe that the entire GW should be presumed to be unsuitable for utility-scale wind energy generation sites. Any rare situations where a ridgetop is already cleared and served by sufficient roads and a wind turbine site would not impair national forest uses could still be assessed on a case-by-case basis using the criterion previously described. Further, of course any consideration of wind energy development on the GWNF must involve full environmental review, including but not limited to full National Environmental Policy Act review, including quantified data and analysis of costs and benefits, and compliance with the Endangered Species Act in consultation with the U.S. Fish and Wildlife Service.

Since private ridgetops are integrated with important national forest lands in some areas, the final plan should also make clear that the GW will ensure that wind projects on private lands do not adversely impact the key national forest resources discussed above and that the agency will be actively involved in the permitting process for projects that could affect national forest resources.

III. ROADLESS AND WILDERNESS AREAS

Background

The Forest Service has a statutory obligation under the NFMA to provide for wilderness, among other resources. 16 U.S.C. § 1604(g)(3)(A). The 1982 NFMA regulations direct that ~~roadless~~ areas within the National Forest System shall be evaluated and considered for recommendation as potential wilderness areas during the forest planning process. . . .” 36 C.F.R. § 219.17 (1999 ed.). Those regulations set forth a two-step process for, first, inventorying roadless areas and, second, evaluating them and considering whether to recommend them for wilderness designation. The regulations specify certain areas that must be evaluated and set forth certain factors the agency must consider in the evaluations. Id. The Forest Service Handbook (FSH) contains further direction for the process and criteria for the roadless area inventory and evaluations.²³

The management and protection of roadless areas also is a significant issue which must be fully considered under NEPA. Further, roadless areas have independent status and values as special areas in their own right, aside from the wilderness recommendation process, as indicated by (1) the public’s view of roadless areas; (2) the Forest Service’s special rules for roadless areas since the late-1990s; and (3) the findings of the Final Environmental Impact Statement (FEIS) for the 2001 Roadless Area Conservation Rule regarding the important values of roadless areas (see summary of those findings and regulatory definition of roadless area characteristics at 66 Fed. Reg. 3244-47, 3272-73 (Jan. 12, 2001)).

A note on terms: Consistent with the 1982 regulations’ use of the term ~~roadless~~ areas,” we will continue to use the term ~~roadless~~ areas” to refer to all the areas in the GW’s inventory of ~~potential wilderness areas~~” (PWAs). We will use the term ~~inventoried Roadless Areas~~” (IRAs) to refer to those areas identified in the FEIS for the 2001 Roadless Area Conservation Rule, 66 Fed. Reg. 3244 (Jan. 12, 2001). We will refer to those PWAs which were newly identified in this plan revision, i.e. those PWAs not previously inventoried as IRAs, as the newly identified roadless areas or as the new PWAs.

A. Inventoried Roadless Areas

The Summary for the DEIS and Draft Revised LRMP states that, in the proposed plan, all inventoried roadless areas (IRAs) would be managed to retain their roadless character by prohibiting timber harvest and road construction with limited exceptions. Summary at S-21. GW staff verbally confirmed that the Forest Service intends to manage all IRAs in the GW consistently with the management provisions of the 2001 Roadless Area Conservation Rule. 66 Fed. Reg. 3244-3273 (Jan. 12, 2001). For the reasons stated in our prior comments, this approach is necessary, we strongly support it, and we applaud the Forest Service for its

²³ The handbook used for years, FSH 1909.12, Ch.7 (1992), was revised in 2007 as part of the Bush administration’s attempt to overhaul forest planning, and a new chapter, FSH 1909.12, Ch.70 (2007) replaced the prior one. For the reasons stated in prior comments, we continue to object to the use of these 2007 directives rather than the prior handbook.

commitment to fully protecting roadless areas. See, e.g., SELC comments dated 8/8/2008 (pp. 6-8), 6/8/2009 (pp. 22-23), and 5/7/2010 (p.34).

However, an examination of the prescriptions actually assigned to IRAs in the draft plan shows they are not consistent with the 2001 Rule. The DEIS p.3-226 and Table C4.3 indicate that proposed Alternative G would allocate IRAs to six “remote character” prescriptions: Recommended Wilderness Study, Remote Backcountry, Special Biological Areas, Shenandoah Mtn. Crest-Cow Knob Salamander, Eligible Scenic River Corridors, and Eligible Recreational River Corridors.²⁴ As explained below, however, only Remote Backcountry and, of course, Recommended Wilderness are actually consistent with the 2001 Rule. Our GIS analysis of Alternative G shows that about 46,956 acres of IRA are allocated to the other four prescriptions which are not consistent with the Rule.

Surprisingly, our GIS analysis also revealed that Alternative G, as currently mapped, would allocate portions of many IRAs to prescriptions other than these six “remote character” prescriptions (see attached chart showing prescriptions proposed for each IRA under Alt. G). In most cases, these other prescriptions occupy small portions of the IRAs. Some are so small we wonder whether they are simply mapping errors. Others are logical, such as the AT Corridor and Utility Corridors. In a few cases, however, the acreage is more substantial and troubling, particularly in the case of the 244 acres allocated to Mosaics of Habitat. In total, about 2,331 acres of IRA are allocated to prescriptions other than the six “remote character” prescriptions, as shown in the table below:

Management Prescription	Acres Allocated to IRA, per SELC GIS analysis of Alt. G
Mosaics of Habitat	244
AT Corridor	1,442
Geologic Area	344
Pastoral Landscapes and Rangelands	72.5
Scenic Corridors and Viewsheds	131.5
Concentrated Recreation	1.2
Dispersed Recreation	32
Indiana Bat-Secondary	1.01
Utility Corridor	63

The Forest Service should consider whether these allocations were intentional or were mapping errors, correct any mapping errors, consider whether any intended allocations are appropriate for IRAs, and ensure that all IRAs are managed consistent with the 2001 Rule (many of these prescriptions will not be consistent with the Rule).

These oversights must be corrected in the final plan.

²⁴ DEIS Table C4.3 shows that Alt. G would allocate 1,300 acres of the Crawford Knob IRA to the Other prescriptions (the non-Remote prescriptions) (DEIS p.3-234). GW staff have verbally stated that this was an error; Alt. G has no IRA acreage in the Other prescriptions in this table. The map of Alt. G correctly shows the IRA portion of Crawford Knob in Remote Backcountry. This should be corrected in the FEIS.

If not corrected, the Plan will lead to project proposals that are inconsistent with the management provisions of the Rule. This would contravene the Forest Service's stated intent and this Administration's support for roadless area protection.²⁵ Allowing new road construction, road reconstruction, and timber harvest for purposes more broad than the Rule will erode or destroy these areas' roadless characteristics as defined by the Rule, 66 Fed. Reg. at 3272. Even the four "remote" prescriptions would make IRAs available for new federal oil and gas leasing with surface occupancy, allowing associated access road construction, which would be inconsistent with the Rule and would be especially damaging to roadless area characteristics.

Below is a summary of the Rule, a comparison of each of the four "remote" prescriptions with the Rule, and a proposal for correcting this problem in the final Plan.

2001 Roadless Rule – Regarding road construction, roads may not be constructed or reconstructed in IRAs, except in certain limited circumstances, including: if needed to protect public health and safety from an imminent threat of flood, fire, or other catastrophic event that, without intervention, would cause the loss of life or property; if needed pursuant to reserved or outstanding rights; if realignment of essential roads is needed to prevent irreparable resource damage that cannot be mitigated; if road reconstruction is needed to improve safety on a hazardous road; or if a road is needed in conjunction with an existing mineral lease as of January 12, 2001 [date Rule published in Federal Register] or for a new lease issued immediately upon expiration of an existing lease. 66 Fed. Reg. at 3272-73.

Regarding timber harvest, timber cannot be cut, sold or removed in IRAs, except under certain circumstances and is expected to be infrequent. 66 Fed. Reg. at 3273. The circumstances most relevant to the forest plan include: (1) The cutting, sale, or removal of generally small diameter timber will maintain or improve roadless area characteristics and is needed (i) To improve threatened, endangered, proposed, or sensitive [TEPS] species habitat or (ii) To maintain or restore the characteristics of ecosystem composition and structure, such as to reduce the risk of uncharacteristic wildfire effects, within the range of variability that would be expected to occur under natural disturbance regimes of the current climatic period; (2) Incidental to other management activities [e.g., trail construction or maintenance; hazard tree removal adjacent to classified roads for public health and safety reasons]; (3) Needed and appropriate for personal or administrative use [e.g., Christmas tree or personal firewood cutting]. Id.

Remote Backcountry – The roads and timber standards match the Rule. However, Standard 12D-001 regarding wildlife openings states: —Expansion of existing openings and/or creation of new openings may occur.” DEIS at 4-119. The Rule allows the cutting of trees only under certain circumstances, which do not include the general creation of wildlife openings to increase browse for game species. The preamble to the Rule clarifies this:

²⁵ In August 2009, the 2001 Rule was upheld and reinstated nationwide (except in the Tongass National Forest and in the state of Idaho) by the Ninth Circuit Court of Appeals, California ex rel. Lockyer v. USDA, 575 F.3d 999 (9th Cir. 2009). President Obama and this administration support the Rule and are challenging a conflicting Wyoming district court decision in the Tenth Circuit Court of Appeals. Presently, the Secretary of Agriculture reviews any actions which would be inconsistent with the Rule. This plan should protect roadless areas according to this administration's roadless area policy.

— . . tree cutting for wildlife habitat improvement could proceed if it is designed to maintain or help restore ecosystem composition or structure to conditions within the range of variability that would be expected to occur under natural disturbance regimes of the current climatic period.” 66 Fed. Reg. at 3257.

The standard allowing expanded and new wildlife openings should be read in conjunction with Standard 12D-006, which states that timber may be cut, sold or removed only under certain circumstances and lists the same circumstances as in the Rule. However, if there is any ambiguity, it could be clarified by adding the following underlined text to Standard 12D-001: Expansion of existing openings and/or creation of new openings may occur if permitted by Standard 12D-006.

Remote Backcountry areas would be available for oil and gas leasing with a no surface occupancy (NSO) stipulation, so no roads could be built to access new leases.

Special Biological Areas – The SBA prescription allows road construction and timber harvesting inconsistent with the Rule.

Regarding road construction, Standard 4D-019a would allow road construction ~~if~~ necessary to achieve the objectives of the specific SBA, or if entering the rare community to access an adjacent area results in less environmental impact” and allows road reconstruction ~~after~~ full consideration of effects on the rare community and associated species.” Draft Plan at 4-56. This type of road construction would go beyond the exceptions in the Rule, and would allow road reconstruction without limit.

Regarding mineral leases, as summarized above, the Rule allows road construction only on mineral leases existing when the rule was published or on new leases issued immediately upon expiration of a then-existing lease. SBAs, however, are proposed to be available for new federal oil and gas leasing with surface occupancy (controlled surface occupancy stipulation (CSU)) and to allow road construction to access mineral leases, without restricting road construction for new leases. Draft Plan at 4-56 (Standard 4D-014). This is a common problem among the SBA, Shenandoah Mtn. Crest, and Eligible Scenic and Recreational River Corridor prescriptions.

SBAs are unsuitable for timber production, but vegetation management with commercial timber sales would be allowed to ~~if~~ maintain, enhance or restore the diversity and complexity of native vegetation” and to ~~if~~ reduce insect and disease hazard.” Draft Plan at 4-55 (Standard 4D-006 and -007). Salvage of dead and dying trees would be allowed, if compatible with the biologic resource for which the SBA was established. Draft Plan at 4-55 (Standard 4D-007, 4D-007a). This would be more broad than the Rule’s limited exception for the infrequent removal of generally small diameter timber to improve TEPS species habitat or to maintain or restore ecosystem composition and structure, such as to reduce the risk of uncharacteristic wildfire. The Rule also does not allow general salvage logging.

Shenandoah Mountain Crest (Cow Knob Salamander Area) – This prescription would allow road reconstruction, road construction for new mineral leases, new wildlife openings for general purposes, and salvage logging inconsistent with the Rule.

The Shenandoah Mountain Crest prescription would prohibit new road construction, except to access valid existing rights and mineral leases, but permit reconstruction when “compatible with biological values.” Draft Plan at 4-108 (Standards 8E7-024 and 8E7-026). This exception for road reconstruction would be more broad than the Rule.

The Shenandoah Mountain Crest also would be available for new oil and gas leasing CSU and would allow road construction to access mineral leases, with no restriction on roads for new leases. Draft Plan at 4-108.

This prescription would allow new wildlife openings, as long as they would not negatively impact the Cow Knob Salamander. Draft Plan at 4-106 (Standard 8E7-002). This seems to allow the creation of new wildlife openings for general purposes, which would go beyond the circumstances allowed by the Rule. Salvage logging of dead or dying trees along open system roads also is allowed. Draft Plan at 4-107 (Standard 8E7-009).

Eligible Scenic River Corridors – The Scenic River Corridor prescription seems to allow road construction for new mineral leases, which would be inconsistent with the Rule. The timber harvest standards are not quite consistent with the Rule but are very close.

Regarding road construction, “[r]oad construction is not allowed, subject to valid existing rights.” Draft Plan at 4-38 (Standard 2C2-024). This is consistent with the Rule.

However, again Scenic River Corridors are available for oil and gas leasing CSU. Draft Plan at 4-38. Although the standards do not explicitly state that road construction is allowed to access new leases, we assume roads could be built to access new leases.

Regarding timber harvest, the Scenic River Corridors prescription is very close to being consistent with the Rule. Scenic River Corridors are unsuitable for timber production, and “[t]imber harvest is not allowed unless associated with reasonable access to valid existing rights.” Draft Plan at 4-37 (Standard 2C2-013). Trees may be cut and left for public safety and trail maintenance, which is consistent with the Rule. This prescription does allow vegetation management using mechanical treatments to “[m]aintain or enhance outstandingly remarkable values of the river corridor” and to “[e]nhance or rehabilitate scenery.” Draft Plan at 4-37 (Standard 2C2 -016 and -012). Depending on the nature and purpose of the activity, cutting trees for these purposes could go beyond the Rule.

Eligible Recreational River Corridors – The Recreational River Corridors, on the other hand, allow road construction and timber harvest inconsistent with the rule.

Road construction and reconstruction are allowed for purposes well beyond the rule, including to improve recreational access, improve soil and water, and salvage timber. Draft Plan at 4-42 (Standard 2C3-017).

These areas are available for oil and gas leasing CSU. Draft Plan at 4-41. As with the Scenic River Corridors, although the standards do not explicitly state that road construction is allowed to access new leases, we assume it would be.

These areas are unsuitable for timber production, but vegetation management with commercial timber harvest is allowed for a variety of purposes that go far beyond the Rule, including to: maintain or enhance outstandingly remarkable values of the river corridor; enhance or rehabilitate scenery; enhance both game and non-game wildlife habitat; maintain rare communities and species dependent on disturbance; and to maintain, enhance, or restore the diversity and complexity of native vegetation. Draft Plan at 4-40-41 (Standards 2C3-006 and 2C3-008). Salvage harvest also is allowed. Draft Plan at 4-40 (Standard 2C3-005).

Requested changes to draft plan – In order to bring the management of IRAs into consistency with the management provisions of the 2001 Rule, we request the following changes to the draft plan:

- Oil and gas leasing – All the remote prescriptions discussed above should be unavailable for federal oil and gas leasing. This would ensure their natural values would be fully protected from the risk of contamination from directional or horizontal drilling with hydraulic fracturing, such as potential risks to groundwater, springs and spring-fed streams, karst and cave formations, etc. At a minimum, if available, IRAs must be available only NSO, in order to be consistent with the 2001 Roadless Rule by preventing new road construction to access new mineral leases.
- Timber and Road Construction – To resolve the inconsistencies with timber and road standards discussed above, the GW should adopt a forest-wide standard for IRAs. Adopting an overlay for IRAs would provide clarity and ensure IRAs will be managed as the Forest Service intends, regardless of the final prescription allocations and the final language of the prescriptions.

The DEIS even suggests that the Forest Service intended to have some sort of overlay direction for IRAs, stating that, under Alt. G, IRAs not recommended for wilderness study would have certain management direction and listing standards consistent with the 2001 Rule. DEIS at 3-247. It is essential for the GW staff to recognize, however, that this intention and this language has not yet been carried through in the actual draft plan (or not that we can find).

As with other such forest-wide overlays, the agency must ensure that land managers consult all overlays to ensure consistency during plan implementation.

The Draft Plan Chapter 3-Strategy already has an objective for IRAs to “Maintain the roadless character. . .” Draft Plan at 3-24. A forest-wide standard for IRAs should be added to Chapter 4-Design Criteria. This standard could apply the same timber and road language used in the Remote Backcountry prescription to all IRAs. For example, a set of forest-wide standards for IRAs could provide as follows:

Inventoried Roadless Areas

Timber Management

FW-X: Inventoried Roadless Areas are unsuitable for timber production. Timber harvest is generally not allowed, subject to valid existing rights.

FW-X: In Inventoried Roadless Areas, timber may not be cut, sold, or removed, except as provided in paragraph (a).

(a) Timber may be cut, sold, or removed if one of the following circumstances exists. The cutting, sale, or removal of timber in these areas is expected to be infrequent.

(1) The cutting, sale, or removal of generally small diameter timber is needed for one of the following purposes and will maintain or improve one or more of the remote area characteristics;

(i) To improve threatened, endangered, proposed, or sensitive species habitat; or

(ii) To maintain or restore the characteristics of ecosystem composition and structure, such as to reduce the risk of uncharacteristic wildfire effects, within the range of variability that would be expected to occur under natural disturbance regimes of the current climatic period;

(2) The cutting, sale, or removal of timber is incidental to the implementation of a management activity not otherwise prohibited;
or

(3) The cutting, sale, or removal of timber is needed and appropriate for personal or administrative use.²⁶

Roads

FW-X: In Inventoried Roadless Areas, roads may not be constructed or reconstructed unless:

(1) A road is needed to protect public health and safety in cases of an imminent threat of flood, fire, or other catastrophic event that, without intervention, would cause the loss of life or property;

(2) A road is needed to conduct a response action under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) or to conduct a natural resource restoration action under CERCLA, Section 311 of the Clean Water Act, or the Oil Pollution Act;

(3) A road is needed pursuant to reserved or outstanding rights, or as provided for by statute or treaty;

(4) Road realignment is needed to prevent irreparable resource damage that arises from the design, location, use, or deterioration

²⁶ This leaves aside the issue of whether subsections (2) and (3) would be permitted under NFMA in areas unsuitable for timber production.

of a system road that cannot be mitigated by road maintenance. Road realignment may occur under this paragraph only if the road is deemed essential for public or private access, natural resource management, or public health and safety;

(5) Road reconstruction is needed to implement a road safety improvement project on a system road determined to be hazardous on the basis of accident experience or accident potential on that road;

(6) The Secretary of Agriculture determines that a Federal Aid Highway project, authorized pursuant to Title 23 of the United States Code, is in the public interest or is consistent with the purposes for which the land was reserved or acquired and no other reasonable and prudent alternative exists; or

(7) A road is needed in conjunction with the continuation, extension, or renewal of a mineral lease on lands that are under lease or for a new lease issued immediately upon expiration of an existing lease. Such road construction or reconstruction must be conducted in a manner that minimizes effects on surface resources, prevents unnecessary or unreasonable surface disturbance, and complies with all applicable lease requirements, land and resource management plan direction, regulations, and laws. Roads constructed or reconstructed pursuant to this paragraph must be obliterated when no longer needed for the purposes of the lease or upon termination or expiration of the lease, whichever is sooner.

B. Newly Identified Roadless Areas

During plan revision, the GW identified about 144,500 acres that meet roadless area or ~~potential wilderness area~~ "PWA) criteria, but were not previously Inventoried Roadless Areas (IRAs).²⁷ The revised plan should clarify the management intended for these new PWAs and should better protect them.

(1) A standard should be added to the final plan to ensure that management of new PWAs will not ruin their PWA (roadless) status.

The DEIS states:

~~Alternative G~~ includes an objective to assure that management activities in Potential Wilderness Areas (including areas allocated to these ~~Other Resource~~ management prescription areas) will only be done if they will not affect the Potential Wilderness Area to the point that it would no longer meet the definition of a Potential Wilderness Area." DEIS at 3-247.

²⁷ Qualifying areas were excluded from the inventory of potential wilderness areas (roadless areas), as discussed at length in SELC comments of May 2010, June 2009, and August 2008.

However, the draft revised forest plan does not contain such an objective for PWAs (or none that we could find). The final revised plan should include a forest-wide standard (not an objective) making this commitment. Such a standard might provide: —~~A~~y management activities in any Potential Wilderness Area may not affect the Potential Wilderness Area to the point that it would no longer meet the definition of a Potential Wilderness Area.”

If such a standard is not included, then the plan could result in the destruction of roadless areas, so the DEIS would need to be revised to consider and publicly disclose the significant effects of adversely affecting roadless characteristics and destroying roadless areas.

(2) The revised plan should place certain PWA areas in the Remote Backcountry prescription, as requested by the GW Stakeholders Group:

a) Signal Knob, portions west of the Northern Massanutten Inventoried Roadless Area, and portions of eastern Duncan Knob should be designated as Remote Backcountry (or similar management area);

b) A 908-acre portion of Crawford Knob east of the Inventoried Roadless Area should be designated as Remote Backcountry;

c) A 4,923-acre portion of Archer Knob west of the ridge should be designated as Remote Backcountry; and

d) A 2,862-acre portion of Kelly Mountain east of the Inventoried Roadless Area should be designated as Remote Backcountry.

(3) New permanent road construction should not be allowed in the new PWAs.

This, too, is a request of the GW Stakeholders Group, which recommended that, in any new PWAs allocated to prescriptions which normally allow road construction, road construction be limited to temporary roads.

The final revised plan should adopt this recommendation. This should be done by adding a forest-wide standard prohibiting permanent road construction in all PWAs. Such a standard could provide: —~~D~~ not construct, or add to the system, new permanent roads in Potential Wilderness Areas.”

C. Evaluations of Roadless Areas (PWAs) for Wilderness Recommendation

In addition to the NFMA’s direction to provide for wilderness, the inventory, evaluation and recommendation of roadless areas for wilderness designation furthers important goals for the expansion of the National Wilderness Preservation System, as set forth in The Wilderness Act of 1964, the Eastern Wilderness Areas Act of 1975, and the Endangered American Wilderness Act of 1978.

In particular, the Eastern Wilderness Areas Act featured a Congressional finding that ~~in~~ the more populous eastern half of the United States there is an urgent need to identify, study, designate, and preserve areas for addition to the National Wilderness Preservation System” and, therefore, ~~that~~ it is in the national interest that these [areas designated in the Act] and similar areas in the eastern half of the United States be promptly designated as wilderness . . . in order to preserve such areas as an enduring resource of wilderness . . . for the benefit of all of the American people of present and future generations.” Pub. L. No. 93-633, § 2, 88 Stat. 2096, 2096 (1975) (emphasis added). Congress subsequently made similar findings in the Endangered American Wilderness Act of 1978, when it found that many areas of undeveloped national forest land meet all criteria under The Wilderness Act for suitability as wilderness, but are not adequately protected, lack statutory designation, are immediately threatened by inconsistent development, and are not being adequately protected or fully studied for wilderness suitability by the Forest Service. Endangered American Wilderness Act of 1978, Pub. L. No. 95-237 (1978). Unfortunately, the Forest Service still has not adequately studied these areas in the GWNF.

1. The Wilderness Evaluations Remain Inadequate and Fundamentally Flawed.

In our May 2010 comments, we pointed out that the draft wilderness evaluations contained a number of inadequacies and fundamental, fatal flaws and we discussed them at length. We previously had commented, also at length, on the proper criteria and analysis for wilderness evaluations, provided information relevant to the evaluations, and requested that particular areas (with specific boundaries) be evaluated. See, e.g., Comments of SELC, SAFC and TWS, May 7, 2010; Comments of SELC, SAFC, VWC, Virginia ForestWatch, Sierra Club and TWS, Jun. 8, 2009; Comments of SELC, TWS, SAFC, VWC and Wild Virginia, Aug. 8, 2008.

Unfortunately, the draft wilderness evaluations in the DEIS Appendix C and Table C-1 are virtually unchanged from the preliminary drafts released last spring, and the problems we pointed out have not been corrected. Since little, if anything, has changed since our May 2010 comments, it would be unnecessarily repetitive to restate all of our prior comments on this issue, although a few key concerns are summarized below.

(a) There is no rationale for the proposed wilderness recommendations, therefore, the evaluations are inadequate and the recommendations are arbitrary and capricious. – The DEIS Appendix C evaluated 37 areas containing a total of 378,229 acres. The GW has by far the most roadless/PWA acreage of any national forest east of the Mississippi River, yet currently only 4% of the GW is designated wilderness. The importance of the GW’s roadless areas for recreation, fish and wildlife habitat, other ecological and biological values, clean water, local drinking water supply, etc. is well documented, as are the need and demand for wilderness and backcountry-type recreation. See our May 2010 NOI Comments, pp. 47-48 and references cited therein. The Forest Service has an extraordinary opportunity on the GW to provide a large supply of high-quality wilderness areas by recommending the designation of a number of new areas.

Yet, despite the Congressional and regulatory direction cited above, and the opportunities, need and demand for wilderness, from this enormous pool of areas preferred Alt. G would recommend only 20,400 acres for wilderness designation, including only one new

stand-alone area (Little River) and modest additions to three existing areas (Rich Hole, St. Mary's, and Ramsey's Draft). Alt. G would recommend merely 5.4% of the acreage evaluated.

The proposal to recommend only these few areas and this small acreage, and not more, is not properly justified and supported. The DEIS and its Appendix C do not provide a rationale or basis for the choices between areas – the choices to recommend these four areas and not to recommend other areas. The lack of explanation will render the evaluations inadequate and arbitrary and capricious, if not corrected. Further, this tiny wilderness recommendation runs contrary to the guiding principles and the information before the Forest Service, as summarized above, discussed in the comments previously submitted by SELC and many other organizations and citizens, and found in the DEIS and App. C. The Forest Service must provide the rationales behind its recommendations. The failure to do so would render the decisions on wilderness recommendations and on plan allocations for the PWAs arbitrary and capricious. See Motor Vehicle Mfrs. Ass'n v. State Farm Mut. Auto. Ins. Co., 463 U.S. 29, 43 (U.S. 1983) (agency must examine the relevant data and articulate a satisfactory explanation for its action, including a rational connection between the facts found and the choice made).

(b) Bias against wilderness – The evaluations are biased against recommending wilderness designation, because they highlight and emphasize any potentially negative factor, while positive factors often are ignored or diminished.

(c) Evaluations do not meet minimum requirements – The 1982 NFMA regulations require that the evaluations consider certain factors. 36 C.F.R § 219.17(a)(2). The additional direction in the FSH instructs the agency to evaluate capability, availability and need for each area, provides factors and examples of those characteristics that should be considered, and outlines “the minimum required” content for the evaluations. FSH 1909.12, Ch. 74; see also Ch. 72. Appendix C and its tables do not contain even this minimum required content, for the reasons discussed in our May 2010 NOI comments, pp.49-54.

(d) The evaluations are based on improper factors, such as “sights and sounds” outside the areas. – The evaluations use and rely on factors which are more stringent than those set forth in The Wilderness Act, the NFMA regulations, and the FSH. The evaluations also rely on factors which misinterpret and/or misapply those laws, regulations and policies. For further discussion, see our May 2010 NOI comments, pp.49-54.

Perhaps the worst of these improper factors are those related to the “sights and sounds” of non-wilderness activities occurring outside the roadless area. The related factor of the roadless areas’ opportunities for “solitude” is also overemphasized and used improperly. The narrative discussion in Appendix C states that “only the characteristics that most contributed to each PWA’s meeting, or to not meeting, the capability for Wilderness are given in this report.” App. C at 13. It is telling, therefore, that the discussions focus on factors related to “solitude” and “sights and sounds.” The evaluations repeatedly emphasize and treat negatively:

- Views of adjacent private or non-wilderness national forest lands. The mere presence of external views (views of other lands from roadless areas) are emphasized and treated negatively, regardless of whether there are any modern

developments or noises on those lands, presumably because of the speculative potential for future sights and sounds from future activities there.

- Views of non-wilderness activities on adjacent lands, such as motorized recreation, farms, houses, and towns.
- The shape and configuration of the roadless area. Long and narrow areas, areas with shapes or configurations the FS viewed as odd, and/or irregular boundaries.
- The extent and/or shape of boundary adjoining private land.

These should not be determinative factors in the evaluations, based on the clear legislative history illustrating Congress' intent for The Wilderness Act and its definition of wilderness. As discussed in prior comments and supporting documents, Congress does not consider "sights and sounds" from outside wilderness areas and does not intend the Forest Service to consider them when inventorying and evaluating potential wilderness areas to recommend to Congress. See our Aug. 2008 comments, pp.15-16; our June 2009 comments, pp.10-13; our May 2010 NOI comments, pp. 40-45; Doug Scott, Campaign for America's Wilderness, *Briefing Paper: Solitude, "Sights and Sounds," and The Wilderness Act: What Can Qualify for Designation as Wilderness?* (2003); and The Wilderness Society (TWS), *The Wilderness Act Handbook*, 5th ed., at 23-26 (2004) (both attached).

First, The Wilderness Act does not mention "sights and sounds." Although the Act defines wilderness, in part, as "an area of undeveloped Federal land retaining its primeval character and influence," 16 U.S.C. § 1131(c), the Act's legislative history and subsequent statements made on the Congressional record by legislators involved in the Act's passage show that Congress did not intend agencies to consider sights and sounds from outside areas when deciding whether to recommend them for designation. See generally Scott at 10-14.

As explained in Scott's paper, an earlier version of the bill that later became The Wilderness Act contained the different phrase "primeval *environment* and influence." Senator James Murray (D-MT), the lead sponsor of the bill, substituted the word "character" for "environment," explaining that "[t]he word 'character' is substituted because 'environment' might be taken to mean the surroundings of the wilderness rather than the wilderness entity."²⁸ As the lead sponsor of the bill and the chairman of the committee handling the bill, Senator Murray's stated intent is definitive legislative history. Scott at 11.

As Scott's paper discussed, after the Act was adopted, some agencies misapplied this provision of the Wilderness Act to assert that outside sights and sounds disqualified lands from wilderness designation. Scott at 11-12. In response, at a Senate hearing, Senator Frank Church (D-ID), who had been the floor manager when the Senate debated and passed the Act, pointed to Sen. Murray's explanation:

"The Wilderness Act calls for the designation of suitable wild lands which are of wilderness 'character.'" This term "wilderness character" applies only to the immediate land involved itself, not to influences upon it from outside areas. This point was specified

²⁸ Scott at 11 (quoting S. 3809, 86th Congress).

precisely in an early amendment to the wilderness bill. * * * What [Sen. Murray's 1960] amendment made clear is that the suitability of each acre of possible wilderness is to be ascertained on the basis of that wilderness entity, not on the basis of insubstantial outside influences. Sights and sounds from outside the boundary do not invalidate a wilderness designation or make threshold exclusions necessary, as a matter of law."²⁹

Although the intent of Congress was clear, the agency persisted in using the improper sights and sounds criteria. In 1978, the Endangered American Wilderness Act implicitly rejected the use of "sights and sounds" by designating a number of Wilderness areas near major cities. See Pub. L. No. 95-237, 92 Stat. 40 (1978); see generally Scott at 12. The use of "sights and sounds" explicitly was discredited during committee hearings on the bill.

During one hearing, Senator Pete Domenici (R-NM) asked the Administration's witness, then-Assistant Secretary of Agriculture Dr. M. Rupert Cutler, whether he believed a wilderness may be located "approximate to a heavily developed urbanized area if the geography within the wilderness is wilderness but the surrounding areas are anything but that."³⁰ Cutler responded:

"... there is no reference in the Wilderness Act to criteria for wilderness that includes such things as the sights, sounds, and smells of civilization which is a set of criteria which has been misapplied to wilderness areas."³¹

At the same time, the House Committee on Interior and Insular Affairs, chaired by Rep. Udall, who was involved in the passage of The Wilderness Act, reported the Endangered American Wilderness Act with a reprimand for the use of "sights and sounds":

"Testimony presented during nine days of Subcommittee hearings on H.R. 3454 [the Endangered American Wilderness Act], repeated allegations that the Forest Service has been unduly restrictive in setting wilderness evaluation criteria which relied solely on the most stringent possible interpretation of the definition section (section 2(c)) of the Wilderness Act.

"Further, many areas, including the Lone Peak [U.T.] and Sandia Mountain [N.M.] proposals in H.R. 3454 [the Endangered American Wilderness Act which designated those areas and others], received lower wilderness quality ratings because the Forest Service implemented a "sights and sounds" doctrine that subtracted points in areas where the sights and sounds of nearby cities (often many miles away) could be perceived from anywhere within the area. This

²⁹ Scott at 11-12, quoting *Preservation of Wilderness Areas*, Hearings before the Subcommittee on Public Lands, Committee on Interior and Insular Affairs, U.S. Senate, on S. 2453 and Related Wilderness Bills, May 5, 1972, page 59.

³⁰ *Endangered American Wilderness Act of 1977*, Hearings before the Subcommittee on Parks and Recreation of the Committee on Energy and Natural Resources, United States Senate on S. 1180, September 19 & 20, 1977, Publication No. 95-88, Committee on Energy and Natural Resources, page 35 (attached).

³¹ *Id.* at 41.

eliminated many areas near population centers and has denied a potential nearby high-quality wilderness experience to many metropolitan residents, and is inconsistent with Congress' goal of creating parks and locating wilderness areas near population centers. The committee is therefore in emphatic support of the Administration's decision to immediately discontinue this "sights and sounds" doctrine."

The Wilderness Society, Wilderness Act Handbook at 26 (2004) (quoting H.R. Rep. No. 95-540, at 5 (1977)) (emphasis added).

Congress has designated many wilderness areas near cities or in view of them, and often has placed wilderness boundaries right up to roads and other human development. See Scott at 9-10, 12-13.

Clearly, sights and sounds from activities outside potential wilderness areas should not be considered and certainly should not be treated as negative factors or as reasons not to recommend areas for wilderness designation. Yet this misinterpretation and misapplication of The Wilderness Act continues. The GW evaluations repeatedly emphasize the presence of outside sights and sounds or even the potential for future outside sights and sounds.

The improper consideration of sights and sounds seems to have particularly affected the following evaluations:

- Crawford Knob – “The area is essentially a mountain offering many external views to non-Wilderness Forest Service lands and to private lands. . .” and “There are views to Staunton and a powerline on the north side.” App. C at 15.
- High Knob – “The area consists of mountainsides with views to external areas. . .” App. C at 17.
- Oak Knob-Hone Quarry Ridge (this area was a good candidate for National Scenic Area designation, although not Wilderness designation) – “There are reserved sub-surface mineral rights on 617 acres near the east boundary. It can be excluded; however it is on a ridgetop and any exploration or production activities may be visible from within the PWA.” App. C at 20. Note that this is referring to speculative future (not current) activities that would be outside the area in question.
- Oliver Mountain – “This area has a semi-primitive core of about 9,200 acres, most of that situated to the west away from Lake Moomaw. While that is positive for escaping the sounds of motorized ski boats and personal watercraft, this portion of the PWA is surrounded by private land with many views to the exterior rather than to the interior.” App. C at 21.
- Beards Mountain – “While this is a moderately large area, the shape and location are poor for providing Wilderness qualities. The area is narrow and located along a mountainside with views to exterior private lands, many with developments such as cabins, camps, houses and farms.” App. C at 14.
- Other affected areas include Dolly Ann, Duncan Knob, Galford Gap, Jerkemtight, Little Mare Mountain, Massanutten North, and Potts Mountain.

Essentially, these areas were penalized for being high mountains with expansive scenic views. Not only should outside sights not be considered, but it was particularly inappropriate to penalize these areas for having views of adjacent national forest land, forested private land, or looking down on farms, cabins, houses, or towns in the scenic valleys below.

Regarding opportunities for solitude, the evaluations overemphasize the need for solitude, incorrectly treating it as a requirement. They also overly rely on the Recreation Opportunity Spectrum (ROS) semi-primitive areas to quantify solitude. The use of the ROS for this purpose is problematic. See our prior comments and see Scott at 7. Some areas were treated negatively because of the size and/or shape of their semi-primitive cores.

The Wilderness Act defines wilderness, in part, as areas which have “outstanding opportunities for solitude or a primitive and unconfined type of recreation.” 16 U.S.C. § 1131(c)(2) (emphasis added). Yet the evaluations focus on whether areas possess what the Forest Service deems adequate opportunities for solitude, without fully considering recreation opportunities and other wilderness values, an arbitrary and capricious interpretation and application of The Wilderness Act. See, e.g., The Wilderness Act, 16 U.S.C. § 1131(a) (policy) and (c) (definition); § 1133(b) (direction to land management agencies); see generally Scott at 2-5; TWS, Wilderness Act Handbook at 23-26. This primary focus on solitude continues to be a major, systemic flaw in the potential wilderness area evaluations, as well as in the roadless/PWA inventories.

Clearly, areas do not have to offer solitude, but rather may offer solitude or recreation opportunities. There are many forms of unconfined recreation, for example, hiking, backpacking, camping, horseback riding, fishing, hunting, canoeing, kayaking, birdwatching, and generally enjoying nature (see FSH 1909.12, Ch.72.1(3)) which should be considered in the evaluations. Wilderness values also include scenery, ruggedness, naturalness, biological and geological features, and opportunities for physical and mental challenge. The Act defines wilderness much more broadly, and sets forth many more wilderness values, than solitude. Recreation and other values have not yet been fully considered in the inventory and evaluations; even when the word “recreation” is used in those documents, it is used in the context of solitude.

The Forest Service should cease to rely on these improper factors or to use certain factors improperly. Evaluations and wilderness recommendations (and the decision not to recommend certain areas) based on these factors misinterpret and misapply The Wilderness Act, are inadequate, and are arbitrary and capricious. See Motor Vehicle Mfrs. Ass'n, 463 U.S. at 43 (agency decision will be arbitrary and capricious if agency did not examine relevant data and factors or relied on improper factors).

(e) The evaluations do not consider or do not fully consider all relevant, proper factors – The evaluations do not identify and consider all relevant, proper factors set forth by The Wilderness Act, the NFMA regulations, and the FSH. For further discussion, see our May 2010 NOI comments, pp.49-54.

As discussed above, the evaluations ignore or gloss over these areas’ many wilderness values other than solitude, such as: the overarching purposes of protecting and preserving wilderness character, to secure an enduring resource of wilderness; recreation; ecological,

geological, or other features of scientific, educational, scenic, or historical value; conservation; physical and mental challenge; inspiration; and watershed preservation and wildlife habitat protection. See The Wilderness Act, 16 U.S.C. § 1131(a), (c)(2), (4), and § 1133(b); Endangered American Wilderness Act of 1978, Pub. L. 95-237, sec. 1(b); Eastern Wilderness Areas Act of 1975, Pub. L. 93-622, sec. 2(b).

Regarding recreation, Appendix C generally does not adequately discuss recreation opportunities provided by these areas, such as those listed for consideration in the FSH – hiking, camping, backpacking, horseback riding, fishing, hunting, boating (e.g., kayaking), cross-country skiing, and enjoying nature. FSH 1909.12, 72.1(3). The occasional mention of recreation usually is presented in a negative light – penalizing areas because they contain popular trails, without pointing out the positive aspects of the recreation opportunities offered (e.g., Big Schloss, Crawford Knob/Mtn., Duncan Knob, Elliott Knob, High Knob, and Three Sisters). It was particularly inappropriate to penalize Three Sisters for containing a portion of The Appalachian Trail.

Regarding special uses and values other than recreation, the FSH instructs the Forest Service to determine each area’s ability to provide these other values and to identify and describe their contribution to wilderness character. FSH 1909.12, Ch.72.1(4). In addition to the above-listed values set forth in wilderness legislation, the FSH provides the examples of “unique fish and wildlife species, unique plants or plant communities, connectivity, potential or existing research natural areas, outstanding landscape features, and significant cultural resource sites.” Id. Again, these generally are not discussed in the evaluations, although some are noted in the tables.

The NFMA regulation requires the consideration of anticipated changes in plant and animal species diversity, 36 C.F.R. § 219.18(a)(2)(v). The evaluations, however, only briefly mention species and, again, focus on the potentially negative factors, citing species which benefit or might benefit from active management, without recognizing that wilderness also would benefit those and/or other species (e.g., wood turtle in Big Schloss, where evaluation claims wood turtle management might be needed, but turtle also probably would benefit from protection from motorized uses).

The GW should consider all of these recreation and other special values in the evaluations. The failure to consider or to fully consider these obviously relevant factors would violate the Forest Service’s own regulation and Handbook, render the evaluations inadequate, and render the recommendations (and the decision not to recommend certain areas) arbitrary and capricious.

(f) The analysis of availability was skewed – The NFMA regulations direct the Forest Service to consider the values of the area as wilderness and the values forgone by wilderness designation. 36 C.F.R. § 219.17(a)(2). As a starting point, “[a]ll National Forest System (NFS) lands determined to meet the wilderness capability requirements are considered potentially available for wilderness designation. However, the determination of availability is conditioned by the value of and need for the wilderness resource compared to the value and need for other resources.” FSH 1909.12, Ch.72.2. In assessing need, the Congressional finding of an urgent

need to designate wilderness in the East should be considered. Since that finding in the Eastern Wilderness Areas Act of 1975, only about 40,000 acres of wilderness in the GW has been designated, about 4% of this 1.06 million-acre national forest.

The GW's availability analysis was skewed by the above-described failure to fully identify and document all the positive wilderness values and need for wilderness. Therefore, it was impossible for the availability analysis adequately to compare those values to the ones that would be forgone, as FSH Ch.72.2 requires. While the benefits of wilderness were not well documented, all non-wilderness uses that would be forgone were thoroughly documented, making it almost impossible for any area ever to meet the availability test, that is, ever to garner enough wilderness "pros" to outweigh every "con" than was marshaled.

Moreover, where the Virginia Wilderness Committee (VWC) proposed modified, feasible boundaries that would avoid user conflicts, the evaluations usually did not say so and continued to treat the other use as one that would be foregone. Appendix C also did not evaluate or discuss the relative importance of these incompatible uses or put them in context.

(g) The evaluations did not consider boundary adjustments proposed by wilderness advocates and user groups – The evaluations should consider how boundaries affect an area's manageability as wilderness and whether boundary adjustments would improve manageability, enhance wilderness characteristics or separate incompatible activities. FSH 1909.12, Ch.72.1(5), Ch.72.5, and Ch.74(2)(f). As discussed in our May 2010 comments, pp. 52-55, VWC and others proposed several areas with boundaries adjusted to avoid conflicts. In many cases, those proposals would obviate concerns pointed out in the evaluations. Yet the areas as modified still have not been evaluated. The GW should evaluate and consider these areas as modified.

2. Two Inventoried Roadless Areas (Southern Massanutten and The Friar) Were Not Evaluated, Although the 1982 NFMA Regulations Require Their Evaluation.

In our May 2010 comments on the NOI, we pointed out that two IRAs, Southern Massanutten and The Friar, were excluded from the draft PWA Inventory and Evaluations. These areas are still excluded. Under the 1982 NFMA regulations, they must be added to the inventory and evaluated.

It is important and positive that these IRAs have not been forgotten entirely and are listed in most tables showing IRAs and PWAs (e.g., DEIS, Tables C4.2 and C4.3). However, these areas were not included in the actual PWA inventory (see, e.g., DEIS, Table C4.1; DEIS, App. C, Table 1) and were not evaluated in Appendix C.

The 1982 NFMA regulations state that ~~the~~ following areas shall be subject to evaluation (1) Roadless areas including those previously inventoried in the second roadless area review and evaluation (RARE II), in a unit plan, or in a forest plan, which remain essentially roadless and undeveloped. . . ." 36 C.F.R. § 219.17(a)(1)(i) (emphasis added). Both Southern Massanutten and The Friar were ~~previously inventoried~~ in the 1993 GW plan. See 1993 FEIS for Revised LRMP, App. C. Southern Massanutten also was inventoried in RARE II. As far as we know, no disqualifying development has occurred in these areas since the 1993 inventory. Therefore,

these two areas must be evaluated. Keeping these areas in the inventory ensures that they are properly considered at appropriate points in forest- and project- level planning and that over time agency staff don't forget them or become confused about their status.

We also want to note that Appendix C, Table 4, still contains errors. That table crosswalks PWAs with IRAs. First, it erroneously displays the Duncan Knob PWA as part of the Southern Massanutten IRA. In fact, these are two entirely separate areas in entirely different locations. Second, it does not list The Friar. We pointed this out in our May 2010 comments, and this still needs to be corrected.

3. Whites Peak Should Be Evaluated and Fully Considered.

The Whites Peak area was considered to some extent in the DEIS, although its treatment is not consistent. Alternatives D and F would recommend the Whites Peak area for wilderness designation, and Whites Peak is included in the DEIS Table C4.3, which compares management prescription allocations to the roadless and PWA areas under each alternative. However, Whites Peak was not considered in the Appendix C wilderness evaluation narrative and tables. Therefore, the area has not been fully evaluated and considered for wilderness recommendation, and it should be in the final plan and EIS. Not only does the area qualify for evaluation, but the Rockbridge County Board of Supervisors supported a wilderness designation recommendation for this area. To be consistent, the area should be included in the inventory and evaluated. Again, this would ensure consistency and prevent the area from being forgotten.

4. Recommendations for Wilderness Designation

In the final plan, the Forest Service should recommend the following areas for wilderness and national scenic area designation:

These areas were recommended by the GW Stakeholder Group:

- Little River – approximately 12,600 acres for Wilderness Study Area
- Rich Hole Addition – approximately 8,200 acres for Wilderness Study Area
- Rough Mountain Addition – approximately 1,900 acres for Wilderness Study Area
- St. Mary's West – approximately 300 acres for Wilderness Study Area
- Ramsey Draft Addition (aka Bald Ridge and Lynn Hollow) – approximately 9,300 acres for Wilderness Study Area
- Beech Lick Knob – approximately 6,200 acres for Wilderness Study Area
- High Knob (aka Skidmore Fork) – approximately 5,200 acres for Wilderness Study Area
- Three Ridges Additions – approximately 370 acres for Wilderness Study Area
- Gum Run/Oak Knob/Hone Quarry/North River Gorge (aka Shenandoah Mountain) – approximately 55,000 acres for National Scenic Area.

Additionally, we support the request of VWC and others that the Forest Service should recommend Laurel Fork for wilderness designation, for the reasons discussed in our prior comments (although the GW Stakeholder Group did not recommend this area, we understand that the group proverbially "agreed to disagree" on it).

There are a number of other areas which are worthy of permanent protection and are wonderful candidates for wilderness and national scenic area designation. In the future, these areas should be considered for recommendation for designation. These areas are listed and discussed in the prior comments of SELC and others, see, e.g., Comments of SELC, SAFC and TWS, May 7, 2010, pp. 54-55; Comments of SELC, SAFC, VWC, Virginia ForestWatch, Sierra Club and TWS, Jun. 8, 2009, pp. 26-28; Comments of SELC, TWS, SAFC, VWC and Wild Virginia, Aug. 8, 2008, pp. 19-20.

D. The DEIS does not contain an adequate range of alternatives, and does not consider reasonable alternatives, for wilderness recommendation.

The Council on Environmental Quality's (CEQ) guidance on NEPA's alternatives requirement discusses the example of wilderness designation in a national forest. CEQ, Forty Most Asked Questions Concerning CEQ's NEPA Regulations, 46 Fed. Reg. 18026 (1981). The CEQ directed:

—When there are potentially a very large number of alternatives, only a reasonable number of examples, covering the *full spectrum* of alternatives, must be analyzed and compared in the EIS. An appropriate series of alternatives might include dedicating 0, 10, 30, 50, 70, 90 or 100 percent of the Forest to wilderness.” *Id.* (emphasis in original).

The CEQ direction is persuasive authority, *Davis v. Mineta*, 302 F.3d 1104, 1125 (10th Cir. 2002), reinforced by ample caselaw requiring detailed analysis of a reasonable range of alternatives. In particular, *California v. Block*, 690 F.2d 753 (9th Cir. 1982) held inadequate the discussion of alternatives in the EIS for RARE II because the Forest Service did not —seriously consider an alternative that allocated more than a third of the RARE II acreage to Wilderness.” *Id.* at 768. Although the EIS included all wilderness, no wilderness, and no action alternatives, these alternatives were included as —points of reference rather than as seriously considered alternatives.” *Id.* at 765. None of the other alternatives designated more than 33% of the roadless acreage to wilderness. *Id.* The EIS should have considered designating as wilderness —a share of the RARE II acreage at an intermediate percentage between 34% and 100%.” *Id.* at 766-67. The court also found the agency skewed its alternatives away from wilderness without justifying the trade-offs made. *Id.* at 768-69. The GW DEIS reflects many of these same inadequacies.

Of the GW DEIS' seven alternatives (six action alternatives and no-action/current plan), no action (Alt. A) and maximum wilderness (Alt. C) were included as points of reference but not seriously considered. Alternative C has an ASQ of zero. While such an alternative is important for providing a full range of alternatives and for comparison, the Forest Service clearly intends to continue a commercial timber program on the GW and logging to create early succession, so we believe the agency never seriously considered adopting Alternative C.

As shown in the table below, five alternatives would recommend less than 25,000 acres of wilderness designation: Alt. A would recommend 1,500 acres of wilderness, Alt. D 14,600

acres, and Alts. B, E and G amounts between 20,400–24,500 acres. Alt. F would recommend 113,209 acres or 30% of the acres considered.

Alternative	A	B	C	D	E	F	G
Acres of Recommended Wilderness³²	1,500	20,700	386,809	14,600	24,500	113,209	20,400
% of Potential Wilderness Areas Evaluated for Wilderness Recommendation (372,631 acres)³³	0.4%	5.6%	103.8%	3.9%	6.6%	30.4%	5.5%
Acres Timber Harvest (Regen) Annually³⁴	2,400	3,000	0	4,200	1,800	1,000	3,000
ASQ (Average Annual) in MMBF	23.5*	27.1	0	45.9	15.5	10.2	27.1
Acres Suitable for Timber Production	350,000	486,000	0	482,000	366,000	278,000	439,000

This range is skewed away from wilderness, clustering most alternatives at the exceedingly low end of the range. There is a dearth of alternatives at the middle-high end. There are no alternatives between about 7% and 30% and no seriously considered alternative that would recommend more than 30% of potential acres for wilderness designation. The range provided in the DEIS is not adequate. Further, the DEIS did not consider several reasonable alternatives, including options proposed by the public and environmental organizations for wilderness, national scenic, and national recreation areas, and options that would recommend a moderate or high amount of wilderness while maintaining or increasing timber harvest.

1. Inadequate Range of Alternatives for Wilderness Recommendation.

There are no alternatives between 25,000 acres and 113,000 acres of recommended wilderness, i.e. no alternatives between about 7% and about 30% of the potential acres. There also are no alternatives between 113,000 acres and maximum wilderness, i.e. no alternatives above about 30% were seriously considered. So, essentially the only wilderness alternatives considered were about 7% or less and 30%. Alt. F is one key component of a reasonable range of alternatives, but it alone is not adequate as the sole alternative between 7% and 100%. The DEIS does not provide an adequate range of alternatives covering the full spectrum of options, as NEPA requires.

To rectify this, several additional alternatives in the low-mid range and in the mid-high range should be considered. For example, in the low-mid range, alternatives recommending about 44,000 acres (11.8% acres evaluated), about 63,000 acres (16.9%), and about 81,000 acres (21.7%) of wilderness should be considered. These options are reasonable and are critical to providing an appropriate range. They also reflect various levels of wilderness recommendation

³² DEIS, Table 2-14.

³³ DEIS at 3-222-24 (acreage of potential wilderness areas (PWA) evaluated for wilderness recommendation).

³⁴ For acres harvested annually, ASQ, and acres suitable for timber production, see DEIS, Errata, Table 2-17.

discussed or proposed by the public, for example, the level recommended by the GW Stakeholder Group, as well as wilderness advocates' mid-level proposals during the planning process, e.g. in June 2009.

In another example, the lack of a mid-high level wilderness alternative, a level between 30% and 100%, is also problematic. The EIS at issue in California v. Block was inadequate for this very reason. Additional alternatives in the mid-high wilderness range also should be analyzed, for example, levels of around 147,000 acres (39.4% of acres evaluated), which would reflect wilderness advocates' higher-level proposals during the planning process, e.g. in January 2009 and May 2010. These alternatives are reasonable, represent key points in the required range, and would respond to public comments requesting additional wilderness recommendations and proposing suitable candidates. Ultimately, analyzing all options would be informative and would simply help to put this issue and the low-mid level proposal, which garnered the most diverse support, into context and into perspective.

2. The Range of Alternatives is Skewed Away from Wilderness Without Justification.

As the table above shows, most of the alternatives are clustered at the very low end of wilderness recommendation (0.4% - 6.6%), but the DEIS provides no justification for skewing the range of alternatives so heavily away from wilderness. There is a similar lack of rationale for the choices to recommend or not recommend particular areas in the preferred Alt. G. In California v. Block, similar errors rendered an EIS inadequate. 690 F.2d at 768-69, 773-74 (alternatives skewed away from wilderness without justification; no explanation of trade-offs in each alternative or why they were acceptable or realistic; no discussion of and response to public comments providing concrete reasons why specific areas should be designated wilderness).

Moreover, the alternatives presented in the GW DEIS suggest a false trade-off between wilderness recommendation and timber harvest. The only alternative with substantial wilderness recommendations, Alternative F, would reduce the current ASQ and timber base and fall well below the timber increase proposed in Alt. G. Alt. F is a reasonable alternative – its estimated annual harvest of 1,000 acres per year is roughly equivalent to actual recent harvest levels, which averaged about 904 acres a year over the past 10 years (DEIS at 2-5). However, throughout the planning process the Forest Service has expressed a clear intent to maintain or increase the ASQ and timber base, so Alt. F would have been undesirable to the agency from the outset. Alt. F is rendered yet more undesirable by its oil and gas leasing elements – it would make about 773,000 acres of the GW available for federal oil and gas leasing allowing horizontal drilling and high-volume hydraulic fracturing, without adequate controls. There have been very strong public comments objecting to fracking in the GW, and the Forest Service has proposed to prohibit horizontal drilling on any future federal leases. Framing Alt. F this way deprived the both the agency and the public of a clear, viable option that would recommend robust wilderness designations while meeting other key objectives.

3. Reasonable Alternatives for Wilderness Recommendation Have Not Been Considered.

The VWC has offered various thoroughly researched and well supported proposals for wilderness recommendations. VWC proposals all aim to avoid or minimize potential conflicts

with uses and management needs that are incompatible with wilderness designation. These reasonable, viable alternatives have not been fully considered. Alternative F contains some, but not all, of the areas proposed by VWC.

For example, the DEIS analyzes the effect of wilderness recommendations on bike trails, showing that the largest wilderness alternative seriously considered, Alternative F, would close about 70 miles of bike trail and about 19 miles of closed roads currently open to bikes, while preferred Alt. G would close 9 miles.³⁵ DEIS at 3-239, Tables C4.6 and C4.7. Although the DEIS provides no explanation for the choice of areas recommended in Alt. G, we assume this factor played some role. On the other hand, the boundaries for VWC's proposals were carefully drawn through many discussions with user groups, allowing increased wilderness recommendations while avoiding almost all closures. Remarkably, all of VWC's wilderness proposals would close significantly fewer bike trails (for example, one set of VWC proposals would close only about 1 mile of bike trail), and VWC always offered to compensate by helping to add/improve trails elsewhere. This is an obvious improvement over the alternatives considered and would allow more wilderness recommendations with fewer impacts on existing uses, yet these options have not yet been considered by the Forest Service.

It is also important for the Forest Service to consider alternatives with more wilderness recommendations than Alt. G and with timber harvests at Alt. G levels or higher. Such an alternative would reflect the GW Stakeholders Group recommendations. Alt. G would allocate less than 84,000 acres of the potential wilderness areas to prescriptions allowing logging, so clearly many more acres could have been recommended for wilderness without reducing the desired timber base and ASQ. We believe this is a reasonable, feasible alternative; the Forest Service simply did not consider it. This type of alternative is reasonable and must be considered or the refusal to do so must be properly justified, which the DEIS does not do. See Block at 769 (before assuming that at least two thirds of roadless areas should not be recommended for wilderness, Forest Service should have considered whether it could meet its resource development needs in other areas); Idaho Conservation League, 956 F.2d at 1520-22 (Forest Service considered environmental organization's proposed alternative of combining maximum wilderness recommendation with preferred timber harvest level and properly justified decision not to consider it as full-blown alternative).

4. Alternatives for Scenic and Recreation Areas Have Not Been Adequately Considered.

The options for protection of roadless areas are more varied than an "either or" choice on wilderness recommendation. For some areas, scenic or recreation area designations can address calls for their protection and calls to continue existing mountain biking there. Many public comments requested that the GW recommend NSA and NRA designations and proposed specific areas for such designation.

To address this issue, the Forest Service could recommend Congressional designation as National Scenic Area (NSA) or National Recreation Area (NRA), or could propose a forest plan

³⁵ Table C4.7 does not clarify whether the roads that would be decommissioned currently are open to the public. This should be clarified in the table itself, so that the difference between impacts on current bike access and current motorized vehicle access is clear.

Scenic Area or Recreation Area prescription. There is precedent for these designations in several of the Southern Appalachian forest plans revised in 2004. The revised plan for the Chattahoochee-Oconee National Forest recommended a small addition to the Congressionally designated Ed Jenkins National Recreation Area. The revised plans for the Jefferson, Chattahoochee-Oconee, and Cherokee National Forests contained a plan-designated Scenic Area prescription. These Scenic Area prescriptions are in addition to, and are different from, prescriptions developed to address other scenery issues, such as those for scenic byways, corridors or viewsheds.

The DEIS, however, considered only two options for NSAs and none for NRAs: Alternative F, with three NSAs totaling about 130,000 acres, and Alternative D, with one NSA of about 8,000 acres. Not only do these two options not constitute an adequate range of alternatives for addressing this issue, but it is questionable whether the Forest Service seriously considered adopting either one. The undesirable aspects of Alternative F are discussed above, and Alternative D is the maximum logging alternative.

Again, VWC and others offered a variety of NSA and NRA proposals which were not considered, including various proposals from around 140,000–150,000 acres to about 55,000 acres. These proposals are reasonable alternatives which must be considered and which would contribute to providing the required range of alternatives for NSA and NRA designations.

IV. FURTHER ANALYSIS OF IMPACTS ON THREATENED AND ENDANGERED SPECIES IS NEEDED, AND THE FOREST SERVICE MUST FORMALLY CONSULT WITH THE FISH AND WILDLIFE SERVICE (FWS).

Section 7 of the ESA directs each federal agency, in consultation with the FWS or NMFS, to —insurè that its actions are not likely to jeopardize the continued existence of any threatened or endangered (T&E) species or result in the destruction or adverse modification of critical habitat of such species. 16 U.S.C. § 1536(a)(2); 50 C.F.R. § 402.01(a). Conservation of T&E species must take priority over all other interests. Tenn. Valley Authority v. Hill, 437 U.S. 153, 184 (1978). If an agency action —may affect listed species or critical habitat,” the agency must initiate formal consultation at the earliest possible time, unless it prepares a biological assessment (BA) that determines the action is not likely to adversely affect any listed species or critical habitat. 50 C.F.R. § 402.14(a)–(b). Because management direction under the proposed plan clearly —may affect” T&E species—on the forest, particularly the Indiana bat and James spinymussel, the FS must prepare a BA to determine whether these species and their habitats are likely to be adversely affected. 50 C.F.R. § 402.12(a). Moreover, the sensitivity of these species to changes in the environment, combined with the nature and extent of proposed management activities, leads to the conclusion that the plan is likely to adversely affect these species, requiring formal consultation with the FWS and the preparation of a Biological Opinion (BiOp). Even the effects of the proposed plan acknowledged in the DEIS show that the Indiana bat is likely to be adversely affected, and the amount of sediment-producing activity that would occur under the plan calls into question any conclusion that rapidly declining James spinymussel populations will not be adversely affected. We understand that the FS will likely initiate formal consultation, and we encourage the FS to do so as soon as possible. We also encourage the FS to

provide an opportunity for the public to review and comment on any additional information regarding impacts on T&E species or measures needed to protect them that arise during the preparation of the Biological Assessment and Biological Opinion.

Indiana Bat

The GW provides the Indiana bat with caves suitable for hibernation as well as summer foraging habitat. DEIS at 3-80, 3-85. There are two caves on the GW and two caves within two miles of the GW that support the bat. DEIS at 3-82 (–Starr Chapel Cave and Mountain Grove Cave on the Warm Springs Ranger District are the only caves on National Forest land which serve as hibernacula for Indiana bats. Clarks Cave and Hupman’s Saltpeter Cave are on private land, but within 2-miles of Forest land.”).

Moreover, Hellhole Cave in Pendleton County, WV, which is one of 13 hibernacula designated under the ESA as critical habitat for the bat, is about 15 air miles from the GW. Biological Opinion on Effects of Management Activities Conducted by George Washington and Jefferson National Forests on Indiana Bat, at 17 (1997) (–GW/JNF BiOp”). The DEIS does not acknowledge the proximity of Hellhole Cave to the GW or the fact that the GW is within the documented foraging and roosting range of the bats in Hellhole Cave. See DEIS at 3-83; Biological Opinion for revised Jefferson National Forest LRMP, at 10 (2003) (–JNF BiOp”) (females form maternity colonies that may be hundreds of miles from hibernacula); GW/JNF BiOp at 8 and 22 (Indiana bats may travel over 200 miles between winter and summer habitats; 1993 study of two male Indiana bats captured at Starr Chapel Cave on GWNF documented one roosting for 19 days in tree about 10 air miles from that cave and foraging over about 1,540-acre area, while 10 other bats believed to be Indiana bats also were observed roosting in same tree).

Indiana bats are known or believed to occur in several counties containing GW land, including Bath, Highland, and Page counties in Virginia, and Hampshire, Pendleton, Hardy, and Monroe counties in West Virginia. FWS Species Profile, Indiana Bat, <http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?sPCODE=A000>.

The DEIS shows that Virginia’s hibernating Indiana bat population has dropped precipitously since the mid-1960s, when the population was estimated at over 5,000 bats. DEIS at 3-81. The population in 1997 was estimated to be 1,840, and most recently in 2009 to be 730—a decline of about 60% over that 12-year period. Id. Rangewide, hibernating populations of the bat are estimated to have dropped from about 880,000 in 1965 to 414,031 in 2009. Draft Recovery Plan at 26. While the rangewide population has increased from its low point of about 328,715 in 2001, the 2009 population represents about a 10% drop from the estimated 468,260 bats in 2007, which has been at least partially attributed to the spread of White Nose Syndrome (WNS). Indiana Bat, 5-Year Review: Summary and Evaluation, at 10 (2009). We were unable to find population data more recent than 2009 (two years ago), so the population may have declined further. More recent data should be obtained and considered. Moreover, as the DEIS acknowledges, there is a dearth of information on the numbers, distribution, and trends of Indiana bats using the GW for summer roosting and/or foraging habitat, and the importance of the GW as summer habitat to the species is unknown. DEIS at 3-80.

During the summer, the bats forage in closed to semi-open forested habitat, forest edge, and riparian areas, and use both snags and live trees for roosting, often in forested settings. DEIS

at 3-80; Indiana Bat Draft Recovery Plan (2007) at 69 (~~Recovery Plan~~). The DEIS states that ~~[w]ooded~~ lands closer to hibernacula are more likely to support males in summer than areas farther away, but essentially all of the George Washington National Forest may provide suitable summer habitat.” Id. at 3-83. Reproductive females may form maternity colonies up to hundreds of miles away from the hibernaculum. JNF BiOp at 10. In addition, autumn swarming and spring staging normally occur in woodlands near the hibernacula. DEIS at 3-83. Summer habitat use changes over time as trees develop or lose bark, or as they die and fall. JNF BiOp at 15.

Given the Indiana bat’s use of trees for roosting habitat, and the uncertain extent of the bat’s use of the GW for summer habitat, timber harvest clearly may have an adverse effect on the bat. Previous reports have confirmed this. See JNF BiOp at 23 (likelihood of felling a tree containing a maternity colony or roosting bat is low but cannot be discounted due to ~~the~~ rarity of the species, and the wide dispersal of Indiana bats and maternity colonies throughout the species’ range”); GW/JNF BiOp at 22 (cutting trees ~~may~~ result in direct mortality or injury to individuals or small groups of roosting bats” and harvesting large tracts of forest may end up ~~forcing~~ the bats in a roosting or maternity colony to abandon a traditionally used site”; GWNF FEIS, Biological Assessment, Appendix K, at K-7 (1993) (~~Timber~~ harvest or proposed actions which could alter the forest conditions around cave entrances or the mature tree canopy overhanging perennial streams would adversely affect the species.”) Other activities that involve forest clearing, such as prescribed burning, mineral development, and road construction and reconstruction, also have the potential to take bats and to destroy actual or potential roost trees. See Programmatic Biological Opinion for the Monongahela National Forest, at 56–59 (2006) (~~MNF~~ BiOp”). It is not known how long and far bats will search for new habitat if previously used habitat is destroyed or rendered unsuitable. JNF BiOp at 15. Bats are already under significant stress after emerging from hibernation in the spring, and any prolonged search for roosting habitat may add to this stress. Id. This stress may be compounded by WNS, which has disturbed affected bats’ hibernation patterns, leaving them emaciated when they emerge, often prematurely, from their hibernacula. USGS, Investigating White-Nose Syndrome in Bats, at 1 (2009). If lactating females abandon a maternity colony because of harvesting activities, this also will hurt their reproductive success. JNF BiOp at 23.

The DEIS claims that, in spite of these risks, ~~there~~ will be overall cumulative positive benefits for the Indiana bat.” DEIS at 3-88. First, we think this conclusion is questionable. The DEIS relies in part on the 1997 GW/JNF BiOp to conclude that the bat will be adequately protected. Id. Given changes in circumstances since that BiOp was released (including population decreases, increased wind energy development in the Appalachians, and the proliferation of WNS), and the lack of information pertaining to the current extent of the bat’s presence on the GW, we think it is, at best, premature to conclude that the species as a whole will be adequately protected and even benefitted by the planned management. Second, the DEIS concedes that proposed logging in mature forests may (1) kill individual bats or groups of bats roosting in trees, and (2) reduce the total amount of available foraging habitat. Id. at 387. BiOps for prior GW and JNF plans found that logging and other management activities on the forests could alter or destroy roosting and foraging habitat and take Indiana bats and issued incidental take statements. JNF BiOp at 32; GW/JNF BiOp at 27. Regardless of whether there may be net positive benefits for the species under the proposed plan, the killing of individual bats and the alteration or elimination of habitat are adverse impacts that require formal consultation.

Furthermore, as mentioned above, timber harvest is not the only threat to Indiana bats on the GW. The DEIS briefly acknowledges the new threats of White Nose Syndrome and rapid expansion of commercial scale wind energy development in the Appalachian region—there needs to be more discussion of these threats in a BA. The FS cannot solely rely on old BiOps and other reports that were issued before these threats materialized. As the DEIS states, over 1 million bats have been killed by WNS (DEIS at 3-85), including thousands of Indiana bats (Indiana Bat, 5-Year Review, at 10). In some hibernacula, 90 to 100 percent of bats have died from WNS. FWS, White-nose syndrome: What is killing our bats?, <http://www.fws.gov/whitenosesyndrome/pdf/Whitenosefactsheet053111.pdf>. The disease is spreading rapidly and its cause remains unknown. *Id.* The FWS has called it “the worst wildlife health crisis in memory.” FWS, About White-Nose Syndrome, <http://www.fws.gov/whitenosesyndrome/about.html>.

Wind turbines have been known to kill bats that fly in their vicinity. DEIS at 3-85. In fact, fatalities have been recorded at almost every wind power facility in North America where surveys have been conducted; some of these facilities are estimated to kill thousands of bats per year. Fort Collins Science Center, USGS, Bat Fatalities at Wind Turbines, <http://www.fort.usgs.gov/batswindmills/>. Migratory species that roost in trees, such as the Indiana bat, are most at risk. *Id.* Alt. G would allow wind energy generation in certain parts of the GW. DEIS at 2-26. The DEIS predicts that only one wind energy site would be developed under Alt. G, but more development is possible. DEIS at 3-299. The DEIS also assumes, without explanation or supporting data, that only 15 turbines will be constructed per site. *Id.* Actual wind energy development proposals call this figure into question. For instance, several years ago, a company expressed interest in constructing a 131-turbine facility on Church Mountain and Great North Mountain. Letter from GWNF to Freedomworks (April 2, 2009). The proposal was rejected in part due to concerns about the combined effects of the threats of WNS and wind turbines on the Indiana bat. *Id.* The FS should justify its assumptions and analyze in a BA the potential impacts on the Indiana bat from the maximum allowable level of wind energy development on the forest. The analysis should consider the proximity of potential wind facilities to hibernacula and migration routes. Given that potential roosting and foraging habitat is found throughout the forest, it seems inevitable that any wind energy site may adversely affect the species. The lack of information about the Indiana bat’s use of such habitat in the GW only reinforces the need for the FS to draft a BA and formally consult with the FWS.

The Indiana bat secondary cave protection management prescription area is based on the 1997 GW/JNF BiOp and is intended to maintain “the structural integrity of the cave system and adjoining landscapes” and “provide for the fall swarming and foraging area and corridors to both upland forest and riparian areas.” GW/JNF BiOp at 23. The secondary buffer has a radius of 1.5 miles, yet the 2006 BiOp for the Monongahela revised LMRP states that bats are likely to be within a five-mile radius of the hibernacula during fall swarming. MNF BiOp at 52. Moreover, the proposed plan would allow activities in these areas that may conflict with their purpose and adversely affect the bat. For example, with the exception of the period between September 15 and November 15, oil and gas drilling is permitted. Draft Plan at 4-104. First, bats may return to their hibernacula as early as late July, which is outside the timing stipulation’s window of protection. MNF BiOp at 28. Second, drilling during other times of the year may still negatively affect the structural integrity of the cave system and adjoining landscapes. Cave geology is complex—recently, on the Fernow Experimental Forest, gas drilling pierced three different

caves. Adams et al. Effects of Development of a Natural Gas Well and Associated Pipeline on the Natural and Scientific Resources of the Fernow Experimental Forest, at 9 (2011). Bats are especially sensitive to disturbance while hibernating. MNF BiOp at 47. In addition, the above-ground area around the cave is often used by the bat during the spring and summer. As the DEIS notes, spring staging normally occurs in woodlands near the hibernaculum. DEIS at 3-83. And while almost all of the GW may serve as foraging or roosting habitat, male bats often use forested lands close to the hibernaculum during the summer. Id. The secondary cave protection management prescription also would allow other activities year-round that disturb the landscape, such as new road and trail construction. Draft Plan at 4-104. These impacts must be considered and disclosed, and the FS should revise this prescription to make it more protective, including making it unavailable for oil and gas leasing.

The findings of the DEIS and the prior biological opinions clearly show that the proposed plan may adversely affect Indiana bats, triggering formal consultation. The incidental take statement in the 1997 BiOp relied on in the DEIS predicted a taking of ten bats, based on total annual disturbance to 4,500 acres of potential habitat across the GW and JNF. GW/JNF BiOp at 28. The FS and FWS must consider the estimated level of take as a result of proposed Alt. G and consider whether, given recent population declines and the introduction of WNS, that level of take is acceptable. Given the increase in management proposed by Alt. G, it is likely that more bats will be taken than previously predicted. Formal consultation is required to assess the likely take and its consequences and to consider measures to reduce adverse impacts on the bat. The FS should prepare a BA which adequately analyzes and squarely addresses the effects of the proposed plan in light of the population declines, lack of information, and new threats documented in the DEIS.

Virginia Northern Flying Squirrel

The Virginia northern flying squirrel (now known as the West Virginia northern flying squirrel) is not listed in the Table of Threatened and Endangered species and is little discussed in the DEIS. See DEIS, p. 3-101, Table B2.8. The flying squirrel was listed as an endangered species in 1985. In 2008, the U.S. Fish and Wildlife Service (FWS) delisted the flying squirrel. In March of this year, the U.S. District Court for the District of Columbia vacated the delisting rule and returned the squirrel to the endangered species list. Although the agency is appealing the ruling, the FWS appears to be treating the squirrel as listed at this time.

The GW clearly contains habitat for the squirrel, for example, Table D17 –Species Potentially Affected by Oil and Gas Leasing on the GWNF” lists the squirrel’s habitat as the Laurel Fork area in Highland County. DEIS at 3-348. Oil and gas leasing and timber harvest considered in some alternatives could result in take of the species. As it is a listed species, the Forest Service must formally consult with the FWS regarding the squirrel.

James Spiny mussel

The James spiny mussel has been eliminated from over 90% of its historic range in the James and Rivanna River watersheds. DEIS at 3-164. The species is now found only in a few small tributaries of the upper James River basin in Virginia and West Virginia, as well as three tributaries to the Dan River in Virginia and North Carolina, though this population has been reduced to 10-15% of its former range. Id.; NatureServe Explorer, *Pleurobema collina*,

<http://www.natureserve.org/explorer/servlet/NatureServe?searchName=Pleurobema+collina>. The DEIS acknowledges that James spiny mussel populations are likely to face further decline largely due to intensive private land development that degrades the species' aquatic habitat. DEIS at 165.

While the James spiny mussel has not been found on the GW, it exists downstream of streams in the forest, so forest management activities can affect the species. DEIS at 3-165. Activities that add sediment to streams, alter flow regimes, or block host fish passage may adversely affect the species. *Id.* at 3-166. Although Alt. G is predicted to produce the second-highest amount of ground disturbance and, therefore, we assume the second-highest amount of sedimentation of all alternatives, the DEIS asserts that the James spiny mussel will be protected from this sediment through the implementation of forest-wide and riparian standards. *Id.* at 3-50, 3-166. However, while these standards might reduce the contribution of sediment to streams from management activities, they will not completely prevent it. Ground-disturbing activities are not categorically prohibited within riparian corridors, and ground-disturbing activities outside the corridors may release sediment into streams as well.

Moreover, the draft plan would allow riparian corridor minimum widths to be shortened in some instances on a site-specific basis (i.e., at the project level). Draft Plan, Appendix A, A-1. The FWS has already concluded that these riparian corridor widths are “the minimum widths necessary to protect . . . federally listed aquatic species.” JNF BiOp at 2. Therefore, the GW plan must clarify that the riparian corridor widths cannot be shortened at the project level, but can be widened to ensure that riparian values and functions are maintained.

The DEIS does not estimate actual levels of sediment production expected to occur under the alternatives. Instead, it merely ranks the alternatives by projected amount of ground disturbance. Alt. G is expected to disturb 315 to 407 acres of forest soil, but, as explained in the section of our comments on impacts to water resources, the DEIS does not discuss the significance of this level of disturbance and the resulting sedimentation on aquatic species such as the James spiny mussel. *Id.* at 3-50. This figure also seems unrealistically low given that oil and gas drilling on federal leases alone is expected to disturb 380 acres. *Id.* at 3-320. Even if, as the DEIS concludes, the James spiny mussel will receive increased protection under Alt. G relative to the current 1993 plan, this does not mean there will be no adverse effects. The impact of the forest's existing 1,800 miles of system roads is one major concern. *Id.* at 3-53. As the DEIS acknowledges, roads “continue to be a chronic source of sediment and additional inputs may be detrimental to water quality.” *Id.* at 3-52. The DEIS does not explain in sufficient detail how existing detriments to water quality will be addressed, such as through the decommissioning of roads. It is clear that forest management under the revised plan may adversely affect the James spiny mussel, triggering formal consultation and the preparation of a BA.

Furthermore, the FS cannot evade these obligations by concluding that it has limited, if any, influence over the James spiny mussel due to its absence from NFS lands. As mentioned, the species exists in streams that flow through the GW—impacts on those streams from management activities may be felt downstream. Even if the influence of FS activities is small, that does not mean it is insignificant. The James spiny mussel populations have rapidly declined over the past few decades and the outlook remains bleak. Any amount of sedimentation or modification of aquatic habitat on NFS lands certainly has the potential to adversely affect the species. The FS must formally consult with the FWS and analyze these potential effects in a BA.

V. CERULEAN WARBLER

Measures proposed by the draft Forest Plan for the benefit of the Cerulean Warbler will be ineffective and, potentially, counterproductive without clearer standards and guidelines for the management of Cerulean Warbler habitat.

The Cerulean Warbler is in need of robust conservation planning, especially by the Forest Service. Cerulean Warbler populations have declined dramatically since the 1960s. Data from the Breeding Bird Survey show that the Cerulean population has decreased approximately 80% since 1966, with an average rate of decline of -4.1% per year from 1966 to 2007.³⁶ The U.S. Fish and Wildlife Service's Cerulean Warbler Status Assessment concluded that this "precipitous" population loss represented the largest decline among any warbler species and one of the most significant declines among neotropical migratory birds.³⁷ Much of this decline has occurred in the species' core breeding range.³⁸ Dramatic habitat loss to mining, development, and logging throughout the Cerulean's breeding range, as well as loss of habitat in its winter range, are the primary causes of this decline.³⁹

National Forest lands like the George Washington National Forest are critical to the Cerulean Warbler's long-term survival, because of the Cerulean's habitat requirements. The Cerulean Warbler is an "area sensitive," forest-interior species, dependent on large tracts of mature forest to breed successfully.⁴⁰ Cerulean Warblers require a minimum forested area of 700 hectares to sustain a viable population.⁴¹ In a Tennessee study, Ceruleans were found only in forest tracts greater than 800 hectares (2,000 acres).⁴² Another study found that the probability

³⁶ J. R. Sauer et al., *The North American Breeding Bird Survey, Results and Analysis 1966-2007* (updated 15 May 2008), Version 5.15.2008 (USGS Patuxent Wildlife Research Center, Laurel, MD, 2009)[hereinafter "BBS 1966-2007"], available at www.mbr-pwrc.usgs.gov/bbs/bbs.html. See also P. Hamel, Cerulean Warbler Status Assessment at Table 11, U.S. Fish and Wildlife Service (April 2000) [hereinafter "Hamel 2000"]. This and all other references cited here are incorporated in full herein by reference, although some also are attached for convenience.

³⁷ BBS 1966-2007 at vii.

³⁸ BBS 1966-2007.

³⁹ Hamel (2000); Paul B. Hamel, How We Can Learn More About the Cerulean Warbler (*Dendroica Cerulea*), *Auk* 121(1): 7, 9 (2004).

⁴⁰ C. Robbins., *A Warbler In Trouble: Dendroica Cerulea*, in Hagen, et al., *Ecology and Conservation of Neotropical Migrant Landbirds* at 555-56, 560. Smithsonian Inst. Pr. (1992); Nicholson, C.P. 2004. *Ecology of the Cerulean Warbler in the Cumberland Mountains of East Tennessee*, at 1. Dissertation, University of Tennessee, Knoxville, USA [hereinafter "Nicholson 2004"]. See also C. Oliarnyk & R. Robertson, "Breeding Behavior and Reproductive Success of Cerulean Warblers in Southeastern Ontario," *Wilson Bull* 108(4): 673 (1996); R. Askins, "Relationship Between the Regional Abundance of Forest and the Composition of Forest Bird Communities," *Biological Conservation* 39: 144 Table 5 (1987); R. Connor and J. Dickson, "Relationships Between Bird Communities and Forest Age, Structure, Species Composition and Fragmentation in the West Gulf Coastal Plain," *Texas J. Sci. suppl.* 49(3): 131 (1997) ("Cerulean Warblers, ... are perhaps the most area-sensitive bird in this region and are likely the most vulnerable species to the forest fragmentation in this region"); Cathy A. Weakland & Petra Bohall Wood, "Cerulean Warbler (*Dendroica Cerulea*) Microhabitat and Landscape-Level Habitat Characteristics in Southern West Virginia," *Auk* 122(2): 497, 498, 506 (2005)[hereinafter "Weakland and Wood 2005"].

⁴¹ MTM EIS at III.F-15.

⁴² Chandler S. Robbins et al., *A Warbler in Trouble: Dendroica cerulean*, at 555, Manomet Symposium (1989) [hereinafter "Robbins et al. 1989"].

of encountering a Cerulean reached its maximum when the area consisted of 3,000 or more unfragmented hectares (7,500 acres) of forest.⁴³

Within the context of a fragmented landscape of private land, the unfragmented forest habitat provided by the GW is of critical importance to area-sensitive species like the Cerulean Warbler. The landscape surrounding the George Washington-Jefferson National Forests is projected to continue to fragment for new housing density at the fastest rate of any national forests.⁴⁴ Appropriately, the plan acknowledges that the Cerulean is “vulnerable on planning unit due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation on the unit.” DEIS, App. H, at H-17 and H-23.

The plan suggests an vegetative management strategy, with the stated goal of benefitting the Cerulean Warbler, however, which could cause far more harm than good without clear plan standards and guidelines. The draft plan proposes the “Creation of structural diversity in mature stands to enhance conditions desirable for species such as the cerulean warbler. . . .” (DEIS at 3-126). Specifically, the plan directs that “stands can be evaluated for addition of canopy gaps and vertical structure through group selection and commercial thinning harvest programs.” *Id.* Vegetative manipulation for the benefit of the Cerulean Warbler is an extremely challenging and sensitive proposition requiring careful planning and tight restrictions that are likely unachievable through the mechanism of a commercially viable timber sale (as we usually see such sales), because of the need to retain a relatively high basal area, at least 70% of canopy trees, and mature oaks and other specific tree species which Ceruleans prefer for nesting.

A team of ornithologists coordinated out of the University of Tennessee have for several years been tracking Cerulean response to a variety of experimental silvicultural treatments in test plots.⁴⁵ The treatments ranged from light thinning to heavy logging. Results in the first several years showed a promising response by breeding adults with increased densities in all the treated stands, as compared to untreated control stands. Monitoring in subsequent years revealed a more complex story, however. While Cerulean Warbler adults favored the treated stands, they had significantly lower reproductive success in all the treated stands as compared to the untreated control stands. The treated stands may have operated as an ecological trap, attracting Ceruleans to nest in an area that undermined their reproductive success.⁴⁶ The researchers also documented strong nesting preference for specific tree species (white oak was strongly favored over red oak, for example) suggesting that leave trees from any logging activity should preferentially include those species.

This was true despite tight restrictions on logging in the experimental plots. For example, each 10 ha treatment plot was buffered by 5 ha of mature forest.⁴⁷ Furthermore, logging in the

⁴³ Chandler S. Robbins et al., *Habitat area requirements of breeding forest birds in the middle Atlantic states*, 103 Wildl. Monogr. 25 (1992) [hereinafter —Robbins et al. 1992”].

⁴⁴ U.S. Forest Service, *Forests on the Edge* at 9.

⁴⁵ See Than J. Boves and Dr. David Buehler, University of Tennessee Dept. of Forestry, Wildlife and Fisheries, *Cerulean Warbler Forest Management Experiment – Cumberland Mountains* (powerpoint presentation) (attached).

⁴⁶ *Id.*; J. Battin, *When Good Animals Love Bad Habitats: Ecological traps and the Conservation of Animal Populations*, 18-6 Conservation Biology 1482 (Dec. 2004) (attached); M. A. Schaeffer, M. Runge and P. Sherman, *Ecological and Evolutionary Traps*, 17 Trends in Ecology 474 (Oct. 2002) (attached).

⁴⁷ *Id.*

–intermediate treatment” was limited to a thinning with a residual basal area of 50-60 sq. ft./ac and retention of 70% of canopy trees. The researchers recommended no logging in areas with relatively high Cerulean density.

As a result, any plan direction to apply silvicultural treatment for the purported benefit of the Cerulean Warbler should be abandoned until such time as there is a completed scientific study addressing the substantial questions about the potential adverse impacts of such treatment. Instead, prime Cerulean habitat should generally be protected from fragmentation, especially large unfragmented forest blocks of 7,500 acres or more that contain existing old growth forest. To the extent logging must be undertaken in prime Cerulean habitat because of other management objectives, it should be limited to low density Cerulean areas and should be only intermediate treatment leaving a basal area of 50-60 sq. ft./ac, retaining at least 70% of canopy trees, and retaining key species of nest trees. Field surveys for Ceruleans should be required when planning projects in Cerulean habitat.

VI. SPECIAL BIOLOGICAL AREAS

Properly identifying, designating, and managing Special Biological Areas (SBAs) is critical to protecting and conserving biodiversity in the George Washington National Forest (GW). As the draft forest plan states (p. 4-54), SBAs “serve as core areas for conservation of the most significant and rarer elements of biological diversity identified to date on the Forest.” Management of SBAs seeks to “perpetuate or increase existing individual plant or animal species and communities that are of national, regional, or state significance and identified as threatened, endangered, sensitive, or locally rare.

All the areas recommended by the Virginia and West Virginia state Natural Heritage Programs should be designated as SBA or related prescription area. Unfortunately, the draft plan does not meet all the recommendations of the Virginia Division of Natural Heritage (VDNH). Many of the SBAs in the draft plan are smaller in size than recommendations made by VDNH. In fact, it is our understanding that, of the approximately 122,500 acres recommended for SBA by VDNH, only about 109,000 acres are proposed for SBA or a similar management prescription. Therefore, many biologically significant sites recognized by VDNH are planned for management prescriptions which are likely inadequately protective. At least 43 sites that VDNH identified as biologically significant and recommended for SBA designation include land assigned to the Mosaics of Habitat prescription, which is open to road construction, logging, and other disturbing activities and is clearly inappropriate for these sites (in total, more than 3,200 acres of VDNH recommended SBAs are proposed for Mosaics of Habitat). And additional VDNH sites would be assigned to other potentially inappropriate management prescriptions.

For example, Frozen Knob and Peters Mountain North were assigned to a new management prescription area, Key Natural Heritage Community Area, in order to protect the very high quality old growth forest habitat occurring there. The new designation and identification of these two areas is very positive. However, the boundary of this proposed prescription area should be adjusted. The proposed prescription area includes about 3,307 acres in these areas, approximately 1,868 acres less than the VDNH recommendation. The 1,868 acres not included in the Key Natural Heritage Community prescription are proposed for

assigned to Mosaics of Habitat, as is all the area of the national forest surrounding the two sites. Again, Mosaics of Habitat is very clearly an inappropriate management prescription for these old growth forest sites. We strongly believe that these sites should be fully protected in their entirety.

In another example, the Virginia portion of the Shenandoah Mountain Crest-Cow Knob Salamander management prescription area is smaller in size than the VDNH recommendation.

Regarding the wood turtle, the “Emphasis Area” identified for the wood turtle should be designated as a SBA, and more specific management information and standards are needed in the Goals and Conservation Measures for the wood turtle.

Further, in the future, GW staff should work closely with the Natural Heritage programs to identify potential new SBAs and to manage them appropriately using the most current information available. When new biologically significant sites are identified, either by GW staff or the Natural Heritage programs, they should be managed as SBAs. The forest plan should require this. Several of the Southern Region forest plans revised in 2004 require this for the similar Rare Community prescription used in those plans. For example, the revised Jefferson National Forest Plan provides that, when new rare communities are found, they will be added to the prescription through plan amendments. The revised Cherokee National Forest plan took a similar but more streamlined approach, providing that all rare communities, wherever they occur, are managed under the rare community prescription. The GW should adopt the Cherokee’s approach, which would ensure that new SBAs are immediately brought under proper management and would avoid the need for a plan amendment.

VII. SPECIES DIVERSITY AND MANAGEMENT INDICATOR SPECIES

Draft Plan direction would inadequately address the maintenance of the full range of species diversity on the George Washington National Forest.

The DEIS and DEIS Appendices discuss species diversity issues fairly extensively. However, the Draft Plan fails to follow through and establish direction in strategies, objectives, and standards that fully address the maintenance of species diversity. Proposed Plan direction focuses on early succession habitat to the neglect of species whose habitat is associated with well developed and mature forest. Strategies, objectives, and standards extensively address creation of habitat for early succession habitat. Strategies, objectives, and standards also address species with specific areas of occurrence or narrow habitat requirements.

The strategy for species associated with late succession forest relies on significant portions of the forest approaching “mature” condition. However, as pointed out in our comments in sections on old growth and restoration, the fact that portions of the GW are approaching silvicultural maturity does not necessarily mean that the forests in these areas are approaching ecological conditions approximating the natural range of variations of these forests. There is nothing to assure that the ecological condition of most so called “mature” forests would provide good habitat for all the late-succession associated species. In fact many of these mature forests

still have even-aged structural characteristics as a relict of past management, rather than the all-age conditions characteristic of most Southern Appalachian forests. Many of these forests also have altered species composition. The assumption that these altered forests will provide habitat for all of the late succession associated species is unwarranted. Objectives and standards should be established for late succession species (beyond the species with narrow and specific habitat) as well as the early succession species.

The Proposed Management Indicator Species Are Not Adequate.

NFMA requires the Forest Service to provide for the diversity of plant and animal communities. 16 U.S.C. § 1604(g)(3)(B). For native vertebrate species (fish and wildlife), the NFMA regulations specifically require the agency to manage fish and wildlife habitat —to maintain viable populations of existing native and desired non-native vertebrate species in the planning area.” 36 C.F.R. § 219.19. To insure species viability, the Forest Service must select and monitor populations of management indicator species (“MIS”) during plan implementation, in order to assess the effects of management activities on their populations and the populations of other species with similar habitats. § 219.19(a)(1),(6). MIS should be biologically relevant and representative of the major biological communities within the forest, as well as rare species and species with special habitat needs.

More generally, for all plant and animal communities, the NFMA regulations on diversity direct the agency to consider plant and animal community diversity —throughout the planning process,” to have inventories which —shall include quantitative data making possible the evaluation of diversity in terms of its prior and present condition,” and to establish management prescriptions that —preserve and enhance” diversity. § 219.26; § 219.27(g).

It is important to note that both the viability and diversity provisions require the agency to have some quantitative data regarding species condition upon which to base planning and to track progress toward the plan’s viability and diversity goals. Under these rules, it is not sufficient to track only acres provided in broad forest types, based on unverified CISC or FSVeg data, and then to assume that all species associated with those forests occupy them in viable or adequate populations, without some actual species population data to test and verify those assumptions along the way.

Under the 1993 Plan, the GW had 23 MIS. The Draft Plan proposes to delete most of these MIS and to adopt the 13 MIS from the Jefferson National Forest (JNF) (with the substitution of the GW’s endemic Cow Knob Salamander for the JNF’s endemic Peaks of Otter Salamander). We support the addition of beaver and the inclusion of brook trout rather than —wild trout” as in previous MIS proposals — this is an improvement. However, the MIS list is still inadequate.

Of the 13 proposed MIS, there are three game species to indicate hunting demand, eight birds, one endemic, a protected salamander, and a mammal associated with riparian habitat. These MIS are a very limited assortment of species that do not adequately represent the variety of species and biological communities found on the GW and seem unlikely to indicate forest-

wide, long-term, and cumulative effects of management on those species and the natural communities to which they belong. The Draft Plan and DEIS fails to establish that: (1) the choice of MIS reflects a deliberate selection of species to indicate fish and wildlife species viability; (2) the MIS chosen will reflect the effects of management activities on species viability; or (3) the proposed MIS adequately will represent the categories of MIS described in the regulations. The documents also fail to justify the decision to drop the prior MIS. The GW should add appropriate MIS in order to meet the requirements of the MIS regulation and to fulfill the intent behind the MIS program.

The proposed MIS do not represent the categories of species enumerated in the NFMA regulations.

Table 2.15 in the DEIS indicates that the MIS proposed represent only some of the categories specified for MIS selection (e.g. special habitat indicators, biological habitat indicators, riparian ecological system indicator), overly narrow categories (e.g. the Cow Knob Salamander, a very narrow endemic species), and management specific outcomes (e.g. demand species). These MIS do not represent all the categories set forth in the MIS regulation and the GW has not explained why those categories are unrepresented:

~~In~~ the selection of [MIS], the following categories shall be represented where appropriate:

- (1) endangered and threatened plant and animal species identified on State and Federal lists for the planning area;
- (2) species with special habitat needs that may be influenced significantly by planned management programs;
- (3) species commonly hunted, fished, or trapped;
- (4) non-game species of special interest; and
- (5) additional plant or animal species selected because their population changes are believed to indicate the effects of management activities on other species of selected major biological communities or on water quality.”

§ 219.19(a)(1).

None of the proposed MIS are endangered or threatened and not a single plant species is identified as an MIS. Moreover, the proposed MIS do not appear to represent most of the GW’s biological communities or they only partially address the habitat or particular management issue in that habitat. No explanation is provided for whether or how the proposed MIS represent the 20 ecological systems identified by the Forest Service within the GWNF. (DEIS Appendix F). Nor do those documents provide any support or justification for the proposal not to select MIS which represent all categories in the regulation, including the forest’s major biological communities, i.e. the identified ecological communities in the GW. Under the regulation, MIS must represent all categories, unless there is a well-supported finding that doing so would not be appropriate. Overall, the relationship between the ecosystem and species diversity reports and the selection of MIS is not explained. The ecological analysis should lead to the selection of MIS to monitor the condition of the communities and species identified therein.

Regarding water quality and aquatic species, only one MIS is proposed for water quality. Even the native brook trout, which was an MIS in the 1993 Plan and should be retained in the revised plan, can only represent those aquatic habitats in which it is found. In smaller stream reaches that do not support trout, additional species sensitive to sediment pollution and other water quality impacts should be designated as MIS.

The proposed MIS are unlikely to reliably indicate the effects of management activities.

MIS shall be selected because their population changes are believed to indicate the effects of management activities on important elements of plant and animal diversity. § 219.19(a)(1). Many of the proposed MIS are generalist species not clearly linked to any specific habitat or ecosystem component. Generalist species have broad niches and can tolerate relatively large changes in environmental conditions. As a result, the effects of management activities on generalist species tend to be much less pronounced than on more specialized or less tolerant species. It could not be assumed that populations of rare species or species with special habitat needs are increasing or stable just because a generalist species is increasing or stable.

Further, all but two of the proposed MIS are large mobile mammals and birds whose populations are affected by habitat conditions and activities beyond the GWNF and whose mobility allows them to avoid some negative effects of GWNF management activities. So, their populations may be less affected by management actions than the populations of species with little or no mobility. Three of the proposed MIS also are secure game species (black bear, wild turkey, and white-tailed deer) with broad habitats, which are offered as MIS only for hunting demand.

Consequently, the population trends of most proposed MIS seem unlikely to indicate the full effects of management on other affected species. These proposed MIS may be fine representatives of certain elements, but the GW should recognize their limitations and fill in the gaps with more sensitive species, as well as less mobile species (for example, site-sensitive creatures with limited motility such as salamanders or flightless invertebrates).

The other two MIS are the Cow Knob Salamander and brook trout. The Cow Knob Salamander (“CKS”) has an extremely limited range and its habitat is protected by a conservation agreement. As a result, its population trends likely do not indicate the effects of logging, road-building and other actions elsewhere in the Forest on other salamanders or species. While the CKS should be retained as an MIS so that its own populations are monitored, other salamander species should be added as MIS. Terrestrial salamanders “have unique attributes that make them excellent indicators of biodiversity and ecosystem integrity in forested habitats.” Hartwell H. Welsh, Jr. and Sam Droege, A Case for Using Plethodontid Salamanders for Monitoring Biodiversity and Ecosystem Integrity of North American Forests, 136 Conservation Biology, Volume 15, No. 3, p 558-569, 558 (June 2001) (available at <http://www.fs.fed.us/psw/rsl/projects/wild/welsh/welsh13.pdf>).

VIII. THE ANALYSIS OF THE IMPACTS OF THE DRAFT PLAN AND ALTERNATIVES ON WATER RESOURCES IS INADEQUATE UNDER NEPA.

To be adequate under NEPA, an EIS must provide a “full and fair discussion of significant environmental impacts and shall inform decisionmakers and the public of the reasonable alternatives which would avoid or minimize adverse impacts or enhance the quality of the human environment.” 40 C.F.R. § 1502.1. The agency must take a “hard look” at the environmental consequences of its proposed action to make possible informed decision making and dissemination of relevant environmental information. Robertson v. Methow Valley Citizens Council, 490 U.S. 332, 350 (1989); Strycker’s Bay Neighborhood Council v. Karlen, 444 U.S. 223, 231 (1980).

A. Assessing amount of ground-disturbing activity is not an adequate substitute for assessing sediment yield.

The largest potential impact on water quality from forest management activities comes from sedimentation. DEIS at 3-40. A variety of activities have the potential to increase sediment yield and concentrate runoff by disturbing or exposing soil, such as construction, reconstruction, and maintenance of roads and trails, vegetation management, mineral development, fire management, and wind energy development. The proposed plan would result in the second highest amount of soil disturbance of all alternatives (315 to 407 acres), and thus, according to the DEIS, would have the second greatest impact on sediment and water quality. DEIS at 3-50. In fact, the proposed plan would increase ground disturbance by about 20-40% over the amount expected under the 1993 plan, and about 30-40% over the amounts expected under the restoration-oriented Alternative E. This is a concern.

What are the changes in the management anticipated in the 1993 plan and in current management that would cause these increases in ground disturbance? What are the changes to recent management practices (over the last five or ten years) that would cause these increases? Alternatives E and G would have the same or very similar timber harvest acreages, prescribed fire levels, minimum road systems, and gas development (see DEIS tables comparing alternatives), yet Alt. G would cause significantly more ground disturbance. What are the additional ground-disturbing activities that would occur under Alt. G but not in Alt. E?

Moreover, this use of acres of soil disturbance as a proxy for directly measuring and modeling sediment production is seriously questionable because it likely presents an incomplete picture of present and future sedimentation levels and the significance of those sediment levels for water quality and aquatic species. This approach assumes that (1) all ground-disturbing activities have equivalent effects with respect to sediment, regardless of the disturbance’s intensity, duration, or proximity to streams; and (2) all soil types that would be disturbed are equally prone to erosion. The DEIS also should have explicitly disclosed which management activities and decisions fell under the category of soil disturbance for the purposes of this analysis. We are concerned that these projections may underestimate the actual amount of sedimentation that would result from present and future forest management activities. For example, did the analysis take into account sediment from existing roads retained in each alternative, which may involve no *new* ground disturbance? Presumably not, and this is another reason why it is important to consider sediment levels as such and not merely ground disturbance (see also further discussion below regarding analysis of cumulative impacts). While the DEIS

notes the high interannual variability of sediment and the difficulty of accurately modeling sediment production, these challenges have not stopped the Forest Service from estimating the volume of sediment production in the past. See, e.g., Jefferson National Forest FEIS (2004) at 3-33 to 34.⁴⁸

B. The analysis of direct, indirect, and cumulative impacts is incomplete.

1. Significance of impacts.

Even if ground disturbance were truly representative of sediment yield, the impacts analysis fails to address the significance of the projected levels of ground disturbance that would occur under the proposed plan or alternatives. An EIS must discuss environmental consequences—and their significance.” 40 C.F.R. § 1502.16. Instead, the DEIS merely ranks the alternatives by amount of ground disturbance without discussing the extent to which water resources would actually be affected under any given proposal. DEIS at 3-50 to 52. Alternative G would disturb between 315 and 407 acres of land. Id. at 3-50. This figure seems unrealistically low—how will there only be between 315 and 407 acres of total disturbance when oil and gas drilling on federal leases alone is projected to disturb 380 acres? DEIS at 3-320. Moreover, not much can be gleaned from this figure alone, other than that it’s higher than the figures for almost all other alternatives. The EIS must put this figure in context and discuss the import or significance of that amount of ground disturbance and resulting sedimentation on water quality and aquatic species.

The effects of activities, particularly ground-disturbing activities, on steep slopes is one example of a potentially significant effect on water and soil resources, as well as public safety, that deserves greater analysis and consideration in the DEIS. The DEIS does recognize, in a general way, the risk of landslides, especially debris flows, caused by the failure of fills for roads and log landings built on steep slopes, and it discusses documented examples of landslides in the National Forests in NC, which were triggered by the failure of fill slopes on Forest Service roads. DEIS at 3-9-10. The DEIS asserts that all alternatives have standards that address and reduce these risks, and claims that Alt. G presents intermediate risks. DEIS at 3-12-13. We have a number of concerns about this approach.

First, the DEIS should acknowledge that most of the mountainous area in and around the GW has been rated by the USGS as having a high incidence and high susceptibility for landslides.⁴⁹ Of course, this is a broad-scale analysis, which is useful for showing regional trends and risks (id.), but also highlights the need for further, careful study and analysis of the risks in specific areas.

Second, the DEIS should directly acknowledge that Alt. G presents the second-greatest risk of landslides, based on the amount of ground disturbance, which the DEIS itself uses as a

⁴⁸ Although we believe that some aspects of the Jefferson sediment analysis were flawed, we believe that type of analysis, when done properly, provides important and necessary data.

⁴⁹ See DOI-USGS, Gerald F. Wiczorek and Benjamin A. Morgan, *Debris-Flow Hazards within the Appalachian Mountains of the Eastern United States*, Fact Sheet 2008–3070, at 1 (Aug. 2008) (attached); DOI-USGS, Dorothy H. Radbruch-Hall, et. al., *Landslide Overview Map of the Conterminous United States*, Geological Survey Professional Paper 1183 (1982) (paper, Plate 1 map, and summary attached); see also DOI-USGS, Paula L. Gori and William C. Burton, *Debris-Flow Hazards in the Blue Ridge of Virginia*, Fact Sheet-159-96 (1996) (attached).

proxy for measuring landslide risk. Third, given the grave consequences of landslides, the DEIS should more forthrightly disclose and consider whether this level of risk is acceptable. What are the likely consequences for water and soil resources, aquatic species and their habitat, and public safety? The agency should consider how these impacts could be avoided.

Fourth, the standards relied on to prevent landslides are vague and inadequate, requiring only: that these hazards be avoided, minimized or mitigated, without specifying how this should be done or ensuring that the worst risks are avoided; and, only for certain ground-disturbing projects on slopes 50% or greater which are near the GW boundary, an assessment of off-forest public safety issues. DEIS at 3-12. Instead, there should be clear limits on ground-disturbing activities on steep slopes. And landslide hazards always should be assessed, not only for a subset of projects.

Fifth, again, focusing only on the total amount of ground disturbance fails to consider whether the alternatives would have different locations and types of disturbance, causing different effects. For example, how much disturbance would result from construction of roads, skid roads/trails, and log landings on steep slopes? How much from oil and gas development? From wind energy development? From other activities?

The analysis of lands suitable for timber production did not screen out all steep slopes from the suitable lands. It does explicitly contemplate logging on slopes steeper than 30%, including ground-based logging on slopes up to 35% (Draft Plan at 4-13). The FS should disclose the amount of land in various slope classes in the proposed suitable base, including land with 30% or greater slopes and land with 35% or greater slopes.

The suitability analysis also does not assess the presence of fragile soils. The agency should disclose the amount of land in the proposed suitable base that has certain soil hazards and limitations documented in the NRCS soil surveys.⁵⁰ This information is needed to ensure that harvest does not impair the productivity of the land, irreversibly damage soil, slope and other watershed conditions, and to ensure compliance with other provisions of the NFMA. See 16 U.S.C. § 1604(g). It should be considered in the suitability analysis and in the analysis of effects on water, soil, and other resources.

Without these analyses, we are concerned that Alt. G poses potentially significant risks to water, soil, and other resources that have not been disclosed or considered in assessing impacts those resources and in identifying lands suitable for timber production.

2. Cumulative impacts.

In assessing significance, an EIS must consider the cumulative effects of the proposed management plan when added to the effects of all other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions.” 40 C.F.R. § 1508.7. [S]ome quantified or detailed information

⁵⁰ The NRCS soil surveys rate soils according to their suitability and limits for various uses. For example, the soil surveys identify soils which have: severe erosion hazards; are poorly suited for road construction; have severe limits on the construction of log haul roads and log landings; and/or are poorly suited for timber harvest equipment operability. This information should be considered in assessing the suitability of land for timber production and for various other uses and in assessing the effects of management activities on soil and water resources.

is required” in support of this analysis. Neighbors of Cuddy Mountain v. U.S.F.S., 137 F.3d 1372, 1379 (9th Cir. 1998). The DEIS does not discuss the extent to which existing management programs, especially roads and logging, DEIS at 3-52, are affecting water quality. We are especially concerned about cumulative impacts from the 1,800 miles of existing system roads within the forest. While some road decommissioning is proposed, a large road system will remain, so the cumulative effects of sedimentation from the remaining system and proposed additions to it must be disclosed and considered.

Similarly, the DEIS does not analyze in any detail impacts from activities on surrounding state and private lands. The DEIS also assumes that activities on private lands will remain relatively constant, when in fact private land development near the forest is predicted to increase enormously,⁵¹ with, presumably, corresponding increases in sediment-generating activities. The Forest Service’s contribution to the sediment load in watersheds containing GW land cannot properly be evaluated in isolation, but must be considered in light of all current and anticipated impacts on these watersheds.

The Watershed Condition Classification for sixth-level watersheds in the GW shows that many are already “functioning at risk.” See attached maps of FS Watershed Condition Classification – Region 8 and GW area and see additional information at <http://www.fs.fed.us/publications/watershed/>. This presents a bleaker picture of existing conditions than the DEIS seems to acknowledge. The DEIS should acknowledge these existing conditions and, in light of them, should carefully analyze and consider the effects, especially the cumulative effects, of increasing ground disturbing activities and, presumably, increasing sedimentation, as proposed in Alt. G.

Given the effort the Forest Service has invested in the national Watershed Condition Framework and the first step in implementing that Framework, the WCCs, it is perplexing that we can find no mention of the Framework or WCCs in the draft documents. See USDA-FS, Watershed Condition Framework: A Framework for Assessing and Tracking Changes to Watershed Condition, FS-977 (May 2011) (available at http://www.fs.fed.us/publications/watershed/Watershed_Condition_Framework.pdf). The GW should explicitly disclose and consider the Framework and the WCCs in forest planning, and the revised plan should commit to a restoration strategy for addressing identified risks to watershed health.

3. Aquatic Species Viability Evaluation.

The NFMA regulations require that *“Fish and wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the*

⁵¹ A Forest Service report predicted the GW will experience the greatest increase in housing development on adjacent private lands of all national forests nationwide. USDA-FS, *National Forests on the Edge: Development Pressures on America’s National Forests and Grasslands*, PNW-GTR-728, at 9 (Aug. 2007) (available at <http://www.fs.fed.us/openspace/fote/GTR728.pdf>). Other research shows that Virginia’s public lands are under pressure from adjacent development of various kinds. See generally H. Ken Cordell and Christine Overdevest, Principal Authors, *Footprints on the Land: An Assessment of Demographic Trends and the Future of Natural Resources in the United States* (“Hotspot” maps previously submitted); housing density forecasts by SILVIS Lab, Dept. of Forest and Wildlife Ecology, Univ. of Wisconsin – Madison (maps previously submitted) (forecasting dramatic increases in housing density in Virginia and across the southeast by 2030).

planning area. For planning purposes, a viable population shall be regarded as one which has the estimated numbers and distribution of reproductive individuals to insure its continued existence is well distributed in the planning area. In order to insure that viable populations will be maintained, habitat must be provided to support, at least, a minimum number of reproductive individuals and that habitat must be well distributed so that those individuals can interact with others in the planning area.” 36 C.F.R. § 219.19 (emphasis added).

The regulations further require that ~~the~~ forest planning shall provide for diversity of plant and animal communities and tree species consistent with the overall multiple-use objectives of the planning area. Such diversity shall be considered throughout the planning process. *Inventories shall include quantitative data making possible the evaluation of diversity in terms of its prior and present condition. For each planning alternative, the interdisciplinary team shall consider how diversity will be affected by various mixes of resource outputs and uses, including proposed management practices.*” 36 C.F.R. § 219.26 (emphasis added).

The DEIS does not adequately disclose and consider the effects of each alternative on aquatic species viability and diversity, or describe in sufficient detail how and to what extent the management direction under each alternative would promote species viability and diversity.

The DEIS asserts that preferred Alternative G is expected to increase protection for all 150 aquatic species analyzed, compared to the 1993 plan. DEIS at 3-163. The DEIS does not disclose the extent to which protection would increase, how it would increase, or whether under this alternative the FS would meet its legal obligation to do all that it can to maintain viable populations of these species. We assume the increased protection will be provided through, for example, widened riparian corridors. We also observe, however, that Alt. G would disturb significantly more acres of land than the 1993 plan. This casts doubt on the assertion that Alt. G would increase protection. The final EIS must further support the assertion that protection will increase under Alt. G.

In any case, the viability of many aquatic species is already at risk, and the viability evaluation results indicate that many of these species will remain at risk. DEIS, Appendix H, Table 5. A large number of aquatic species in the forest, including all fish and mussel species of viability concern, are sensitive to sediment. DEIS, Appendix H, Table H4. As mentioned above, Alternative G is expected to produce the second-highest amount of sediment of all alternatives. This suggests potential for significant adverse impacts on the viability of these species. Rather than merely making comparisons to the 1993 plan, the EIS should fully assess and disclose the extent to, and means by which, all alternatives, in and of themselves, would undermine, maintain, or promote the viability of these species.

The aquatic viability determinations do not provide much clarification—they merely indicate whether the species is presently at risk and whether the extent and location of FS lands are conducive to positively influencing the species’ sustainability. DEIS at 3-162. How would alternative management plans, as implemented, *actually affect* species viability? If the change is positive, through what mechanisms will it be accomplished? Again, there is no indication of what the FS will actually do to promote aquatic species viability for any of the potential outcomes—to what extent would the alternatives promote the viability of at-risk species through management activities (e.g., by avoiding activities that would increase sedimentation, by restoring and enhancing water quality and aquatic habitat, by providing the optimal aquatic

habitat and water quality which cannot be ensured on private lands, etc.)? Or to what extent do the alternatives leave unchanged or exacerbate stressors facing those species? As far as we can tell, the DEIS does not analyze and disclose this information and factor it into its consideration of the alternative management approaches. This analysis is needed even if much of a species' habitat is on private land; although an aquatic species may not be physically present on FS lands, the rivers or streams it occupies may be fed by streams flowing off the forest.

This analysis is inadequate under both NEPA and NFMA.

4. Impacts in key watersheds.

The EIS also cannot ignore the prospect of significant localized impacts. The DEIS states that —the effects of future management on NFS lands may result in some localized effects . . .” DEIS at 3-52. These effects must be analyzed in addition to those on a broader watershed scale. The DEIS analysis of cumulative impacts on aquatic species habitat, and the aquatic species viability evaluation, only considered effects at the fifth-level watershed scale. DEIS at 3-158; 3-160. Given that the priority watersheds are identified at the sixth level, it is important to understand impacts on water quality and aquatic species at that level. It is particularly important to consider how the proposed plan is likely to impact the sensitive and important resources for which the priority watersheds were identified. TESLR species are often limited to a few isolated populations and vulnerable to local extinctions. Such impacts cannot be masked or ignored by only considering impacts on broader landscapes. Pacific Coast Fed'n of Fishermen's Ass'ns v. NMFS, 265 F.3d 1028, 1035–36 (9th Cir. 2001). As noted above, the Forest Service's Watershed Condition Class analysis also is at the 6th level.

For example, Wild Virginia's GIS analysis of Alternative G revealed that, based on the management prescriptions' road construction standards, 94% of the Drinking Watersheds national forest land, 88% of the Priority Watersheds national forest land, and 92% of “local drinking watersheds” national forest land (watersheds identified in Wild Virginia's *The State of Our Water*) would be open to either permanent or temporary road construction.

Similarly, much of the land in these watersheds would be suitable for timber production. The 438,000 acres of the GW that are suitable for timber production in the draft plan represents roughly 41% of the total land base. Approximately one third, or 33%, of the Drinking Watershed lands would be suitable. About 36% of Priority Watersheds would be suitable, and about 39% of “local drinking watersheds” would be suitable. The particular impacts of road construction and logging (and attendant ground disturbance) in these important watersheds has not been disclosed and considered. In watersheds already identified as priorities for restoration, the Forest Service should consider taking a somewhat more limited approach to road construction and other ground-disturbing activities that can adversely affect water quality, rather than improve it.

5. Karst

The analysis of impacts on groundwater is also lacking. While alternatives are ranked by the potential miles of road construction, it is not clear what the extent of the impacts would be. The DEIS again seems to suggest that groundwater will not be significantly adversely affected due to plan standards common to all alternatives. These standards, however, tend to broadly

require the Forest Service to locate and design projects so as to —miimize” effects on groundwater, and would not eliminate the prospect of any adverse impacts. See, e.g., Draft Plan at 4-21 (FW-214; FW-215a). The Geologic Area management prescription affords additional protection to geologic resources, but does not cover every area of the forest where karst is found. Karst is widely distributed across every district in the forest. DEIS at 3-51. Especially in karst areas, it is critical to assess the cumulative effects that disturbances could have on groundwater resources.

6. Determination of insignificant impacts is unsupported.

NEPA requires the agency to support its conclusions with analytical data, thereby providing the public with —a basis for evaluating the impact” of its action. Idaho Sporting Cong., 137 F.3d 1146, 1151 (9th Cir. 1998). While conceding that there may be some localized effects (without specifying them), the DEIS vaguely concludes that —the effects of future management on NFS lands may result in some localized effects, but overall should not contribute to any measurable downstream impacts.” DEIS at 3-52.

This conclusion is unsupported. First, as discussed in the previous section, the impacts analysis is incomplete and often vague. Second, the FS rests this conclusion largely on forest plan standards and guidelines for soil, water, and riparian resources. Id. While some forest-wide standards generally call for protection of water resources, this hardly guarantees the absence of any measurable or significant impacts.

First, the width of the riparian corridor should track the width of the SMZ under the Virginia Department of Forestry Best Management Practices (BMPs) for Water Quality. BMPs call for a streamside management zone (SMZ) width of 150’ for streams (both perennial and intermittent) or lakes that are municipal water supplies and have adjacent lands with a slope between 11% and 45%. The SMZ width is 200’ when the adjacent land slopes 46% or more. Virginia DOF BMPs for Water Quality Technical Manual (2011) at 37. However, in the draft plan, the minimum riparian corridor widths for perennial water bodies in the same slope classes are only 125’ and 150’, respectively. The minimum riparian corridor widths for intermittent streams in the draft plan fall considerably short of Virginia BMPs in all categories of land slope, since the BMPs do not distinguish between perennial and intermittent streams. Draft plan, Appendix A, Table A-1.

The tables below illustrate these differences:

Adapted from Table A-1 in draft plan. Riparian Corridor Minimum Widths for Perennial Streams, Lakes, Ponds, Wetlands, Springs, Seeps

	0-10% Slope	11-45% Slope	45%+ Slope
Minimum feet in width - Draft Plan	100	125	150
Minimum feet in width – Va BMPs for Municipal Water Supplies	100	150	200

Adapted from Table A-2 in draft plan. Riparian Corridor Minimum Widths for Intermittent Streams

	0-10% Slope	11-45% Slope	45%+ Slope
Minimum feet in width - Draft Plan	50	75	100
Minimum feet in width – Va BMPs for Municipal Water Supplies	100	150	200

Second, the riparian corridor management prescription restricts activities around aquatic environments, but this would likely only mitigate impacts rather than completely eliminate them. A riparian corridor is only part of a riparian area, which is defined as an area “with three-dimensional ecotones of interaction that include both terrestrial and aquatic ecosystems” that extends “down into the groundwater, up above the canopy, outward across the floodplain, up the near-slopes that drain into the water, laterally into the terrestrial ecosystem, and along the watercourse at a variable width.” Draft Plan at 4-109. Within riparian corridors, any disturbances that concentrate runoff, cause erosion, or transport sediment into stream channels need only be rehabilitated or mitigated to *reduce* or eliminate impacts. *Id.* at 4-112. In addition, oil and gas leasing is allowed, grazing is allowed, timber harvest may occur around the core of the corridor,⁵² roads, motorized trails, and recreation facilities may in some circumstances be located within the corridor, and other ground-disturbing activities may be allowed if it is determined they would cause more resource damage outside the corridor. *Id.* at 4-414 to 416. And ground-disturbing activities outside the riparian corridor still can contribute muddy runoff to streams. Mitigation and BMPs can reduce impacts but cannot completely avoid or eliminate them.⁵³

The DEIS also claims that the natural recovery of watersheds will prevent any measurable impacts. There are no studies or data referenced in the DEIS that suggest watershed conditions are improving, and the WCC seems to find otherwise. In fact, the DEIS states that roads “continue to be a chronic source of sediment and additional inputs may be detrimental to water quality” and “sediment that enters a channel can remain in the system for years, even decades . . .” *Id.* Further, “[r]oads located within the riparian corridor that either parallel or cross a stream present the greatest potential for allowing pollutants into surface waters.” DEIS at 3-156.

According to the DEIS, the plan will fully protect drinking water quality. *Id.* at 3-51. Drinking water watersheds are a priority for restoration. Draft plan at 2-2. However, there is no specific management prescription or standards for these areas. Even relatively minor potential

⁵² Logging should not be permitted in the riparian corridor.

⁵³ The poor implementation and effectiveness of BMPs has been documented in, for example, a report by a former Forest Service fisheries biologist and others, who wrote, among other conclusions, that “[t]he reality is that BMPs cannot protect aquatic resources from the effects of excessive development,” and that BMPs “do not deal with cumulative effects. . .” Espinosa Jr., F.A., et al., *The Failure of Existing Plans to Protect Salmon Habitat in the Clearwater National Forest in Idaho*, 49 J. Env'tl. Mngt., 205, 225 (1997).

impacts need to be assessed in light of existing conditions on the forest, especially impacts on both relatively pristine watersheds and watersheds already in need of restoration.

Given its heavy reliance on forest plan standards and guidelines as an apparent means of reducing impacts to insignificant levels, the FS must provide a more detailed account of mitigation measures that would be put in place and how they would ensure achievement of the predicted outcomes. See Pacific Coast, 265 F.3d at 1037 (affirming finding that the agency failed ~~to~~ adequately explain its assumption that passive restoration will adequately mitigate the adverse impacts of logging.”). It seems clear that not all potentially threatening activities will necessarily be excluded from even sensitive watersheds. The EIS also needs to thoroughly discuss the expected impacts from activities outside of riparian corridors and karst areas, and explain what mitigation and restoration measures will be taken and how they will offset these impacts. How will existing detriments to water quality be addressed? For example, the DEIS mentions that ~~“small increments”~~ will be added to the existing 1,800 miles of roads in the forest, DEIS at 3-53. Will road decommissioning, especially in priority watersheds, offset the effects of new road construction and, if so, to what degree? A fuller picture of current conditions, new inputs, and planned mitigation is necessary for any meaningful assessment of the potential impacts on water quality under the proposed plan and alternatives.

C. The DEIS does not consider an adequate range of alternatives for activities and conditions that affect water quality, particularly those that contribute to sedimentation of streams.

As the DEIS acknowledges, the largest potential impact on water quality from forest management activities comes from sedimentation. DEIS at 3-40. The Forest Service should consider alternatives that would result in less sediment delivery to streams and rivers, lessening adverse impacts on water quality. The DEIS does not estimate the actual amount of sediment that would be produced by each alternative, instead using the amount of ground disturbance as a proxy for sediment production. As explained above, this substitution is seriously questionable because it assumes that (1) all ground-disturbing activities have equivalent effects with respect to sediment, regardless of the disturbance’s intensity, duration, or proximity to streams; and (2) all soil types that would be disturbed are equally prone to erosion.

Using ground disturbance as a proxy also does not take into account runoff from the existing 1,800 miles of system roads in the forest, which ~~“continue to be a chronic source of sediment.”~~ DEIS at 3-52. Five of the seven alternatives propose to decommission 160 miles of roads, while Alt. D would decommission 80 miles and Alt. A (no action) would not decommission any. DEIS at 3-272, Table C8.1. Without a comparison of sedimentation levels among the alternatives and an assessment of the impacts of these different road system sizes on water quality, it is difficult to determine whether this is an adequate range.

In its comparison of alternatives, the DEIS also should explain in finer detail the extent of the ground disturbance and sedimentation that would result from particular management activities. Providing a table that identifies how much overall ground disturbance would occur for each alternative is not sufficient. The nature, extent, and location of these ground-disturbing activities are relevant factors in evaluating the potential impacts on water quality from sediment production. Decisionmakers and the public need to understand the water quality consequences, particularly sedimentation, of varying levels of certain management activities for each alternative

in order to make an informed choice among them. This would include, for example, the water quality consequences of the timber program; road maintenance, construction and decommissioning; and oil and gas development. In neglecting to disclose and analyze this specific information, as well as the contribution of sediment from existing conditions, particularly roads, the DEIS does not sharply define the issues regarding water quality and sedimentation from forest management and provide a “clear basis for choice among options by the decisionmaker and the public,” as required by the CEQ NEPA regulations.40 C.F.R. § 1502.14.

It is not apparent under any alternative whether there would be a net increase or decrease of sedimentation compared to current levels, let alone what the significance of the net change would be. Again, the public’s ability to evaluate and compare alternatives and their effect on water quality and aquatic habitat and species is seriously hampered without an understanding of the extent to which those alternatives would increase or decrease sedimentation. Based on what the DEIS discloses, it is unclear whether any alternative besides Alt. C would actually improve overall water quality in the forest. The FS should provide more specific information on net sedimentation rates, taking into account expected forest management activities, existing roads, and road decommissioning, and make clear that it has considered alternatives that decrease sedimentation and enhance overall water quality.

IX. CLEAN WATER ACT

A. The Forest Service needs to consider whether its roads in the GW are point sources of pollution under the Clean Water Act.

Section 402 of the Clean Water Act (CWA) requires an NPDES permit for all point source discharges of pollution. Sand and dirt, which are the primary components of sediment, are listed as pollutants under the CWA. See 33 U.S.C. § 1362(6). The CWA defines “point source” as:

any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged.

33 U.S.C. § 1362(14).

Thus, the text of the CWA makes clear that, should any road runoff be collected in ditches, gullies, culverts, or channels, the Forest Service must obtain an NPDES permit for that runoff. The GW should consider whether sediment-laden runoff from forest system roads that enters streams and rivers constitutes such point source discharges.

Recent court decisions have held that stormwater runoff that flows off roads into a system of ditches, culverts, or channels before entering streams or rivers qualifies as point source pollution and must be regulated as such under the CWA. The most recent case is Northwest Env’tl. Def. Center v. Brown, 640 F.3d 1063 (9th Cir. 2011), where the court held that stormwater runoff from logging roads “collected by and then discharged from a system of

ditches, culverts and channels” was a point source discharge. Id. at 1087. The court rejected the EPA’s attempt, through promulgation of the Silvicultural Rule, to exempt from regulation all stormwater runoff associated with silvicultural activities, including runoff from forest roads. Id. at 1079. This would be inconsistent with the CWA, which plainly prohibits the discharge of any pollutant from a point source without a permit, regardless of the manner in which the pollutant, in this case sediment, reaches the point source. Id. In other words, for the purpose of determining whether water pollution originates from a point source, the proper inquiry is into the means of conveyance, and it is irrelevant if the runoff reaches the “discernible, confined and discrete conveyance” through natural means, such as rainfall.

Northwest Env'tl. Def. Center echoed earlier decisions that also found that natural runoff delivered to streams and rivers through discrete conduits or channels constitutes a point source discharge. See Env'tl. Prot. Info. Center v. Pacific Lumber Co., 2003 U.S. Dist. LEXIS 25734, at *49-51; North Carolina Shellfish Growers Ass'n v. Holly Ridge Assoc., 278 F.Supp. 2d 654, 675-77, 679-81 (E.D.N.C. 2003).

We believe that many FS roads in the GW have drainage ditches or channels that funnel and convey sediment-laden runoff to streams. As part of its forest and transportation planning process, the Forest Service should identify and document these sources of pollution and address and remediate them. As explained in our comments on water resources, the effect that sediment production has on water quality and aquatic life is a major concern. The fact that this pollution violates the CWA only compounds the problem and reinforces the need for remediation.

Under the FS transportation regulations, for each national forest the agency is “required to identify the minimum road system needed for safe and efficient travel and for administration, utilization, and protection of National Forest System lands.” 36 C.F.R. § 212.5(b)(1). The minimum system is defined as the system “determined to be needed”: to meet management objectives in the forest plan; to meet statutory and regulatory requirements; “to reflect long-term funding expectations”; and “to ensure that the identified system minimizes adverse environmental impacts associated with road construction, reconstruction, decommissioning, and maintenance.” Id. Essentially, the minimum road system must be an environmentally and economically sustainable system. This regulation also directs that roads on each forest be reviewed to identify those which are no longer needed, so should be decommissioned or considered for other uses, such as for trails, with “priority to decommissioning those unneeded roads that pose the greatest risk to public safety or to environmental degradation.” 36 C.F.R. § 212.5(b)(2). To accomplish these tasks, the FS Handbook instructs the FS to conduct a travel analysis that takes into account factors such as: “environmental issues, such as soil and water resources, invasive species, and biological communities”; “the availability of resources for maintenance and administration of designated roads, trails, and areas”; and “economic costs and benefits.” Forest Service Handbook (FSH) 7709.55, Ch. 21.11(1). The Forest Service should “examine the major uses and environmental, social, and economic effects of the portion of the forest transportation system under analysis” and “analyze the risks and benefits associated with the current situation.” FSH 7709.55, Ch. 21.4(1).

As part of the travel analysis process (TAP) for the plan revision, as well as in the analysis of effects in the DEIS, the Forest Service should consider both the environmental and economic costs of maintaining roads that deliver sediment to streams through discrete channels

and are out of compliance with the CWA. Roads that substantially contribute to degradation of water quality should be a high priority for decommissioning.

In addition, EPA regulations require every state to adopt a tiered antidegradation policy, which must include the maintenance and protection of water quality in “waters of exceptional recreational or ecological significance” (Tier 3 water bodies). 40 C.F.R. § 131.12. Several rivers and streams on the forest are designated as Tier 3. Any pollution from forest roads into Tier 3 waters would be of particular concern and the Forest Service should identify and address it.

B. The Forest Service must comply with the BMPs required for forest roads exempt from CWA Section 404 permits.

Forest road construction and maintenance activities are exempt from the CWA § 404 permit requirement for the discharge of dredged or fill material into the waters of the United States, such as those caused by road crossings of streams, only

where such roads are constructed and maintained, in accordance with best management practices, to assure that flow and circulation patterns and chemical and biological characteristics of the navigable waters are not impaired, that the reach of the navigable waters is not reduced, and that any adverse effect on the aquatic environment will be otherwise minimized.

33 U.S.C. § 1344(f)(1)(E).

Army Corps regulations reiterate that these roads must be constructed and maintained in accordance with federal and state BMPs. 33 C.F.R. § 323.4(a)(6). These BMPs “shall include those detailed BMPs described in the State's approved program description pursuant to the requirements of 40 CFR 233.22(i)” in addition to fifteen “baseline provisions” found in the federal regulations. Id. These include requirements that “road fill shall be bridged, culverted, or otherwise designed to prevent the restriction of expected flood flows” and “design, construction and maintenance of the road crossing shall not disrupt the migration or other movement of those species of aquatic life inhabiting the water body.” Id. The regulations also disallow the unpermitted discharge of dredged or fill material into components of the National Wild and Scenic River System. Id.

It is important to note that these regulations cover both permanent and temporary roads, and apply equally to both construction of new roads and maintenance of existing ones. Therefore, all culverts and other fills for existing forest roads must be maintained to stay in compliance with BMPs, and future road construction, maintenance, or upgrades also must comply. If any road fails to comply with the relevant laws and regulations, including applicable BMPs, then it loses its exemption and the FS must obtain a § 404 permit from the Corps.

The state of Virginia has additional BMPs concerning stream crossings, such as specifications that roads follow gradients between two and 10 percent as much as possible and culverts be installed with 10 percent of their diameter below the streambed. Virginia Dept. of Forestry, Virginia’s Forestry Best Management Practices for Water Quality Technical Manual, 18, 44 (2011).

The Southern Region's Center for Aquatic Technology Transfer (CATT) has surveyed many road/stream crossings on forests around the Region, including the GW, and assessed whether they are providing for fish passage. CATT reports for the GW indicate that many crossings in the GW are impassable to fish and other aquatic organisms. Thus, those crossings are out of compliance with the mandatory BMPs described above. Of 60 crossings on the GW that CATT surveyed in 2006 and 2007, almost all were impassable or could not be determined to be passable. USDA-FS, Southern Research Station, Center for Aquatic Technology Transfer (CATT), Fish Passage Status of Road-Stream Crossings on Selected National Forests in the Southern Region, for 2006 and 2007; see also 2005 CATT report. In addition, the TAP for the GW plan revision states that 110 road segments on the forest have "known aquatic organism passage issues." George Washington National Forest Travel Analysis Process (TAP) (2011). These data suggest that fish passage problems at road/stream crossings may be prevalent throughout the forest.

In addition, several rivers on the forest are eligible for designation as National Wild and Scenic Rivers. As mentioned above, unpermitted discharge of dredged or fill material into these rivers is prohibited. The Forest Service cannot construct or maintain road crossings on these rivers without a § 404 permit.

The FS must either bring these roads into compliance with all applicable BMPs or lose the forest road exemption and obtain a § 404 permit from the Corps. Additionally, any new road maintenance and construction that occurs under the revised forest plan must comply with these regulatory conditions and BMPs to avoid § 404 permit review.

Again, the impacts of aquatic passage obstacles and the costs and feasibility of bringing all road/stream crossings into compliance with the BMPs should be considered in the TAP and in the identification of the minimum road system that is economically and environmentally sustainable. For example, the Forest Service will probably need to prioritize and focus its limited resources on properly repairing, upgrading, and/or maintaining the most needed roads, while decommissioning less needed roads which are adversely affecting water quality and aquatic species and would be unjustifiably costly to repair and maintain.

C. The Forest Service must not further degrade 303(d) streams, including any impaired due to sediment.

Section 303(d) of the CWA requires states to identify the waters within their boundaries that fail to meet water quality standards, and to establish a total maximum daily load (TMDL) for pollutants preventing attainment of those standards. 33 U.S.C. § 1313(d). The CWA further requires federal agencies to comply with all state water quality standards. 33 U.S.C. § 1323(a). NEPA also requires agencies to address their compliance with state water quality standards. American Wildlands & Native Ecosystems Council v. United States Forest Service, 1999 U.S. Dist. LEXIS 22243, at *22 (D. Mont. 1999). Therefore, the Forest Service must consider whether its activities cause or contribute to impairment and must avoid further degradation of 303(d) listed waters.

The DEIS lists 17 river and stream segments on the forest as impaired based on "benthic macro bioassessments," but neither the 303(d) list nor the DEIS disclose the cause of the benthic

impairment. DEIS at 3-41, Table A6.1.⁵⁴ It is our understanding that benthic impairments in general are often at least partly caused by sedimentation. The Forest Service should determine whether sedimentation from forest roads is contributing to these impairments and, if so, remediate it. Again, in the TAP and forest planning process, any roads that degrade already-impaired waters should be identified and should be a high priority for decommissioning, and the Forest Service should avoid increasing road densities in watersheds of streams impaired as a result of sedimentation.

X. OLD GROWTH

Old Growth Network: The Plan and DEIS fail to demonstrate how possible and future old growth constitute an old growth network.

The proposed Plan and DEIS define existing, possible, and future old growth in accordance with the Region 8 Old Growth Guidance. The DEIS discussion of the old growth network contains a discussion of possible old growth to demonstrate that there are small, medium, and large patches of possible old growth of various forest types totaling 224,537 acres. A parallel discussion of future old growth is used to document the acreage of future large old growth patches that will fall within different protective management categories. There is also a discussion of the Plan direction to treat possible and existing old growth of all old growth types except types 21 and 25 as unsuitable. The point of this discussion seems to be to demonstrate that an old growth network consisting of possible and future old growth provides an old growth network with sufficient representation and distribution to satisfy Region 8 Old Growth Guidance.

The fact that the Plan and DEIS seeks to implement Region 8 Old Growth Guidance is commendable. We support this goal and the GW has sought to make their Plan compliant with Region 8 Guidance to a greater extent than many Forests in region 8. However, we are troubled by the disjointed approach of jumping between different old growth categories in defining an old growth network and the DEIS fails to explain or throw light on this approach.

We understand the difficulty of attempting to address old growth issues and to consider existing old growth without an inventory of existing old growth on the GW. Possible old growth consists of stands with FS Veg stand data indicating compliance of the age with R8 guidance. However, given the notorious unreliability of both stand age and stand type within FS Veg data, existing old growth, once inventoried on the ground, could be significantly less than the pool of possible old growth. Possible old growth could be used to assess ballpark figures, but its unreliability should be recognized.

Future old growth includes forest falling within protected management categories, where forest would be expected to mature into old growth over the long term. This is a reasonable assumption and the management categories included in future old growth for the most part seem reasonable, although there is nothing to assure that some of these categories will remain past a planning period, making maintenance of old growth conditions over the long term questionable.

⁵⁴ Note that the DEIS references the 2008 303(d) list, but a 2010 list now is available and should be consulted instead.

Existing, possible, and future old growth as structured in the GW Plan and DEIS amount to categories of overlapping Venn diagrams where the extent of overlap is undefined. Some of this lack of definition is understandable. Existing old growth could be within both possible and future old growth as well as within forest found elsewhere, and this would not be defined until project-level inventories. The DEIS estimates the amount of future old growth in the different alternatives, but it is not clear how much of this is possible old growth currently – or will be possible old growth soon. Table B2 in Plan Appendix B lists possible and future old growth under different forest types, but again it is not clear how these two categories overlap. However, the amount of future old growth that is possible old growth now is easily identified and should be disclosed.

It is also not clear from Plan Direction whether the large, medium, and small patches identified within possible old growth will remain old growth patches in the future. Patches found to be existing old growth (and not of Types 21 and 25) would receive Plan protection as existing old growth. However, the Plan seems inconsistent on the treatment of possible old growth that doesn't satisfy all 4 Region 8 criteria for existing old growth. The DEIS seems to envision protection of possible old growth, as well as existing old growth:

Each alternative evaluated in detail includes management prescriptions that either have the intent of protecting possible old growth and expanding it, or of providing old growth indirectly as the result of management focused on other values, such as primitive recreation. (DEIS 3-146)

However, the Plan itself seems to envision protection of only existing old growth:

FW-77: Inventory stands for existing old growth conditions during project planning using the criteria in Appendix B (Guidance for Conserving and Restoring Old Growth Forest Communities on National Forests in the Southern Region (Forestry Report R8-FR 62, June 1997)). Consider the contribution of identified patches to the distribution and abundance of the old growth community type and to the desired condition of the appropriate prescription during project analysis. For purposes of project planning, the following old growth forest types are considered well-represented in the current inventory of existing old growth for the George Washington National Forest: the Dry Mesic Oak Type (FSVEG forest types 51, 53, 54, 55) and Dry & Dry-Mesic Oak-Pine (FSVEG forest types 42, 43, 44, 45, 46, 47, 48) Forests and may be managed using standard silvicultural practices. FW-78*: Following project analysis, inventoried old growth will be identified, mapped and subject to old growth management direction. (Plan 4-8)*

On the other hand, the draft plan direction would seem to protect only inventoried, existing old growth. Presumably, possible old growth would be protected until project inventory, but after inventory only those stands found to meet all R8 criteria for existing old growth would be protected (and the future old growth areas). This raises the question of the integrity of large and medium patches identified in the DEIS. The Plan states:

“Large patches are greater than 2,500 acres and are always made up of Future Old Growth with medium and small patches of Possible Old Growth imbedded. (Plan Appendix B-1)

However, the Plan and DEIS provide no details of how large patches were established from future old growth. Other portions of the DEIS imply that large patches were established out of possible old growth rather than future old growth:

The network, or spatial distribution, of old growth by patch size is of importance as described in the Regional Guidance report. Currently (2010) the inventory of possible old growth identified 1,749 small patches (1-99 acres) totaling 58,773 acres, and 450 medium sized patches (100-2,499 acres) totaling 152,657 acres, and 7 large patches (>2,499 acres) totaling 33,107 acres across the GWNF. The average size of small patches is 34 acres, 339 acres for medium sized patches, and 4,730 acres for large patches. Table B3.2 shows the current condition of patches and their condition projected to be in 10 and 50 years from now. (DEIS 3-146)

It may be that large patches are future and possible old growth, but this is not disclosed, it seems counter to what the DEIS says, and it would be somewhat unusual for all large clusters of possible old growth to fall within future old growth categories. Presumably, a significant amount of possible old growth falls outside the future old growth areas, would not meet all of the fairly stringent criteria for existing old growth, would not be classified as existing old growth, and would not be protected, thus resulting in fragmented remnants of medium (and possibly large) patches. Perhaps the intention is to maintain protection of large and medium possible old growth patches identified in the plan; in this case the plan direction should be clarified.

On the other hand, if the intention is to drop possible old growth stands from protection if they don't fully satisfy criteria for existing old growth, the Plan is misleading in saying: *“This Forest Plan contains a network of old growth areas composed of both Possible and Future Old Growth. This network consists of a mix of large, medium, and small patches.” (Plan B-1)*. If this is the case, the DEIS fails to adequately analyze and disclose the transition between a reliance on possible old growth as the basis for an old growth network and a future old growth scenario. This should be clarified in the Plan and EIS.

The Plan should better deal with the representation issue within the context of the Plan framework of old growth patches.

The DEIS contains a Table of possible old growth by forest type and a discussion of representation. However, in considering forest representation in the context of the issue of whether possible old growth patches will remain intact (see above) it raises the issue of representation. Analysis of representation is based on the possible old growth inventory. If the old growth network transitions to greater reliance on future old growth patches during the life of the plan, how will different forest types be represented. This should be analyzed and provisions made for representation.

The Plan should better deal with the distribution issue within the context of the Plan framework of old growth patches.

The DEIS only touches on old growth distribution. The Plan states that: *“This Forest Plan provides large patches of old growth in every Ecological Subsection.”* (Plan B-1) This leaves the question of how these patches are distributed across the landscape. The DEIS should address the distribution issue beyond just noting that every Ecological subsection has a large patch. Other Forest Plans (e.g. Nantahala/Pisgah Forest plan) have addressed distribution by addressing large, medium, and small old growth patches within each watershed and compartment, assuring that every watershed has a large patch or system of medium patches and that each compartment has a portion of a large or medium patch or a representation (5%) of small patches. Representation should be better analyzed in the EIS, and the Plan should provide for distribution on scales appropriate for the landscape (such as by watershed and compartment).

Protection of existing old growth – The rationale for planning of harvest of existing old growth is flawed and lacks criteria.

The old growth direction in the Forest Plan and Appendix B is based on the Region 8 Old Growth Guidance. We support this reliance on regional guidance. However, by jumping between the analysis of possible, future, and existing old growth, the Plan comes up with direction that needs further refinement. The Plan acknowledges that there is no comprehensive inventory of existing old growth.

There has been no formal inventory of old growth done for the George Washington National Forest. A preliminary inventory of possible old growth and future old growth for the George Washington Forest Plan Revision is based upon the report of the Region 8 Old Growth Team entitled Guidance for Conserving and Restoring Old Growth Forest Communities on National Forests in the Southern Region (Old Growth Guidance). (Plan B-1)

However, the Plan and DEIS essentially use the analyzed possible old growth and future old growth to project an overabundance of existing old growth in Dry-Mesic Oak Forest and Dry and Dry-Mesic Oak-Pine old growth forest types.

This leads to a Plan standard that is plainly inconsistent with the agency’s other findings regarding old growth inventories. As quoted above, proposed plan standard FW-77 states that ~~the~~ following old growth forest types are considered well-represented in the current inventory of existing old growth for the George Washington National Forest: the Dry Mesic Oak Type . . . and Dry & Dry-Mesic Oak-Pine. . . and may be managed using standard silvicultural practices.” Plan at 4-8. However, the Plan elsewhere admits that there is no such ~~inventory~~ of existing old growth” for the GWNF. Plan at B-1. Therefore, the asserted rationale that these types of existing old growth may be logged because they already are well-represented in the forest’s inventory is erroneous, is unsupported, runs contrary to the agency’s other findings that existing old growth is very rare in the Southeast, and therefore would be arbitrary and capricious.

Further, the Plan contains unclear direction regarding the consideration of these two types of existing old growth when inventoried at the project level. The Plan states:

Existing Old Growth, as it is verified on the ground, will be managed based on the old growth forest type and the representation of that type in the Existing, Possible and Future Old Growth inventories. In Northern Hardwood, Hemlock-Northern Hardwood, White Pine-Northern Hardwood, Spruce Northern Hardwood, Mixed Mesophytic, Hardwood Wetland Forests, Dry and Xeric Oak Forest, Xeric Pine and Pine-Oak Forest and Woodland, Eastern Riverfront, Rocky, Thin-Soil Conifer Woodland old growth forest types, any existing old growth will be unsuitable for timber production. In the Dry-Mesic Oak Forest and Dry and Dry-Mesic Oak-Pine old growth forest types, any existing old growth, in areas otherwise suitable for timber production, will be evaluated to determine its suitability for harvest. (Plan Appendix B; B-2)

This language leaves it unclear what “evaluated to determine its suitability for harvest” means. What are the criteria for evaluating existing old growth in these forest types for suitability for harvest?

The Plan Chapter 3 Strategy states for these forest types:

If, during project analysis, it can be demonstrated that an identified existing old growth patch does not contribute to the Forest old growth inventory, then the patch could be suitable for timber production and harvest of the patch could occur. The project analysis will include a discussion of the old growth characteristics found in the area, the effect of the action on these characteristics, and the effect the action will have on the contribution of the area to the Forest’s old growth inventory. (Plan 3-24.)

The Plan Appendix B states:

Dry-Mesic Oak Forest and Dry & Dry-Mesic Oak-Pine Forest communities are well-represented in both Possible and Future Old Growth; however there are specific forest types within this broader community classification which are not well-represented. When evaluating newly discovered patches which meet the operational criteria for existing old growth in these community types, specific forest types should be considered separately for their contribution to the matrix of large, medium, and small old growth patches. If, during project analysis, it can be demonstrated that an identified existing old growth patch does not contribute to the Forest old growth inventory, then harvest of the patch could occur. The analysis will include a discussion of the old growth characteristics found in the area, the effect of the action on these characteristics, and the effect the action will have on the contribution of the area to the Forest’s old growth inventory. (Plan B-4).

While this Appendix discussion mentions what the analysis should contain, it is difficult to see what criteria would be used. What does the analysis address about the old growth characteristics found in the area? How would the effect of the action on these characteristics affect the value of the old growth? How would the contribution of the area to the Forest’s old growth inventory be evaluated? Establishing landscape distribution and representation criteria for

watersheds and compartments, as suggested above, would give some metric to help evaluate the contribution of the area to the Forest's old growth inventory. Without such criteria it is difficult to see how this would be applied. Is one of the specific forest types mentioned above sufficient for the forest; one per subsection. In most cases distribution across landscape units (e.g. watershed makes the most sense.

The discussion also ignores the fact that different definitions of old growth are being considered as though they were the same in the analysis. While an analysis of possible and future old growth may indicate an overabundance of Dry-Mesic Oak Forest and Dry and Dry-Mesic Oak-Pine old growth forest types, this is no guarantee that there is sufficient **existing** old growth of these types to provide adequate representation and distribution and over time to return the forest to its natural range of variation. Much of the possible old growth is not likely to qualify as existing old growth under Region 8 criteria. It will take a long period (far beyond the plan horizon) for some of the future old growth to qualify as existing old growth under Region 8 criteria. In the absence of an old growth inventory, there is no assurance that there is adequate existing old growth of these forest types or that there will be sufficient old growth within a reasonable time period. The plan should establish better criteria for how existing old growth of this type would be evaluated for considering them suitable for timber production. At a minimum, establishing criteria relevant to landscape analysis (e.g. watershed and compartment) would allow better analysis during project planning. Such criteria should be set forth in plan standards, not in appendices which may not contain binding management direction or which may be neglected in project planning.

However, we continue to strongly recommend that the revised plan protect all existing old growth, including these two types, for the reasons set forth in our prior comments, including: the rarity of existing old growth in the Southern Appalachians; the lack of a forest-wide inventory, verified with —on the ground” field surveys, of existing old growth in the GW; the fact that it will be decades before such an inventory is compiled from a patchwork of project-level surveys (as apparently is intended); and the many unique and important values of old growth forests. Certainly until the Forest Service can produce ample inventories and evidence to confirm its assertion that there are abundant quantities of well-distributed old growth in these two types existing in the GW, the agency cannot support its claimed rationale for logging these types of old growth forest.

The Plan and DEIS approach would overestimate existing old growth and pass up opportunities to incorporate old growth that will soon be high quality old growth.

Many possible old growth stands likely will not qualify as existing old growth. It will likely be long periods before some stands within future old growth sites qualify as existing old growth. Some stands within possible and future old growth may be so altered as to require very long periods (centuries) to regain natural species composition and structure as well as qualify under old growth criteria, and some —future old growth” stands are likely to have conditions such as non-native invasive infestations that will preclude them returning on their own to a native forest with a natural range of variation. On the other hand there are likely recovering stands that almost qualify as old growth or would qualify after a short period of additional recovery. The Plan makes no allowance for these conditions. As a result the reliance on possible and future old growth likely will significantly overestimate the existing old growth network. In addition,

opportunities to build old growth from some of the most promising sites that technically don't meet all of the criteria will be missed. The Plan should provide for flexibility in the old growth network to incorporate areas that address distribution and representation gaps in the old growth network. Possible old growth that was found not to qualify and future old growth that was far from old growth conditions could be replaced in the network by existing old growth or forest that was nearing old growth conditions. This could best be addressed if there were standards for old growth distribution at the watershed and compartment level (see above) where project planning could identify and address gaps in the landscape old growth distribution.

XI. ECOLOGICAL RESTORATION

The Plan and DEIS fail to provide a framework for true ecological restoration of forest composition and structure.

The proposed Plan provides a number of emphasis areas, desired conditions and standards related to restoration. We are particularly pleased with the emphasis on restoration of watersheds, soil and water quality, riparian resources, and aquatic diversity. There are some standards relating to restoration of these resources that provides a framework for progress in restoring these resources. We do have concerns about the details of the proposed Plan and DEIS in this regard – see other sections of comments relating to riparian areas, aquatic species viability, and water quality. In other areas, notably the use of fire as a restoration tool, desired conditions and standards are structured in a way that ties plan direction for the fire program to the restoration of natural forest composition and structure in a way that is based on science and where restoration progress is verifiable and adaptive. Plan desired conditions and standards around invasive species also has direction that seems verifiable and efforts can be adaptive.

However, restoration related to silvicultural activities and the timber program in the Draft Plan is not based on the best ecological science. Instead, it is based on a simplistic model of rotational forestry. The proposed Plan and DEIS reflects a reliance on the assumption that a mosaic of successional forest is desirable and the natural condition of Southern Appalachian forests. This vision of desired conditions consists of a shifting mosaic of forest in different successional stages from early successional to late successional. Under this model, the forest should consist of a mosaic of early, mid, and late succession forest. The goal of the Plan is to readjust this balance, and the emphasis is on supplying adequate early succession habitat (ESH). The assumption that this is natural or desirable is not supported by science, runs counter to what is known about the ecology and the history of our forests, and fundamentally distorts what is known about natural forest conditions.

Current even-aged and successional forest conditions are the result of past logging. These conditions are not natural and should not be identified as the goal of restoration. The mosaic of even-aged forest stands is the relic of widespread clearcutting at the turn of the 20th century and ongoing use of even-aged silvicultural techniques. The ecological literature Runkle (1982, 1984, 1985, 1998), Whitmore (1989), Lorimer and Frelich (1994), Runkle and Yetter (1987), Martin, (1992), Schafale and Weakley (1990), Tyrell et. Al (1998) among many others clearly indicates that most forest types in the Southern Appalachians are all-age or uneven-age forest types that naturally function under gap phase disturbance and occasional larger disturbances rather than successional forests that are primarily even-aged. Indeed Forest Service records reported in the

early works of W.W. Ashe and others as well as more recently by Quentin Bass (2002) reflect a clear record that these forests are currently even-aged only because of massive cutting at the turn of the twentieth century as well as ongoing reliance on even-aged forestry that creates and maintains mosaic stands of successional forest. This condition is not a natural condition for most Southern Appalachian forests except for some specific forest types or under specific conditions following major disturbances. This depiction of the GW in the Plan and DEIS as a mosaic of successional stands distorts ecological restoration goals and models, and creates an incorrect model of a healthy and dynamic forest.

These issues of scale and landscape structure of forest disturbance is pertinent to ESH as well as old growth and mid succession forest. The pattern of forest structure has been disrupted over the last century or more through alterations of disturbance patterns. Early succession is currently in high demand because a number of species in decline have been correlated with early succession habitat. A critical analysis also reveals that true existing old growth is also in extremely short supply in the Southern Appalachians. Much of the existing forest is in a mid age structure. Although a significant amount of this forest is classifiable as “mature” under the LANDFIRE framework, this is misleading. If forest age on national forest lands is graphed against acreage, one gets a classic bell curve, with very little early succession and very little old growth or near old growth. Most of the forest is in the bell surrounding the middle of the graph. This is also the forest that provides the least structural diversity and the least habitat diversity. The Plan and DEIS rely on the assumption that logging should be increased to provide early succession habitat. However, if logging or other vegetation management is concentrated in the rare forest that is nearing old growth, it would act to perpetuate the exiting distortion in forest structure as well as perpetuate the unnatural even age pattern of forest across the landscape.

Natural disturbance has provided a mix of habitat across evolutionary time. This occurred as a spectrum of disturbances ranging from gap phase through various sized disturbance to the rare large disturbance. These natural disturbances still operate (fire, ice, wind, tornado, hurricane, disease, natural mortality) and should be accounted for in forest planning and management. Ecological restoration as applied in the Southern Appalachians should seek to reestablish natural patterns of forest structure across the landscape that would have a natural range of variation. There is an appropriate role for vegetation management in restoration goals to reestablish the natural range of variation of forest ecosystems. There is even a good rationale for creating early succession in the short term to provide a bridge of habitat for species that would otherwise be in jeopardy. However, this early succession habitat should not be created from forest that was least altered or has largely recovered and is regaining uneven age structure and species diversity. The Plan and DEIS fail to prioritize silvicultural activities so that true ecological restoration will occur rather than perpetuate its current altered state. A large proportion of our forest is in a degraded condition with poor species diversity, shifted species composition, and a lack of structural diversity. Ecological restoration and vegetation management should be concentrated in the highly altered areas (under the swell of the bell curve and in degraded areas on the left of the bell curve). To be a legitimate ecological restoration framework the structural and landscape pattern distortions discussed above have to be addressed in the DEIS and Plan.

The Plan should address ecological restoration focused on the most departed forest within ecological systems.

The Draft Plan and DEIS focus vegetation management activities and the timber program on the creation of ESH. However this focus and the analysis in the DEIS ignores the fact that regenerated even age stands will not have the composition, structure, function or productivity of native forest ecosystems. There is also no indication that any supposed benefits from early succession habitat were weighed against maintaining and enhancing ecological integrity of the recovering forests or the contribution these recovered forests play in providing landscape connectivity and older habitat for the forest. The DEIS simplistically categorizes forest as early mid and late succession with some discussion of old growth. However, there is no discussion of how these current conditions relate to natural or reference conditions of the forest.

It is widely recognized that there is a major age and structural imbalance in the forests of the Southern Appalachians from massive logging at the turn of the 20th century. The mid-succession forests are vastly over-represented while there is very little true old growth forest. The DEIS and Draft Plan propose what is needed is more logging of these maturing forests to create early succession. However, in reality this approach holds the potential to perpetuate the structural problems of the forest by keeping the forest in an even aged condition that is never allowed to develop the structural diversity of our all-aged native forests. This natural structural diversity provides many of the habitat benefits of early succession habitat. While much of the current forest is mid-successional, relatively little is true old growth or recovering late succession forest that is developing the species mix and structure characteristic of the native forest.

There are highly departed portions of the GW National Forest that should be the main focus of the timber program and vegetation management for restoration. White pine stands and old clearcuts that have come back with little species or structural diversity would be excellent candidates for restoration. This focus would address longer term issues of ecological restoration of forest composition and structure while also contributing to habitat for early successional species.

Tools exist (some already within the DEIS and Plan) to address restoration using methodology grounded in ecological science. The DEIS and Plan make extensive use of “ecological systems” found in the GW National Forest. We understand that these ecological systems or zones were modeled for the Forest using the latest GIS modeling techniques. This model should provide a good picture of the potential natural ecological systems in the Forest. LANDFIRE, a tool developed and used extensively by the National Forest system, provides a tool for not only assessing potential and current vegetation composition and structure, but assessing the “departure” of current conditions from reference conditions. Forests have used tools such as this to assess restoration needs and opportunities.

For example, Cherokee National Forest has used a LANDFIRE model with biophysical setting descriptions updated and tailored to local conditions and incorporating old growth to assess current departure from reference conditions on the northern Cherokee National Forest (see <http://www.communityplan.net/cherokee/> visited 10/11/2011). This initiative has utilized ecological systems, updated to local conditions very similar to the model used on the GW. This type of assessment can be used to identify the most “departed” forest and conditions. It can also

be used to model the future outcomes of different restoration strategies. This can help to identify and prioritize restoration strategies that will move the forest toward conditions more in line with reference conditions. A scientifically based approach along these lines is needed in the Final EIS and Plan rather than the simplistic model of successional mosaics and minimum levels of ESH in the DEIS and Draft Plan.

The Proposed Plan and DEIS fail to address the role of natural disturbance and how plan implementation will interact with natural disturbance.

While the Draft Plan and DEIS acknowledge the role natural disturbances have played in the past in shaping the composition and structure of the forest, the DEIS and Draft Plan fail to examine this in any depth. The DEIS estimates natural disturbance at 1-2%. for example DEIS, p. 105:

The highest projected acreage of early successional forest created by timber management is 40,000 –50,000 acres (4-5%) at 10 years under Alternative D. The lowest is 16,888 acres at 10 years under Alternative C, which assumes no timber harvesting and only natural disturbances creating early successional forest, modeled at 1-2% (Table B2.11).

This level of natural disturbance is far below what is found in the scientific literature. Cove hardwood forest for example, considered among the most stable forests relying primarily on tree fall gaps, is routinely estimated to have 4% natural disturbance (e.g. Runkle, 1998). A level of natural disturbance of 1-2% is totally unrealistic and distorts the role of natural ecological factors. The EIS also fails to address the occurrence of natural disturbance in the future and the role that natural disturbance can and will play in providing habitat for early successional habitat (ESH) species. The DEIS and Draft Plan are also unclear on how natural disturbance will be tracked or estimated. The tools are now available to determine the extent of natural disturbance, and this natural disturbance should be accounted for in planning for ESH. This is particularly true with the likely increase of natural disturbance through non-native pests and increased severity of weather events with climate change.

The Plan should address national and regional direction on restoration

The Plan and EIS should seek to be in conformance with national and regional direction on ecological restoration. There is little evidence that the Draft Plan and DEIS has analyzed how this would be done or formulated a framework for this compliance. Interim Directives FSM 2020 address ecological restoration. This will presumably be replaced by directives currently being drafted, but they appear to be headed in the same direction as the interim ones. The interim directives state:

FSM 2020.2 – Objective

The aim is to reestablish and retain ecological resilience of National Forest System lands and associated resources to achieve sustainable management and provide a broad range of ecosystem services. Healthy, resilient landscapes will have greater capacity to survive natural disturbances and large scale threats to

sustainability, especially under changing and uncertain future environmental conditions, such as those driven by climate change and increasing human uses.

FSM 2020.3 – Policy

1. All resource management programs have a responsibility for ecological restoration including, but not limited to, management of vegetation, water, wildland fire, wildlife, and recreation. Management activities may range from monitoring resource conditions to manipulation of terrestrial and aquatic ecosystems to regulation of human uses.
2. Establish ecological restoration goals and objectives in strategic plans to maintain the adaptive capacity of ecosystems - recognizing uncertainty related to climate change. Identify opportunities to sustain ecological refugia that may serve as vital sources of ecological diversity. Develop goals and objectives within the framework defined by laws, Indian treaties, regulations, collaboratively developed public and Indian tribal values and desires, historical conditions, current and likely future ecological capabilities, a range of climate change projections, the best available scientific information, and technical and economic feasibility —to achieve desired conditions (FSM 1905) for National Forest System lands.
3. Ecological restoration activities should be planned, implemented, monitored, and evaluated in consideration of current and desired conditions and the potential for future changes in environmental conditions, including climate change.
4. Where appropriate, integrate resource management programs and projects to achieve complementary or synergistic results contributing to ecological restoration.
5. Collaborate across ownerships and jurisdictions to achieve landscape restoration objectives.
6. Within existing authorities, revenue from commercial uses of natural resources may be used to help fund restoration activities.⁵⁵

Some of the responsibilities in the interim directives are addressed in the draft Plan, but generally not in the context of ecological restoration and not to the extent that the Draft Plan would “Establish ecological restoration goals and objectives in strategic plans to maintain the adaptive capacity of ecosystems”. Also the implications of climate change to restoration and strategies for ecological restoration to climate change are not addressed. Neither is there an effort in the Draft Plan or DEIS to “Identify opportunities to sustain ecological refugia that may serve as vital sources of ecological diversity.” The final Plan and EIS should address this national direction on ecological restoration.

⁵⁵ *Id.*

Open woodlands

Throughout the DEIS and draft plan, the various discussions of the needs and goals for “open woodland” restoration and creation need to be clarified. Please also see our August 2008 comments, pp.35-37, regarding open woodlands; while the discussion of woodlands has been clarified since then, ambiguities and some concerning provisions remain.

In some places, the draft documents are more clear about the definition and intentions for open woodlands. For example, the DEIS states defines woodlands as open stands of trees with 25-60% canopy closure and asserts that they were once frequent in the southeast, being “maintained with frequent fire on xeric ridge-tops and south-facing slopes . . .” DEIS at 3-57. The DEIS explains that woodlands are “expected to occupy the most xeric sites of the dry and xeric oak forest, woodland, and savanna and the xeric pine and pine-oak forest and woodland community types. These community types are most likely to occupy sites that historically supported woodlands, savannas, and grasslands.” *Id.* In some cases, the draft plan suggests that restoration and maintenance of open woodlands would be accomplished by prescribed fire. For example, the draft plan states that open woodlands were “created and maintained largely by periodic fire disturbance regimes” and contains objectives for prescribed fire in forests and woodlands. Draft Plan at 2-8, 3-15-16, and F-32.

However, in other places in the DEIS and draft plan, open woodlands are discussed in more broad terms that create confusion about how and where open woodlands would be created or maintained and cast doubt on whether the plans for open woodlands would be appropriate ecological restoration.

Some confusion may have been caused by grouping of woodland communities into broad categories for “oak forests and woodlands” and for “pine forests and woodlands” (see, e.g., DEIS at 3-67; Draft Plan at 2-7-8). In many places, forests and woodlands are discussed together, without distinguishing between forest and woodland communities. This results in the suggestion that logging would be used create open woodlands. See, e.g., Summary at S-21 (“Timber harvest is used as tool to achieve some of the ecological objectives for regenerating forests and open woodlands.”); Draft Plan at 3-5 (“Forest strategies for maintaining and enhancing the Oak Forest and Woodland systems will integrate the use of timber harvest and fire. . . . Timber harvest will be another frequent technique of creating regenerating forests and creating desired more open canopy conditions.”); Draft Plan at 3-22 (“Commercial timber sales often provide the most cost effective method for creating early successional habitat, open woodland settings, and varied forest structures.”). In at least one place, the documents clearly contemplate logging to create open woodlands. See Draft Plan at 4-122 (In Mosaics of Habitat, “open woodland conditions are common and this habitat is enhanced from the integrated use of timber harvest and prescribed burning. . .”).

At the same time, the draft plan has very high objectives for the creation of open woodlands, proposing to put 8-11% of the forest into open woodland condition in the next 10 years. Summary at S-14. We cannot determine from the DEIS exactly how and where (on what types of sites) this would occur. For example, the DEIS Table B.1.1 indicates that Alt. G would put 13% of “oak forests and woodlands” and, additionally, 13% of “pine forests and woodlands”

into ~~open~~ canopy". Are these the planned open woodlands? Further, the DEIS Table B2.2, which shows the amount of various habitats that would be provided by the alternatives, shows that Alt. G would provide 118,278 acres of ~~Open Woodlands,~~" including ~~Open canopy pine, oak, mafic, cliff, riparian, cove, northern hardwood systems~~". DEIS at 3-71.

First, given the DEIS earlier discussion that open woodlands are created and maintained by fire on the most xeric sites, creating them in riparian, cove and northern hardwood systems would obviously be totally inappropriate. There are other problematic references to creating open woodlands in ecologically inappropriate riparian or mesic locations, e.g. ~~Open oak woodlands near riparian areas and in valley bottoms~~" (Draft Plan at 2-17) and ~~mature mesic and xeric pine/hardwood open woodlands~~" (Draft Plan at 4-122). This must be corrected. The EIS and plan must ensure that sites which are not naturally woodland-type sites are not converted to woodland conditions through a harsh regiment of logging and burning.

Second, converting 13% of the oak and pine forests in the GW into open woodlands (if indeed that is the intent), creating about 118,278 acres of open woodlands, would be an enormous amount, especially given that the DEIS estimates there are only 21,230 acres of it now. How will this be accomplished? How will the FS ensure that any woodland restoration is done only to restore natural community types on appropriate sites? The DEIS states that these open woodlands are created through prescribed burning. DEIS at 3-76. But other places in the DEIS and draft plan seem to contemplate using logging to create them. If the Forest Service intends to create them through logging, that intention must be disclosed. If not, the DEIS and plan must be clarified. These inconsistencies need to be corrected and the plans for open woodlands better explained.

Using commercial timber harvest and frequent, intense prescribed burning to convert non-woodland sites to woodlands would likely violate the NFMA prohibitions against forest type conversion and impairing the productivity of the land, as well as the NFMA requirements to maintain tree species diversity, maintain soil productivity, and restock after timber harvest, as well as Multiple Use Sustained Yield Act (MUSYA) requirements not to impair the productivity of the land.

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XII. CLIMATE CHANGE

The Plan and DEIS fail to provide a monitoring framework that identifies measurable goals/objectives for climate adaptation and mitigation and monitors progress towards them.

The proposed Plan and DEIS discuss climate adaptation and mitigation fairly thoroughly. Six strategies are outlined in the Plan for climate adaptation and mitigation:

1) reducing vulnerability by maintaining and restoring resilient native ecosystems; 2) providing watershed health; 3) providing carbon sinks for sequestration; 4) reducing existing stresses; 5) responding to demands for cleaner energy including renewable or alternative energy; and 6) providing sustainable

operations and engaging in partnerships across landscapes and ownerships. Plan 3-12

However, these strategies do not seem to lead to measurable goals or outcomes or other Plan direction where success or failure can be gauged. The above strategies could be attached to specific outcomes: e.g. forest restored to natural range of variation; watersheds restored to functioning condition class; estimates of carbon sequestered. While there are uncertainties in climate change and in specific targets that would make accomplishments within the strategies outlined, this is an excellent candidate for the adaptive management that the Draft Plan talks about as a means of dealing with uncertainty. Direction from the Chief on climate change (Climate Change Considerations in Land Management Plan Revisions; January 20, 2010) states:

Place increased value on monitoring and trend data to understand actual climate change implications to local natural resource management.

Monitoring climate change factors or any measures of the strategies above is not mentioned in the Draft Plan. The list of “Monitoring Tasks” in Appendix H of the Draft Plan does not list any items related to climate change or relating to the Draft Plan strategies. It is essential that the Plan incorporate measurable outcomes to measure the success of climate strategies so that the climate strategies can become a part of adaptive management.

The Draft Plan and DEIS fail to adequately address basic considerations of climate change.

The Forest Service Chief’s direction on climate change lists two basic considerations for evaluating climate change:

- How climate change is likely to modify conditions on the planning unit?
- How management of the planning unit may influence levels of global greenhouse gases and thus climate change?

Climate Change Considerations in Land Management Plan Revisions; January 20, 2010; p. 2.

The Draft Plan and DEIS discuss climate change and potential effects of climate change at length. However, this discussion does not actually address the two key considerations quoted above and does not lead to any Plan direction to address climate change. The direction states:

Most of the focus of the evaluation for plan revision will be to understand how climate change is affecting the planning unit to determine what parts of the plan need to be changed to maintain the commitment to sustainability. Ibid. p2

The Final EIS and Plan should carry the climate discussion further to determine Plan elements that would address sustainability and would provide direction and measures to address the 6 strategies identified in the Plan.

The Chief’s direction also states:

The evaluation should also include some discussion of how management of the planning unit may influence climate change. This would usually be limited to how the planning unit contributes to or mitigates the build up of greenhouse gases in the atmosphere. Ibid, p.2

Aside from a very general discussion of carbon sequestration, the Draft Plan is fairly silent on this issue. This issue is most directly addressed here:

Biomass sequestration: Sustainable forestry practices can increase the ability of forests to sequester atmospheric carbon while enhancing other ecosystem services, such as improved soil and water quality. Planting new trees and improving forest health through thinning and prescribed burning are some of the ways to increase forest carbon in the long run. The most defensible options for managing forests for their carbon storage are keeping forests as forests, reforesting areas where forests historically occurred, using forest biomass to offset fossil-fuel use (burning forest biomass generally means that fossil fuel will not be burned), and promoting long-lived forest products such as wood-framed buildings. Forests (particularly older forests) generally store carbon better than forest products, so harvesting old-growth forests for their forest products is not an effective carbon conservation strategy (Harmon et al. 1990). However, harvest and regeneration of young to middle-aged forests for long-lived forest products can help with carbon storage (Ryan 2008). The Plan provides for a diversity of ages and structure in the forest to provide multiple strategies for addressing carbon storage. (Draft Plan; p. 3-14).

But this discussion seems designed to justify maintaining a status quo in the Draft Plan, rather than addressing the issue with specific measures that could be monitored and lead to adaptive management. No Plan direction or measurable items come out of this discussion. The implicit argument seems to be that plan direction already determined by other plan objectives is just the right choice. Yet this determination is made without testing assumptions that can be tested. Forest conditions that can be monitored lead to implications for carbon sequestration and climate mitigation. Carbon sequestration can be modeled and estimated under different management scenarios. Different management scenarios in different alternatives are not compared in the DEIS for their potential for carbon sequestration. The Final Plan and EIS must address the implications of different plan alternatives for carbon sequestration and climate mitigation.

We also question a number of assumptions in this paragraph. For example, this promotes replacing fossil fuels with forest biomass, suggesting implicitly that this will somehow reduce net carbon emissions. In fact, there are many questions around the carbon effects of woody biomass energy, this question is being studied, and its answer depends on many factors.

XIII. TIMBER SUITABILITY AND VEGETATION MANAGEMENT.

We have a number of questions and concerns with many of the critical elements which inform the determination of lands unsuitable for timber production and eventual management of

national forest system (NFS) lands. These include growth and yield modeling, stratification of lands, cost and revenue figures and their use in Spectrum modeling, the creation and application of constraints and the allowable sale quantity (ASQ). Throughout our examination of these topics, the lack of any tie to the effects of climate change in determining appropriate Forest Service management during the plan period and over the planning horizon is evident. We discuss this further below.

A. Calculating Growth and Yield

Accuracy of Data

The GW DEIS discusses the various data sources and software tools used to calculate growth and yield. But this calculation is only as good as the data inputted to the models. The DEIS reveals, —Not all lands on the Forest have received the same level of inventory (...) and stand examinations do not cover as much area as they did in the past.” DEIS, Appendix B-6. How much inventory and acres of stand exam have been conducted over the last plan period (1993-present)? What is the yearly average and trend for acres of stand exam over that same period? We are concerned with the drop in stand exam, not only on the GW but across the national forest system. Inaccurate stand data can lead to overestimations of growth and yield, high expectations for timber harvest, overscheduling of harvest, incorrect information on forest age-classes, and even situations where timber sale planners go out in the field to plan a sale and discover that the timber that exists in their records just isn’t there on the ground.

The DEIS also discusses the use of FIA plots to fill in data requirements for the Forest Vegetation Simulator (FVS). The DEIS discloses, —Whenever possible, data selected for a simulation was limited to FIA plots on National Forest System lands in Virginia to simulate conditions on the George Washington National Forest as much as possible. . . . However, in some cases (...) very few FIA plots were found within those constraints. In such cases, selection criteria were broadened to include first, all of Virginia, then to all of the remaining States until an adequate number of FIA plots meeting the working group/site index criteria were selected.” DEIS, Appendix B-14. How many FIA plots were located on the GWNF itself? How many selected were located in Virginia? How many other states’ FIA plots had to be used? What states were used and how many FIA plots were used from each state? The geological province, forest type and site index criteria are not the only elements affecting growth and yield. Elevation, soil type, slope aspect, as well as many other elements can all affect growth and yield. The lack of adequate FIA data combined with the lack of actual field confirmation of ground conditions via stand exam is a concern.

Role of Natural Disturbance

Natural disturbance plays a significant role in stand conditions and the growth and yield that is possible. The role of natural disturbance will only grow larger as the effects of climate change grow more severe, along with attendant changes in elements such as storm intensity and precipitation rates. Errata 3 to the DEIS reveals that quantifiable data is known about acres of natural disturbance, —Alternative A includes both early successional habitat created through natural disturbances and through timber harvest. Alternative C includes only early successional

habitat created through natural disturbances. Alternatives B, D, E, F, and G only display early successional habitat created through timber harvest.” Errata 3 – changes to DEIS Page 3-108, Table B2.11 and to DEIS Page 3-109, Table B2.12.

The GW has predicted 16,888 acres of natural disturbance created over a decadal period (Errata 3 – Correction to Table B2.11), apparently based on the estimated amount of early succession created annually through natural disturbances. Therefore, natural disturbance rates should be included and considered in all alternatives, not just two of them. This data should have been included to inform the assessment of the need for early successional habitat (ESH). (See our comments elsewhere in this document on the topic of ESH creation.) So, too, the amount of natural disturbance should have been modeled in the FVS and set as a constraint in the Spectrum modeling. The amount of ESH estimated to be created via natural disturbance is well within the acreage target for the ESH habitat component for Alternative F and just under the acreage target for Alternative G, the preferred alternative. And these figures were estimated based only on those NFS lands within the proclamation boundary. An all-lands approach focusing on assessment of habitat needs within the region as a whole would show additional ESH creation via both natural disturbance and human manipulation. The cumulative effects of natural disturbance combined with proposed management should be calculated in the same manner in all the alternatives and plainly disclosed. As discussed elsewhere in these comments, this would put the asserted need to create ESH into perspective and could allow the discussion of ESH needs to focus on the needs of specific species and on ecological restoration objectives.

We note too an anomaly between two corrected tables in Errata 3: Tables B2.11 (DEIS page 3-108) and B2.12 (DEIS page 3-109). Table B2.11 notes 16,888 acres of ESH created via natural disturbance for Alternative C at the 10-year mark. Table B2.12 notes 16,888 acres of ESH created via natural disturbance at the 50-year mark. This implies not a single acre of change in natural disturbance ESH creation over a 40-year period. It implies that 16,888 acres of ESH will be created via natural disturbance over each of those decades and that each acre of each previous decade’s acres will have regenerated into the next age class; that none of these acres, no matter their slope, aspect, soil type or any other factor will be subject to forces such as erosion, loss of soil productivity, flooding, etc. that will impede their growth into a new age class. And all of this will occur over the next 50 years when the effects of climate change are expected to be significant. Obviously, the numbers reported are likely unreliable at the 50-year mark. While it may be difficult to predict the effects over 50 years, some more carefully considered estimate (or a range that acknowledges uncertainty) should be given.

Role of Climate Change

As it has for a very long time, vegetation management drives many of the management activities that implement a plan. The plan DEIS will analyze and disclose environmental impacts and their significance, but it is the determination of timber suitability, the ASQ, budgets and forest plan itself that drive what will happen when and where in implementing a plan. Because of this it is critical that the effects and influence of climate change be more than just a narrative in the effects section of the environmental impact statement. Consideration of the effects of climate change must be considered when modeling growth and yield, must be considered when calculating the likely timber types and ecological communities that will remain in the plan area,

and must be considered when calculating costs and returns, including the cost of mitigation. In short, climate change must be considered in every aspect of the determination of timber suitability and the modeling that informs it.

We acknowledge that this is relatively uncharted territory. But the forest is modeling change and harvest over a 200-year planning horizon. Surely the effects of climate change will be apparent over this time. Resources exist to help the GW, some of them inside the agency in the various research stations, some of them through the wide area assessments this and other agencies have prepared. Getting down to the practical level, various climate change assumptions from the various climate models could be tested by setting a range of constraints that simulate potential changes and then conducting multiple runs with different constraints in each run. However the agency chooses to do it, during this critical phase of plan revision the agency must consider the effects of climate change on forest resources, rather than continuing to ignore them.

B Land Stratification

NFMA Requirements

The National Forest Management Act (NFMA) requires that the Forest Service —. . . shall identify lands within the management area which are not suited for timber production, considering physical, economic, and other pertinent factors to the extent feasible, as determined by the Secretary.” 16 U.S.C. 1604 (k). NFMA regulations set forth the requirements the Forest Service must follow in complying with the Act at 36 CFR 219. The NFMA dictates a three-stage process for the determination of suitable lands at 36 CFR 219.14.

Stage I [36 CFR 219.14(a)] requires that all National Forest System (NFS) lands be reviewed and lands within the following categories be identified as not suitable for timber production: (1) the land is not forest land; (2) technology is not available to ensure timber production from the land without irreversible resource damage to soils productivity or watershed conditions; (3) there is not reasonable assurance that such lands can be adequately restocked; (4) the land has been withdrawn from timber production by an Act of Congress, the Secretary of Agriculture or the Chief of the Forest Service.

Stage II [36 CFR 219.14(b)] requires that forest lands other than those that have been identified as not suited for timber production [in 36 CFR 219.14(a)] —shall be further reviewed and assessed prior to formulation of alternatives to determine the costs and benefits for a range of management intensities for timber production. For the purpose of analysis, the planning area shall be stratified into categories of land with similar management costs and returns. The stratification should consider appropriate factors that influence the costs and returns such as physical and biological conditions of the site and transportation requirements.”

Stratification of the land is done using GIS and the Spectrum model. Typically, six stratification layers are defined which are meant to divide the land into categories.

The stratification layers on the George Washington National Forest (GW) were defined as:

1. SAA Old Growth Community Type (Vegetation Type, aggregated into combinations of community types)
2. Site Productivity and Scenery Classes
3. Recreation Experience and Slope
4. Management Prescriptions Suitable for Timber Production
5. Successional Stage
6. Elevation

DEIS, App B-16 – B-18.

The test for the appropriateness of these stratifications is in how well they divide the land into categories with similar management costs and returns, and how well they consider factors influencing costs and returns, such as physical and biological conditions of the site and transportation requirements.

Physical and Biological Conditions

First of all, it is unclear how site productivity and scenery class in Level 2 are treated in relation to one another. There are four site productivity classes and three scenery classes. Were they integrated into 12 possible Level 2 choices or paired into 7 possible options? How were cost and returns valued across these options? Secondly, slope plays an important role in determining harvest methods and therefore costs, yet the only stratification in Spectrum for slope was in Level 3, where gentle slopes “ $\leq 25\%$, near existing roads” was a choice. Lands $\leq 25\%$ but not near roads and lands $> 25\%$ were not stratified. Proposed Forest Plan standards use a higher slope percentage (35%) to determine the types of harvest activities allowed. Therefore, we don’t understand why a break at 25% was used. Further, additional slope breaks above 25% should have been considered, to account for higher harvest costs as harvest methods change and harvest mitigation increases. The analysis was flawed in failing to consider slope and should be corrected. It is important to consider and disclose the amount of steep area proposed to be included in the lands suitable for timber production, especially the amount of area with slopes 35% or greater where ground-based methods cannot be used, to that there is a clear understanding of the methods, mitigations, and costs involved in harvesting those lands.

Third, as to Level 3, how were differences in costs and returns across recreation experience classes valued? The documentation provides no clue. Finally, elevation above 3000 feet was used for Level 6. The documentation doesn’t seem to address any differences between harvest at different elevations and there doesn’t seem to be a particular no harvest, harvest method or treatment type cut-off at 3000 feet. Please explain the need for this stratification level and how it stratifies the land into categories with similar costs and returns.

Transportation Requirements

The NFMA suitability regulation also requires that stratification consider the transportation requirements that influence costs and returns. The only consideration for access in

the stratification was in the category in Level 3, Recreation and Slope. The only stratification element was defined as “slope \leq 25%, near existing roads”. As this is tied to slope percentage, and distance to existing roads is not specified, this is not sufficient consideration of transportation requirements, which are pertinent and required factors under the NFMA and this rule.

A second explanation for the consideration of transportation requirements is given in FEIS Appendix B, page 21: —The amounts of road construction and reconstruction needed to access future timber harvests were not calculated in the Spectrum model for several reasons. Permanent road construction for the alternatives analyzed in the EIS ranged from 0 to 4.1 miles per year. Spectrum is not a spatial model, therefore it is difficult to address accessibility. However, costs of roads were included in the Present Net Value analysis.”

This explanation fails to fulfill the requirements of the NFMA and the rules for a number of reasons. First of all, there is nothing in the NFMA that says Spectrum must be used or that if a requirement is difficult it can be modified or dropped. Secondly, the Forest explained in the DEIS that GIS (a spatial model) was used to construct analysis areas. Third, roads are not located uniformly across the landscape. Because of this, transportation needs figure prominently in the cost of harvest. These differences will show up in the amount of resource coordination needed to determine and conduct any survey and engineering needs (on the Forest Service cost side) and the bid amounts submitted and the revenues collected (on the revenue side). Also, even with little new road construction, there may still be significant road reconstruction needs that impact harvest costs. The outstanding maintenance backlog is an indicator that roads have not been maintained to their maintenance class and significant reconstruction costs are likely. Fourth, other stratification layers, such as community type and site productivity, are not randomly located across the landscape yet could be grouped by similar conditions, just as distance from roads can be.

Finally, if the road construction costs were considered, averaging those costs out across all harvest and turning it into a per unit cost, as seems to have been done, wrongly treats road construction costs as uniform across all lands, when in fact road construction needs are highly variable and are a major factor in determining harvest costs. Therefore, lands must be stratified based on their access needs, as is explicitly directed by the 1982 rule. 36 C.F.R. § 219.14(b) (planning area shall be stratified into categories of land with similar management costs and returns; stratification should consider factors that influence costs and returns, including transportation requirements).

These problems must be corrected.

Costs and Returns

The application of cost and revenue figures in Spectrum fails to fulfill the requirements of the NFMA. A very small range of costs are given for particular activities with no explanation for how these ranges were applied in the model. They may account for Forest Service cost differences for particular silvicultural treatments, such as clearcut versus group selection, but more explanation is needed. Cost and revenue differentiations between logging systems do not

appear to have been estimated or applied either. Given the numerous factors on the Forest determining whether an area is tractor-logged, cable-logged or logged by helicopter (terrain, access, quality of product, proximity to markets, etc.) and stated GW intent to rely on helicopter logging for steep slopes and other conditions, this clearly should have been done.

The lack of cost and revenue differentiation by logging system fails to perform one of the central tasks of determining timber suitability under the NFMA. Analysis areas are to be grouped by considering factors that influence costs and returns. These factors include terrain (slope), access (transportation requirements), and quality of product (vegetative community type, site index, age class). The stratification in Spectrum should identify areas likely to be harvested by the different logging systems. Because the only stratification element that would do this instead differentiated only based on one factor (25% slopes near existing roads), the proper stratification based on the full range of logging systems does not appear to have been done. (Nor does any constraint appear to have been applied.)

In addition, a focus on ~~“appraisal groups with similar revenues”~~ (DEIS, Appendix B-20), without any range in value per unit, fails to consider the differences in costs for the successful bidder due to different harvest methods. These differences then affect revenues. Bid amounts for harvest via clearcut are likely to be different than bid amounts for harvest via group selection. And bid amounts for helicopter logging are likely to be different than they would be for conventional tractor logging for the same product class.

Grouping costs by appraisal groups with similar revenues serves only to solve one half of the Stage II suitability equation. Costs must be subtracted from revenues. As long as those costs are undervalued and represent only the least expensive cost total (by ignoring factors that drive up costs) the acres of suitable land will be overestimated because analysis areas where costs exceed revenues will remain in the solution. And as long as revenues are overvalued, ignoring factors which drive down stumpage receipts, the acres of suitable land will be overestimated for similar reasons. The excess of discounted benefits less discounted costs will be larger than it really is. ASQ will also then be overestimated as the number of acres of suitable land will be overestimated.

The definition of direct costs at 36 CFR 219.14 (b)(2) is explicit, ~~“direct costs include the anticipated investments, maintenance, operating, management, and planning costs attributable to timber production activities, including mitigation measures necessitated by the impacts of timber production”~~. Mitigation measures do not seem to have been accounted for at all in the cost calculations. This cost is especially tied to factors such as slope, proximity to streams, proximity to cultural resources, and proximity to threatened and endangered plant and animal habitat, all of which can be stratified. In addition, it is not clear what activities are included in the ~~“timber sale coordination with other resources”~~ category. DEIS, Appendix B-20. Does this include NEPA analysis and specialist field surveys? Where are long-term timber sale program planning costs accounted for?

Designation of Management Prescriptions by Alternative in Spectrum

No explanation was given for how the management prescriptions were mapped by alternative in order to serve as a stratification layer. The other stratification levels rely for definition on some physical characteristic, such as community type or site index. For example, a predominant vegetative community type defines every area. Areas can be differentiated by whether slopes are above or below a certain percentage. The management prescriptions present a different case. The prescriptions were mapped based on the emphasis of each alternative. This is especially true of the Mosaics of Habitat prescription which includes almost half of all forest acreage. No explanation is given for how these alternative mapping schemes were derived and decided.

In addition, because management prescriptions were inputted as a stratification level in the Spectrum model, rather than using the outcomes of the model to inform prescription mapping, and no apparent modifications to the prescription mapping appear to have been made after the model runs were conducted, significant unsuitable acres are included in management prescriptions which allow timber production. Under Alternative G, there are over 68,000 acres of unsuitable land located in the Mosaics of Habitat prescription (far more than the entire acreage of some of the other prescriptions). The presence of these “unsuitable in the suitable base” lands should be clearly acknowledged, so that their existence is understood and is not overlooked during project planning. A review of where these “unsuitable in the suitable base” acres are located may suggest boundary adjustments that should or could be made to remove more unsuitable acres from the prescriptions that allow timber production, to avoid confusion.

Negative Present Net Value Areas

The requirements for Stage III of the suitability process are described at 36 CFR 219.14(c). In part, “Lands shall be tentatively identified as not appropriate for timber production to meet objectives of the alternative being considered if – (1) Based upon a consideration of multiple-use objectives for the alternative, the land is proposed for resource uses that preclude timber production, such as wilderness; (2) Other management objectives for the alternative limit timber production activities to the point where management requirements set forth in §219.27 cannot be met; or (3) The lands are not cost-efficient, over the planning horizon, in meeting forest objectives, which include timber production” (emphasis added). And at §219.14(d), “Lands identified as not suited for timber production in paragraph (a) of this section and lands tentatively identified as not appropriate for timber production in paragraph (c) of this section shall be designated as not suited for timber production”.

As we discussed above, some unsuitable areas will be included in management prescriptions that allow timber production. What is unclear in the DEIS and Appendices is whether, and how many, analysis areas that were unprofitable to harvest (i.e. had a negative present net value in the solution) remain in the suitable base. We are interested in understanding the number of acres with a negative value and where they ended up in the management prescriptions. Appendix C in the Forest Plan states, “Economically inefficient lands include all Site Index 40 lands and those lands that are slopes greater than 55%, with the exception of those having a forest type of 48, 56, 53 and 81 (northern red oak-hickory-yellow pine, chestnut oak,

white oak-northern red oak-hickory, and sugar maple-beech-yellow birch).” Draft Forest Plan, Appendix C-4. Were these lands determined to be economically inefficient and they all just happened to share the characteristics detailed above? Or was the description above used as a proxy for economically inefficient lands somehow? We are confused since site index < 40 lands that also had a physical barrier were removed (along with all lands with a site index < 70 and a physical barrier) in Stage I of the suitability determination in the irreversible damage category. How many site index < 40 lands did not have physical barriers? And slopes were only stratified at 25% so how did the solution identify lands greater than 55%? Was a constraint applied? Please explain.

C. Constraints

Constraints are applied in Spectrum in order to apply appropriate limits, i.e. constrain the results, in order to account for various resource conditions and limitations. Little explanation is given in the Forest Service materials provided (Appendix B of the DEIS being the most appropriate location for such information). Some constraints are described but little explanation is provided for how or to what extent they constrained the model runs. Please provide a more detailed description of the constraints used, why they were used and the numeric values for the constraint in a revised or supplemental DEIS or if this is not prepared, in the FEIS.

We have questions about certain constraints described in Appendix B of the DEIS. Why was group selection limited to “only those lands with a gentle slope near an existing road network”? DEIS, Appendix B-22. Was this somehow related to cost and revenue factors? We are also interested in the constraint on harvest detailed on page B-23 of the DEIS Appendices. How was this constraint arrived at? Why was it applied? Did the constraint force a solution between the values listed or no more than the top value listed? Please explain.

The Long-Term Sustained Yield (LTSY) constraint “was used to ensure that the harvest of timber in the last decade is not greater than the long-term production capacity of the Forest. Long-term sustained yield capacity was computed using the acreage scheduled to each regeneration prescription applied in the model.” DEIS, Appendix B-22, emphasis added. This would seem to imply that not all acres were subject to long-term sustained yield requirements, a problem discussed in more detail below. The DEIS is a bit fuzzy on which harvest prescriptions are “regeneration prescriptions” and which are not. We notice the word “regeneration” added in various locations in the DEIS via Errata 3. Please explain further. There also is little explanation of how the harvest to create “open woodland” conditions is being treated either in the sense of volume, acres to be treated or regeneration requirements under NFMA, which we discuss in greater detail elsewhere in these comments.

D. Timber Production and Harvest on the GW

Conversion Factors

As we discussed at the beginning of our comments, the plan and DEIS have presented a significant challenge to understand and analyze due to the sheer number of errors, especially in the numbers presented. One of the most challenging aspects has been in understanding and

consistently applying the conversion factors to translate cubic feet to board feet and vice versa. The Forest has reported the use of a few conversion factors over time and in various locations in the documentation provided. We are still not sure if there is a consistent conversion factor in use here and do not believe that all tables have been corrected. For instance, Errata One contains a corrected Table C6.4 showing total timber volume sold by year from 1993-2009. It describes two wildly divergent conversion factors used over the years and then attempts to correct to a common factor. But it appears the factor used is itself a mistake (as a board foot now appears to contain multiple cubic feet instead of the other way around), leaving the public with no clear report on actual timber volume sold over the last plan period. These numbers were then carried over into the annual accomplishments budget data the Forest provided online, leaving us confused as to which data to trust.

What has not been provided is a clear answer as to why the Forest uses a conversion factor of 1 cubic foot = 5 board feet (if that is indeed the accepted factor on forest). We consulted numerous sources and have consistently found a conversion factor of 1 cubic foot = 12 board feet⁵⁶. Please explain what the accepted conversion factor is on the Forest and why it is used. We are especially concerned as forest staff members often have to provide data to the RO and WO in cubic feet, but due to training and experience often think in terms of board feet. Since many of the “important” numbers here are given solely in terms of cubic feet, we want to make certain of their meaning. The Total Allowable Sale Quantity (ASQ) and Total Timber Sale Program Quantity (TSPQ) are reported in the draft Plan as 54.3 million cubic feet (mmcf). Draft Plan, Appendix C-4. Please confirm that the Forest is therefore proposing a decadal ASQ of 271.5 million board feet (mmbf) (1:5) and not a decadal ASQ of 651.6 mmbf (1:12). Please also correct any other numbers in the draft Plan and DEIS which are still incorrect.

Forest Service Budget Limitations

It would be useful to see an estimation of likely yearly harvest expressed in millions of board (mmbf) or cubic feet (mmcf), rather than in average acreage spreads alone. Acreage and volume numbers together would give a better understanding of the intensity of harvest and would allow a more meaningful comparison with forest budgets. At least over the past several decades, due to National Forest System budget reductions, national forests rarely, if ever, have harvested up to their maximum ASQ. Given the current economic situation, recent and predicted agency budgets, and overall federal government efforts to reduce spending, it would be difficult for the GW or any other national forest to reach management goals which would require significant budget increases for the forest. Of course, increased collaboration and partnerships can help compensate and can help achieve ecologically-sound mutual goals, and work on this front is encouraging.

The timber program is of interest to many people, and this would help the public to understand what would be needed for each alternative to be fully realized. A clearly disclosed estimate of both harvest volume and acreage for all alternatives (with all necessary caveats about contributing factors that may change the eventual volume) and the corresponding budget levels that would be needed, as well as an explanation of the current forest budget, would be informative. The Forest Service has a responsibility under NEPA to adequately disclose the

⁵⁶ See <http://www.unitconversion.org/> for cu ft. to bd ft. conversion.

factors relevant to the decision at hand, and the relationship between the ASQ, the yearly timber sale program, and the budget is a relevant factor.

D. NFMA Requirements

Optimality Requirement

The NFMA has an “optimality requirement”, which reads in part,

“(E) insure that timber will be harvested from National Forest System lands only where –
... ”

- (iv) the harvesting system to be used is not selected primarily because it will give the greatest dollar return or the greatest unit output of timber; and
- (F) insure that clearcutting, seed tree cutting, shelterwood cutting, and other cuts designed to regenerate an even-aged stand of timber will be used as a cutting method on National Forest System lands only where-
 - (i) for clearcutting, it is determined to be the optimum method, and for other such cuts it is determined to be appropriate, to meet the objectives and requirements of the relevant land management plan.”

16 U.S.C. 1604 (g)(3).

In addition, the NFMA requires that any such even-aged cuts be “carried out in a manner consistent with the protection of soil, watershed, fish, wildlife, recreation, and esthetic resources, and the regeneration of the timber resource.” § 1604(g)(e)(F).

These requirements are usually met at the site-specific project level. But the draft plan has an overwhelming reliance on clearcutting and multiple shelterwood harvest systems: 98% of all GW harvest is proposed for these harvest systems, and group selection, the only uneven-aged harvest method, would be limited to areas of at least 100 acres, with gentle slopes and near existing roads. The DEIS should explain why there is a need for almost exclusive use of these harvesting systems that is not tied to trying to optimize the revenues so that the analysis areas are determined to be suitable. The Forest must show that clearcutting is the optimum method and that all even-aged management practices are “consistent with the protection of soil, watershed, fish, wildlife, recreation, and aesthetic resources, and the regeneration of the timber resource.” 16 U.S.C. § 1604(g)(3)(F)(v). This is especially important in the case of open woodlands management and the restocking requirements of NFMA as we discuss elsewhere in these comments.

E. Lack of Forest Plan Standards for Timber and Vegetation Management

The proposed Forest Plan contains few standards for timber and vegetation management. The few that do exist are often not written as absolute standards, but as guidelines with loopholes that make them almost meaningless as effective sideboards to plan implementation. We believe

there should be an additional standard for timber harvest on steep slopes: ~~“timber harvest shall not take place on slopes over xx%.”~~ In addition, we recommend a standard specifying that whole tree harvest shall not be allowed. (See also our prior comments on woody biomass harvesting issues). Finally, we recommend that there be standards for slash dispersion requirements following timber harvest.

XIV. SOCIAL AND ECONOMIC ASSESSMENT

A. NEPA Requirements for Analysis and Disclosure

To be adequate under NEPA, an EIS must provide a ~~full~~ and fair discussion of significant environmental impacts and shall inform decisionmakers and the public of the reasonable alternatives which would avoid or minimize adverse impacts or enhance the quality of the human environment.” 40 C.F.R. § 1502.1. The agency must take a ~~hard~~ look” at the environmental consequences of its proposed action to make possible informed decision making and dissemination of relevant environmental information. Robertson v. Methow Valley Citizens Council, 490 U.S. 332, 350 (1989); Strycker’s Bay Neighborhood Council v. Karlen, 444 U.S. 223, 231 (1980).

While the Social and Economic Impact Analysis in the DEIS contains a number of statistics and tables, it does not adequately consider and disclose the expected extent and significance of the effects of Forest Service actions and expenditures on local communities under the proposed plan. See 40 C.F.R. § 1502.16 (stating an EIS must discuss environmental consequences ~~and their significance~~”). A generic statement that a certain action might result in certain environmental impacts, without further discussion of the likelihood or significance of those impacts within the affected area under the proposed plan, does not provide the type of precise information necessary for informed decision making.

In the case of the Social and Economic section of the DEIS, even generic statements of impact are missing from the direct, indirect and cumulative economic environmental effects section, particularly as they relate to employment and labor income. The reader is left to decipher the impacts and their significance from a series of tables, as we discuss in more detail below.

B. IMPLAN Updated and Corrected Data and Opportunity to Comment

First of all, the IMPLAN data used is egregiously out of date when considering economic impacts. The national economy has changed immensely since 2000, which is the latest year used in the IMPLAN runs. The Forest has already acknowledged that the IMPLAN runs need to be done again with data corrected in the errata. This should have been completed before the comment period closed or the comment period should have remained open until the new data was provided to the public. Since this has not been done to date, once the new runs (with corrected and updated data) have been completed, the public should be allowed to provide input in a new comment period on the draft Plan and DEIS so the opportunity for meaningful public comment is afforded as required under NEPA.

D. “Associated With,” Not Caused By

Leaving aside the inadequacy of the IMPLAN data for the moment, another critical element of the analysis needs to be addressed. The DEIS discloses, ~~Due~~ to substitution effects from competing non-government sources (...), these jobs are characterized as being associated with local economic activity initiated by Forest Service programs and activities, rather than caused by these activities.” DEIS, page 3-293, emphasis added. This distinction is important as it would seem to indicate that the Forest Service has not or cannot determine with any measure of specificity the direct and indirect effects of its actions and their significance. As required under NEPA, the agency should do so or should more clearly explain why more precise information cannot be provided. The employment and labor income illustrate this point.

E. Employment and Labor Income

There are a series of tables (DEIS, pages 3-293 – 3-295, Tables C12.14, C12.15, C12.16 and C12.17) which appear to provide data on employment (numbers of jobs) and labor income (employee compensation and sole proprietorship income) by program by Forest Plan alternative, and by major industry by Plan alternative. The reader is left to decipher the meaning of various categories, the connections between them, and the results overall.

An initial look at the employment tables shows that the choice of Alternative G, the preferred alternative, would result in a 23.3% drop in the number of jobs locally. Review of the labor income tables show a drop of over 32% in local labor income for Alternative G. This would appear to be a devastating effect, but for a few facts which put this purported drop in context and show it is highly confusing and misleading.

First, it appears (although nowhere is it stated or explained) that these percentage figures probably are in comparison to the estimated outcomes of Alternative A if A had been fully implemented, which it was not, particularly regarding mineral development. Much of the change shown in the employment and labor income categories occurs in the mining and minerals sectors. Employment and labor income values are high in Alternative A and are much less so in Alternative G, the preferred alternative. But this difference would appear to be fictional. Alternative A represents the level of development planned for in the previous plan, not the actual level of development that has occurred over the last plan period. Because the level of mining predicted in the last plan never came to pass, the alternatives are being compared to a world (Alternative A) that never occurred. Instead, they should be compared to the actual conditions existing in the GW region (Alternative A as actually implemented).

Second, these results are not caused by Forest Service actions, but ~~associated with~~ them. This provides little in the way of useful disclosure of impacts under NEPA. Third, Table C12.18 (DEIS, page 3-296) analyzes the current role of Forest Service-related contributions to the area’s economy and reveals that ~~the~~ George Washington NF is associated with 0.12% of the total local economy’s jobs, and 0.10% of the labor income” (emphasis added). This then is an almost negligible effect and the fact that it is merely associated with Forest Service activities makes it even more difficult to understand the degree of impacts under NEPA. It also shows

there is no possible way for any alternative forest plan to influence total local employment and income by double digit percentages.

We look forward to the opportunity to comment once the IMPLAN data has been updated and run again. We hope that the Forest Service will provide more explanation as to the significance of the effects in order to meet the requirements under NEPA.

F. Net Public Benefits Analysis (NPB)

The discussion of non-market values and net public benefits appears to have been deferred, ~~we~~ will discuss them in a narrative fashion as part of the assessment of net public benefits that is made in the Record of Decision for the George Washington National Forest Plan.” DEIS, page 3-297. The DEIS presents a table showing cumulative decadal present net values of benefits and costs with no explanation for how the values presented were calculated or how particular program costs should be assessed against benefits. A number of previously non-market benefits can now be monetized and should have been included. In addition, the Forest Service staffing and budget necessary to implement each alternative should have been included so that the public can understand the extent to which each alternative could actually be implemented. These discussions should appear in the DEIS to inform the net public benefits analysis.

G. Road System

We will make only a few brief comments regarding the Transportation Analysis Process (TAP) and the proposed identification of the forest’s minimum road system, but we look forward to commenting further on this in the future. It appears that the GW reviewed all Forest Service roads (all maintenance levels) as part of the TAP and sought to fulfill the minimum road system regulation, and we commend the agency for doing so. We do have some comments and concerns, however.

First, while it is positive that the TAP identified the high sediment risk roads (see TAP Spreadsheet), it appears that none of them were proposed for decommissioning, and it is not clear to us whether or how the TAP plans to address the sedimentation caused by these roads by other means, such as repairs, relocations, mitigation, etc. A proper minimum road system is environmentally sustainable, so these problems must be addressed.

Second, the proposed minimum road system could not be maintained with the GW’s current budget level, despite the requirement that the minimum road system be economically sustainable. The TAP Report explicitly acknowledges that it sets forth a ~~target budget~~” which is 27% greater than the actual historical CMRD budget on the GW/JNFs. See TAP Report at 2. The actual historical CMRD budget for the GW is about \$ 922,800. Id. The target budget, on the other hand, is about \$ 1,171,956. Id. A comparison of the GW’s actual and target budgets (TAP at 2) with the maintenance costs estimated for the GW’s proposed minimum road system (TAP at 7) indicate that the proposed GW minimum system would cost about 120% of actual budgets. Maintenance on the current system is underfunded by about 39%, and the proposed system would still be underfunded by about 20%. This would improve the situation, but it would

still seem to continue the problems the TAP is intended to address: the ever-accumulating road maintenance backlog and erosion and sedimentation caused by roads which the FS cannot adequately maintain, among other problems.

Third, a major part of the proposed strategy seems to depend on shifting 120 miles of GW roads to the state, for VDOT to take primary responsibility for. TAP at 7; see also DEIS at 3-272 (Alt. G would propose to shift 107 miles). This would save the FS about \$ 550,769 (we assume this is an annual figure). TAP at 7. During the current economic and budget climate, is it likely that VDOT would take responsibility for over 100 miles of mountain roads with a half-million dollar price tag? Because of the proposed shift, these roads were not considered to be part of the FS' own minimum road system. The FS should realistically assess the likelihood that the state would assume responsibility for these roads and carefully consider whether shifting responsibility is the right decision for these roads, given their role in the national forest. The TAP should consider what would happen if these roads are not shifted and, since they seem to be key routes for the public, should plan to manage them properly.

Fourth, given the fact that even the proposed road system would still exceed actual maintenance budgets by about 20%, it would seem logical to avoid adding to the road system, especially in the more remote parts of the forest. However, about 10-15% of the semi-primitive non-motorized (SPNM) areas and about 50-55% of the semi-primitive motorized (SPM) areas are proposed to be open to new road construction which would be inconsistent with those classifications and which would result in the loss of SPNM and SPM acreage. DEIS at 3-208. This seems inappropriate.

XV. CONCLUSION

Thank you for your consideration. We look forward to further discussions with you and your staff regarding these issues. Please let us know if you have any questions or if we can provide more information on any of these topics.

Sincerely,



Sarah A. Francisco
Senior Attorney
National Forests and Parks Program Leader
Southern Environmental Law Center
201 West Main Street, Suite # 14
Charlottesville, VA 22902
(434) 977-4090
sfrancisco@selcva.org



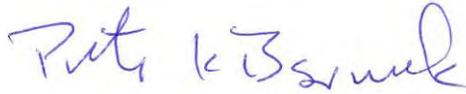
Mary C. Krueger
Forest Policy Analyst
The Wilderness Society
950 Pearl Hill Road
Fitchburg, MA 01420
(978) 342-2159
mary_krueger@tws.org



Hugh Irwin
Conservation Planner/Program Director
Southern Appalachian Forest Coalition
P.O. Box 817
Black Mountain, NC 28711
(828) 252-9223
hugh@safc.org

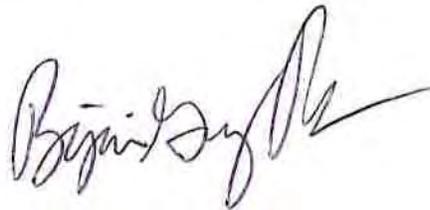


Sherman Bamford
Forests Committee Chair
Virginia Chapter – Sierra Club
PO Box 3102
Roanoke, Va. 24015-1102
(540) 343-6359
bamford2@verizon.net



Pete Bsumek, Wilderness Committee Chair
John Cruickshank, Chair
Virginia Chapter – Sierra Club
422 East Franklin St., Rm. 302
Richmond, Va. 23219
(804) 225-9113
(signature available on request)

Bud Watson
Director
Virginia Forest Watch
14031 Independence Road
Ashland, VA 23005
804-314-2225
(signature available on request)



Ben Prater
Associate Executive Director
Wild South
16 Eagle St. Suite 200
Asheville, NC 28801
828-258-2667 ext 2
ben@wildsouth.org

LIST OF ATTACHMENTS

to Comments of the Southern Environmental Law Center, The Wilderness Society, the Southern Appalachian Forest Coalition, the Virginia Chapter of the Sierra Club, Virginia ForestWatch, and Wild South re: George Washington National Forest Plan Revision – Draft Environmental Impact Statement and Draft Revised Land and Resource Management Plan, submitted October 17, 2011.
Attachments submitted on enclosed CD-ROM.

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* Items marked with asterisks are also enclosed as hard copies with comments sent via U.S. Mail.

From: [KIRSTEN KRIVOSHIA](#)
To: [FS-comments-southern-georgewashington-jefferson](#)
Subject: PLS Ban Fracking-VERTICAL- in George Washington National Forest
Date: Monday, October 17, 2011 5:11:22 PM

Thank you-- although the ban on horizontal fracking outlined in the Draft Forest Land and Resource Management Plan is a welcome step in the right direction, WE REALLY NEED TO BAN ALL fracking (vertical too!) in the George Washington National Forest.

Even more conventional forms of natural gas drilling (non-horizontal fracking) can deplete and contaminate local water, damage the environment and threaten public health. Fracking is exempt from key federal water protections and overwhelmed state regulators largely oversee the practice.

Fracking poses an unacceptable risk to our pristine national forests, tourism and agriculture industries, and public drinking water. All fracking should be banned from George Washington National Forest.

KIRSTEN KRIVOSHIA
7000 FALLS REACH
FALLS CHURCH, VA 22043

October 17, 2011

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

Dear Ms. Hyzer:

On behalf of The Nature Conservancy, I am pleased to submit our comments on the George Washington National Forest (GWNF) Draft Revised Land and Resource Management Plan (Draft Plan) and Draft Environmental Impact Statement (Draft EIS; Federal Register, Vol. 76, No. 107, June 3, 2011; amended Federal Register, Vol. 76, No. 166, August 26, 2011).

The Conservancy's mission is to preserve the plants, animals and natural communities that represent the diversity of life on Earth by protecting the lands and waters they need to survive. With the support of more than one million members, the Conservancy has protected more than 120 million acres and 5,000 river miles around the world. The conservation and restoration of key forest and freshwater habitats has been and will remain a core component of our work, both domestically and internationally.

As you know, the Conservancy has invested considerable time and energy in the GWNF plan revision. We have gladly made this investment for a number of reasons, but none more important than the simple and compelling fact that the GWNF contains some of the most biologically rich temperate broadleaf forests on the planet. The effective conservation and management of these forests is critical to Virginia, the larger network of Appalachian forests, and, indeed, to the conservation of biodiversity on a global scale. That importance not only explains our interest and engagement on the Draft Plan, but it also underlies and shapes our substantive comments on specific aspects of the plan. The forests, streams, and patch communities of the GWNF are special, and we commend staff for drafting a plan that protects those critical resources, while allowing for continued human use and enjoyment.

We have greatly appreciated the opportunity to work with you, members of the Interdisciplinary Team (IDT), and other staff through an open, public process dating back to

when the plan revision initiated in 2007. We commend you for emphasizing public participation in development of the plan revision (as outlined in Appendix A of the Draft EIS), including: hosting a substantial number of public workshops, opening IDT meetings to the public, posting relevant background and supporting documentation on the web, providing materials in multiple formats (hard copy, CD/DVD, web download), and facilitating dialog not only between the agency and stakeholders, but between the interest groups themselves. We also appreciate your support of, and active participation in, the stakeholder group which independently convened just over 12 months ago. Fourteen organizational members of that group, including the Conservancy, signed onto an agreement, dated October 17, 2011, which we are submitting as joint comments on the Draft Plan. We believe such collaborative efforts will prove increasingly important to all stages of national forest management (planning, implementation, and monitoring) and hope you and other GWNF staff will encourage continued dialog and open collaboration with stakeholders beyond a final plan.

In general, we conclude that the Draft Plan effectively establishes a solid management framework that will help conserve a core network of resilient forests, emphasize ecosystem restoration, maintain and improve healthy watersheds, and provide necessary ecosystem services and recreational benefits for people. Our comments today are generally organized by Significant Issues (as listed in the Summary of Draft EIS and Draft Plan) and will emphasize specific elements of the preferred alternative (Alternative G) that we either support as presented or that we submit should be further strengthened or modified in order to maintain or enhance that framework.

Land Allocations

Dating back to our original comments on the Comprehensive Evaluation Report in February 2007, the Conservancy has consistently recommended that the GWNF manage multiple core biological areas primarily for biodiversity and the maintenance of ecological processes while managing surrounding multiple-use buffer areas for a wider variety of biological, social, and economic values. Such an approach, grounded in principles of biogeography and focused on minimizing stressors to relatively unfragmented forests of adequate size and landscape context, offers a sound conservation strategy that can contribute to the protection of a regional network of resilient forests under both current and future climates. The preferred alternative effectively conserves a minimum set of core biological areas through a combination of administrative and congressional designations.

Specifically, the following management prescription areas begin to prohibit or minimize activities which create durable fragmenting features (e.g., road construction, wind energy

development, and oil and gas leasing): Designated Wilderness, Recommended Wilderness Study Area, Eligible Scenic River Corridor, Appalachian Trail Corridor, Research Natural Area, Geologic Area, Special Biological Area, Key Natural Heritage Community Area, National Scenic Area, Indiana Bat Primary Protection Area, Shenandoah Mountain crest – Cow Knob Salamander, Riparian Corridors, and Remote Backcountry. In general, the desired conditions for these areas emphasize their contribution to a network of core areas, protection of unique biological or geological resources, and maintenance of native plant communities through late successional dynamics and ecological disturbances such as ice storms, wind, and fire.

Consistent with those themes, we offer the following comments and recommendations for specific prescriptions:

Recommended Wilderness Study Area

- a) We support standard 1B-005 which allows wildland and prescribed fires to reduce a buildup of fuels; to restore native forest communities; to maintain threatened, endangered, sensitive, and locally rare species habitat; and to decrease the risks and consequences of wildland fire escaping from the area.
- b) We suggest adding language to standard 1B-005 that would encourage the use of natural fuel breaks such as streams, roads, rock slides, etc. where possible to minimize fireline construction.
- c) We suggest clearly describing the desired conditions to include fire-adapted forested communities, cold-water streams, and threatened, endangered, sensitive, and locally rare species where applicable.

Eligible Scenic River Corridor

These areas are designated to preserve unique free-flowing conditions and remarkable geologic values, features which would normally be avoided entirely for areas leased under controlled surface use stipulations. Therefore, we suggest standard 2C2-022 be changed to indicate that federally-owned minerals are leased with a no surface occupancy stipulation.

Geologic Area

- a) We commend staff for adding 14 caves and surrounding areas to this prescription, especially considering potentially devastating impacts of white-nose syndrome on bats.
- b) Aside from the two unique geological features, this prescription is designed to protect the physical, chemical, and biological characteristics of sensitive cave and karst areas. As such, we do not believe that a controlled surface occupancy stipulation, which the

Draft Plan is proposing for this prescription, is adequate to prevent adverse effects on groundwater and groundwater-dependent species. Lease terms for areas under a controlled surface use stipulation would normally require sensitive geologic areas to be avoided entirely; thus it is unclear why surface use would even be considered for this prescription. We recommend standard 4C1-013 be changed to indicate that federally-owned minerals are administratively unavailable for oil and gas leasing, or at a minimum, leased with a no surface occupancy stipulation.

Special Biological Area

- a) We commend staff for adding new and expanding existing areas to this prescription and for the recognition that these lands serve as a network of core areas for conservation of biological diversity.
- b) These areas are designated for their high quality ecological communities and rare species, features that like geologic areas would normally be avoided entirely for areas leased under controlled surface use stipulations. Thus, it is again unclear why surface use would even be considered for this prescription and therefore we suggest standard 4D-014 be changed to indicate that federally-owned minerals are leased with a no surface occupancy stipulation. This change should also apply to Key Natural Heritage Community Areas since they share the same standards.
- c) We support the continuation of Laurel Fork being administratively unavailable for oil and gas leasing.

Shenandoah Mountain Crest – Cow Knob Salamander

- a) Similar to our comments on Special Biological Area, and given this prescription's emphasis on managing habitat for an at-risk species, we suggest standard 8E7-020 be changed to indicate that federally-owned minerals are leased with a no surface occupancy stipulation.
- b) Because of this area's significant contribution to the network of core, unfragmented forests along the crest of Shenandoah Mountain and Great North Mountain (see our previous comments dated May 7, 2010 and November 5, 2010), the final plan should explicitly recognize that in the prescription's emphasis and desired condition statements.

Riparian Corridors

- a) We support the desired condition that "prescribed fire can be used within the corridor to create or maintain the composition and vitality of fire-dependent vegetative communities," but suggest expanding that condition to fire-adapted species, especially

considering that the structure and composition of some floodplain systems were historically maintained through anthropogenic fire.

- b) Standards 11-027 through 11-030 on fireline construction are duplicative. We suggest adopting standard 11-030 and deleting the others.
- c) We strongly support the preferred alternative's increase in buffer widths for perennial and intermittent streams and addition of buffers for channeled ephemeral streams.
- d) For reasons similar to our comments on Eligible Scenic River Corridor, Geologic Area, and Special Biological Area, we suggest standard 11-041 be changed to indicate that federally-owned minerals are leased with a no surface occupancy stipulation.

Remote Backcountry

- a) Similar to our comments on Shenandoah Mountain Crest, we suggest that the final plan should more explicitly recognize this area's contribution to a network of core, unfragmented forests, not simply from a recreational position, but also from an ecological one.
- b) We support standard 12D-015 which requires federally-owned minerals to be leased with a no surface occupancy stipulation and the continuation of Laurel Fork being administratively unavailable for oil and gas leasing.
- c) We support how Inventoried Roadless Areas are managed under this prescription. However, we recommend that all Inventoried Roadless Areas be managed consistent with the 2001 Roadless Area Conservation Rule, not just those allocated to this prescription.
- d) We especially appreciate recognition and designation under this prescription of key corridors of forested continuity such as along Church Mountain/Great North Mountain and Warm Springs Mountain.

In our comments dated November 5, 2010, we recommended that six specific areas be considered for wilderness or other congressional designations. The preferred alternative recommends four of those (Little River, Ramsey's Draft Addition, Rich Hole Addition, St. Mary's West) for Recommended Wilderness Study Area and we support that decision. After 12 months of dialog with the stakeholder group and development of the aforementioned agreement, we are also supportive of the following additional areas for consideration:

- 1) Rough Mountain Addition – approximately 1,900 acres for Wilderness Study Area,
- 2) Beech Lick Knob – approximately 6,200 acres for Wilderness Study Area,
- 3) High Knob (aka Skidmore Fork) – approximately 5,200 acres for Wilderness Study Area,

- 4) Three Ridges Additions – approximately 370 acres for Wilderness Study Area, and
- 5) Gum Run/Oak Knob/Hone Quarry/North River Gorge (aka Shenandoah Mountain) – approximately 55,000 acres for National Scenic Area.

We are able to support consideration of these congressional designations only after evaluating the list of Potential Wilderness Areas for opportunities to either expand existing wilderness areas or create new ones that would provide the best prospect for ecological processes to occur unassisted by managers, and after considering other social and economic interests presented by the stakeholder group. Skidmore Fork and Beech Lick Knob, while smaller than what we consider to be a minimum dynamic area in the Central Appalachians, are embedded within a larger landscape of federal lands considered by us to be a component of that network of core forests. If recommended for Wilderness Study Area in a final plan, these areas must be adequately buffered by core-compatible management areas such as Remote Backcountry.

If an area on Shenandoah Mountain is recommended for National Scenic Area in a final plan, then the plan should include emphasis, desired conditions, and standards similar to those for the Mount Pleasant National Scenic Area and be generally consistent with the parameters recommended in the stakeholder agreement. Specifically, we recommend clearly describing the desired conditions to include fire-adapted forested communities, cold-water streams, and threatened, endangered, sensitive, and locally rare species where applicable.

Additional prescriptions help frame the management of what we have referred to as multiple-use buffers and we offer the following comments on a few of those areas:

Eligible Recreational Rivers

- a) We support management of existing old fields, pastoral areas, and wildlife openings as permitted under standard 2C3-003, but recommend these areas be correlated with floodplain systems where fire and other disturbances played a historic role.
- b) To avoid conflict between standards 2C3-009 and 2C3-010, we recommend that the word “suppressed” in 2C3-009 be changed to “managed.”

Mosaics of Habitat

- a) We strongly support the combination of previous management areas for individual species (e.g., black bear, ruffed grouse, deer/turkey) into one prescription with an ecological systems based approach to management.
- b) For any Potential Wilderness Area (or parts thereof) allocated to this prescription, we recommend a standard similar to 12D-018 which would prohibit construction of

permanent roads. This recommendation is consistent with language suggested in the stakeholder agreement. We also recommend that any federal-owned minerals in these areas be leased with a no surface occupancy stipulation, or at a minimum a controlled surface occupancy stipulation. These recommendations may require that Mosaics of Habitat be separated into two sub-prescription areas (e.g., 13A, 13B) to clearly distinguish for both the public and staff the different management emphasis.

Indiana Bat Secondary Area

Our field examination of two of these prescription areas (e.g., Mountain Grove, Hupman's Saltpetre) suggests that their ecological systems are highly departed from historical conditions and the desired compositional and structural conditions are lacking. Thus, for these areas to serve as focal areas for maintaining and enhancing swarming, roosting, and foraging habitat for bats, we first recommend an extensive analysis of restoration needs for all four areas. Designation of these areas based solely by delineating a 1½-mile radius buffer around hibernacula does not ensure that they actually will serve their intended purpose.

Watersheds

We commend staff for emphasizing the maintenance and restoration of healthy, diverse, and resilient watersheds, especially considering the number of communities relying on clean drinking water sources derived from GWNF lands. We also support the identification and utilization of priority watersheds for a variety of restoration purposes and believe this will serve as a critical tool as the GWNF must increasingly prioritize activities where limited and often competitively awarded funding must be allocated. However, since these priority watersheds were selected for the Draft Plan, the U.S. Forest Service (USFS) has released a new Watershed Condition Class Framework (WCC) and we know the GWNF has now scored its watersheds based on the Framework's criteria. The final plan should incorporate the WCC classifications into a revision of its priority watersheds for the final plan and utilize that product to prioritize restoration treatments as recommended in OBJ WTR-5.

Ecosystem and Species Diversity

We were extremely pleased to see the GWNF adopt the USFS Southern Region's Ecological Sustainability Evaluation (ESE) during the plan revision process. As you know, the ESE framework is based on the Conservancy's Conservation Action Planning process, and we have recommended that a very similar process be included in the new planning rule to be published later this year. We continue to believe that a plan developed through a "coarse-filter, fine-

filter” analysis such as that used in the ESE will more effectively address issues of biological diversity and species viability, while providing the necessary platform upon which to consider other social and economic factors. We appreciate staff’s thorough work on developing the Ecosystem Diversity Report, Species Diversity Report, and Aquatic Ecological Sustainability Analysis (Draft EIS Appendices E-G). We have discussed various aspects of these reports with members of the IDT and only have few additional comments to add here.

Ecological Zones

We understand that the Ecological Zones on the George Washington National Forest: First Approximation Mapping report (Simon 2011) had not been published and the dataset was not yet available for the entire GWNF at the time the Draft Plan was developed. That now complete product should be used to revise estimates of current conditions (e.g., acres, indicators) for all ecological system groups and calculate ecological departure from historic range of variability. We also recommend utilizing the Ecological Zones report, LANDFIRE models, and finer-scale analyses (e.g., aerial photography, FSVEG data) to describe an uncharacteristic vegetation class for each system’s current conditions. The Draft EIS (Appendix B, p. B-6) already notes the presence of highly departed stands (e.g., areas planted to white pine); determination of their extent will help prioritize restoration activities.

Oak Forest and Woodlands

- a) Desired structural conditions for this ecological system group describe an open grassland class (Draft Plan p. 2-12; Draft EIS Appendix E, pp. E-51-52) that is not modeled in LANDFIRE’s biophysical settings descriptions for this group’s applicable ecological systems. We recommend clarification of how an open grassland condition is not already captured in either the early or late successional open canopy classes.
- b) We recommend that a description of the fire return interval be included in the desired conditions, similar to how it is described for Pine Forests and Woodlands. A good basis for this description is provided in the Draft EIS (Appendix E, pp. E-34-37) and OBJ ESD-6 suggests an interval of 5-15 years (Draft Plan, p. 3-6).
- c) The description of desired conditions states that “late successional stages represent areas where fire is not a major component...” (Draft Plan p. 2-12; Draft EIS Appendix E, pp. E-51-52). We recommend clarifying that fire is not a major component of “late successional *closed canopy*” stages.

Spruce Forests

Even though the Central and Southern Appalachian Spruce-Fir Forest represents a minor component on the GWNF, we believe there are opportunities to restore this system beyond what is recommended in OBJ ESD-3 (Draft Plan p. 3-6). Additionally, we hope that you will consider more active involvement in the Central Appalachian Spruce Restoration Initiative. As noted, the Laurel Fork area represents a conjunct component of that system which extends into West Virginia and, based on the Ecological Zones report, other areas in the northwest portion of the GWNF have been shown to contain the environmental gradients necessary to support spruce and northern hardwood systems. Through restoration, it may be possible to increase the patch size and connectivity closer to historic conditions in time to help improve its resiliency to changes in average and seasonal temperature and precipitation patterns over the next 50 years. Restoration of this system may also prove to be a necessary strategy for Virginia northern flying squirrel (*Glaucomys sabrinus fuscus*) recovery now that the species has been re-listed.

Forest Health

We commend staff for their comprehensive approach to non-native invasive species (NNIS) management, including: 1) prevention of new infestations; 2) elimination of new infestations before they become established; 3) containment or reduction of established infestations; and 4) reclamation of native habitats and ecosystems. As noted (Draft Plan, p. 3-11), integrated pest management, comprehensive monitoring, partnerships, and educational strategies will all be necessary to address what we all recognize as one of the top threats to biodiversity. We believe the Draft Plan provides the necessary framework through desired conditions (Draft Plan, p. 2-20) and standards (Draft Plan, p. 4-9) to implement these strategies, but we reiterate our previous comments (November 5, 2010) on this issue. Specifically, we submit that a more robust plan for prioritizing those efforts and accomplishing objectives OBJ NNI-1 and NNI-2 is necessary, given that implementation resources are currently limited and likely to remain so. Such a plan is likely beyond the scope of land and resource management planning, so we will not comment further here. We do recommend that staff re-evaluate our comments on the forest-wide non-native invasive species environmental assessment (March 15, 2010) and consult the USFS internal directive to Forest Service Manual (FSM) 2900 for invasive species management. The latter is currently under development and the Conservancy recently submitted comments on the draft (August 1, 2011).

Wind Energy

The Conservancy recognizes the important role that alternative energy sources, including wind, may play in reducing the greenhouse gas emissions associated with power generation. As such, we are supportive of wind energy projects with appropriate siting criteria and well-developed and implemented construction and operation guidelines. However, we remain concerned about impacts associated with some commercial wind energy facilities, including: 1) fragmentation of large, contiguous forest habitat, 2) destruction or fragmentation of unique habitats supporting sensitive, rare, threatened or endangered species, 3) mortality of migratory or resident birds and bats from collision with turbines or from lighting on turbines or associated structures, and 4) avoidance by breeding, migrating, or wintering birds of otherwise desirable habitat.

Our previous comments recommended a minimum set of areas that should be avoided to protect large, unfragmented forests and corridors of key forested continuity. To that end, we support the Draft Plan's designation of the following areas as unsuitable for wind energy development: Designated Wilderness, Recommended Wilderness Study Area, Appalachian Trail Corridor, Research Natural Area, Geologic Area, Special Biological Area, Mount Pleasant National Scenic Area, Indiana Bat Primary and Secondary Protection Areas, Shenandoah Mountain Crest – Cow Knob Salamander Area, and Remote Backcountry. Given its contribution to that network of core forests and emphasis on conserving high quality examples of vegetation communities, the final plan should include Key Natural Heritage Community Areas in that list of unsuitable designations.

Unfortunately, in many areas of the Appalachians, including across the GWNF, the overlap between higher class wind resources and ecologically unsuitable locations for development of wind energy facilities is quite high. Indeed, after avoiding those areas designated as unsuitable in the GWNF, there are relatively few areas remaining with potentially economically viable wind speeds (e.g., Class 3 and above). In fact, the Draft EIS (p. 3-299) estimates that only one site with approximately 15 turbines would be developed under the preferred alternative. Some renewable energy advocates may criticize this situation, but we submit that the GWNF is right to make its decisions based on specific impacts to, and compatibility with, natural resources in its boundary than on the much larger-scaled push to develop renewable energy in the country as a whole. That being said, if the GWNF intends to consider proposals for wind energy development in the remaining areas, we recommend a thorough review of the environmental impacts as directed in the recently revised (August 4, 2011) USFS internal directives to FSM 2720 and Forest Service Handbooks (FSH) 2609.13 and 2709.11 for special uses administration. If any projects do advance, the GWNF should place a special emphasis on requiring rigorous

ecological monitoring and mitigation procedures so we can gain a better understanding of the true extent of ecological impacts and how best to minimize them, especially with regard to direct wildlife mortality or habitat avoidance.

Oil and Gas Leasing

Leasing and development of oil and gas have been part of the regional landscape for decades, however, the development of Marcellus shale gas is unfolding at a speed, scale, and scope that could drive one of the fastest and largest land use changes ever seen in the region. Although GWNF staff have experience on the Jefferson National Forest with more traditional oil and gas leasing, there is currently no active drilling on the GWNF, no real history of commercial gas development in this part of Virginia, and the development of Marcellus shale and other shale gas plays in the Central Appalachians brings a new set of variables for careful and deliberate consideration. For example, horizontal drilling technologies now present greater opportunities to lessen surface impacts by reducing the number of well pads and allowing reserves to be tapped under areas that are unsuitable for surface occupancy, while at the same time, the multi-stage, high-volume hydrofracturing (often called “fracking”) that is necessary to release the tightly held gas in the Marcellus formation adds concerns about water withdraws, flowback storage and disposal, and gas migration. Specifically, the following issues are just beginning to be understood by stakeholders, and/or are not currently or adequately addressed through regulatory or voluntary industry best management practices: 1) non-casing related methane migration through fissures and fractures, 2) inadequate processing and/or disposal of wastewater and solid wastes, and 3) destabilization of underlying geology.

In addition to these specific issues, the Conservancy is especially concerned with terrestrial habitat fragmentation, impacts to rare species populations and special biological areas, surface and groundwater contamination, altered hydrologic flows, and increased sedimentation to streams, rivers, and wetlands. While the Conservancy is also concerned with shale gas development on private lands, the high quality and largely unfragmented nature of the terrestrial and freshwater habitats of the GWNF offer significant opportunities that warrant particular attention. Many of these concerns are addressed in the Draft EIS (pp. 3-331-339) and we commend staff for their work to-date to evaluate the known and potential risks to environmental quality and human health that are being raised by members of the public, researchers, and government agencies. We encourage staff to continue engagement with industry and other stakeholders to ensure they are utilizing the best available science as they continue to evaluate both the technology and ways to minimize impacts.

Given the uncertainties and impacts that are not yet thoroughly understood and for which management standards have not yet been developed, the unknown viability of the formation in the Ridge and Valley due to its geologically folded and fractured nature, and the lack of regulatory experience with its development by federal and state agencies in Virginia, we support the Draft Plan's recommendation to prohibit multi-stage, high volume hydrofracturing on federal-owned minerals until such time as the concerns can be adequately addressed and adequate voluntary and regulatory management practices are in place (and subject to recommendations on no surface occupancy of important places made throughout these comments).

Lastly, we suggest that how the Draft Plan frames the proposed prohibition - through the use of a no horizontal drilling stipulation - may not adequately reflect the factors of highest concern. Horizontal drilling technologies potentially reduce habitat fragmentation as compared with traditional vertical well drilling, which would be a positive in and of itself. Rather, it is the impacts, regulation, and voluntary management practices associated with hydrofracturing operations overall that are of the highest concern and present the greatest potential impacts.

Regarding more traditional oil and gas leasing on federally-owned minerals, we express the same concerns as articulated above. However, we have previously suggested (see Land Allocations) alterations to standards for specific management prescription areas that would avoid or minimize terrestrial habitat fragmentation through administratively unavailable status or no surface occupancy stipulations. To minimize other impacts, we recommend additional stipulations as indicated by the specific management area prescription's standards and desired conditions. The Conservancy is also developing a set of Recommended Conservation Practices applicable to both traditional oil and gas development and Marcellus shale gas development that we will gladly share once completed.

Finally, we also recognize and respect that private parties own mineral rights on 16 percent of the GWNF and that the owners of those minerals may wish to lease or develop those rights. We would encourage staff to collaborate with those owners who choose to exercise their rights and implement best management practices compatible with the management area.

Fire

We continue to support the GWNF in its efforts to restore fire-adapted ecological systems to within their historic range of variability in terms of fire frequency, intensity, and seasonality. The Ecological Zones report suggests that over 86 percent of the GWNF supports fire-adapted or fire-tolerant systems. Therefore, even conducting prescribed fire on 20,000 acres annually is

insufficient to approximate, much less fully restore, the historic fire regime. Similar to our comments on NNIS, we strongly encourage a prioritization plan to determine the most effective treatment areas to help accomplish OBJ FRE-2. In addition, as noted in the Desired Condition for Fire (Draft Plan p. 2-21), we strongly support the use of wildland fire that results from natural ignitions, thus allowing fire to function in its ecological role to the extent practical. We also appreciate the GWNF taking a proactive role to ensure that smoke management procedures are implemented in such a way to allow the state to attain National Ambient Air Quality Standards (Draft Plan, p. 3-3).

Timber Harvest

The Conservancy acknowledges that early successional habitat and open woodland conditions are an important element in a landscape mosaic of habitat conditions. In particular, these forest conditions provide critical habitat for some species such as ruffed grouse (*Bonasa umbellus*), northern bobwhite (*Colinus virginianus*), Indiana bat (*Myotis sodalists*), golden-winged warbler (*Vermivora chrysoptera*) and many others at some point in their yearly life cycle. As noted in the stakeholder agreement, we support management activities such as silvicultural treatments, controlled burns, and other applicable habitat management techniques that primarily serve to promote ecological restoration by: 1) promoting oak reproduction, 2) enhancing habitat conditions for declining early successional species and other Species of Greatest Conservation Need in Virginia/West Virginia, and 3) restoring low diversity stands and systems severely altered from their historic range of variability (e.g., stands <40 years old, systems converted to white pine plantations, fire-dependent systems).

In closing, we want to express our support of the preferred alternative with the above recommendations for improvement. We greatly appreciate your consideration of these comments and look forward to a final plan and EIS later this year or early next. If you have any questions, please feel free to contact me.

Sincerely,



Marek Smith
Director, Allegheny Highlands

Cc: Ken Landgraf, Planning Staff Officer
Karen Overcash, Interdisciplinary Team Leader

From: [Rae](#)
To: [FS-comments-southern-georgewashington-jefferson](#)
Subject: Horizontal drilling in GWNF
Date: Monday, October 17, 2011 4:54:38 PM

I have been a resident of the Shenandoah Valley for 18 years now. The GNWF is a tremendous asset to this area, and I urge the management to continue the ban on horizontal drilling for natural gas. Not only is this important in order to protect water resources, but also to preserve the quality of life for the human residents and visitors who come to enjoy the beauty of the forest. We must also think of the wildlife and ecology of the forest. For example, the Shenandoah Mountain area is home to many species plants and animals. In addition to damage due to clearing of trees, damage to underground water, the process of hydrofracking releases a lot of air pollution, from the trucking involved, as well as from the venting of wells.

We (humans, wildlife, and plants) on the east coast have already lost huge amounts of forest habitat. Let us preserve the precious places that remain.

Thank you,

Rae Lynn Kasdan
1913 Mt Vernon St.
Waynesboro, VA 22980



Virginia Forestry Association

3808 Augusta Avenue • Richmond, Virginia 23230-3910
Phone 804/278-8733 Email: vfa@vaforestry.org
Web site: www.vaforestry.org

PAUL R. HOWE, EXECUTIVE DIRECTOR

October 17, 2011

Ms. Maureen Hyzer
Mr. Ken Landgraf
George Washington & Jefferson National Forests
5162 Valleypointe Parkway
Roanoke, Virginia 24019

Dear Ms. Hyzer and Mr. Landgraf,

On behalf of the Virginia Forestry Association (VFA), thank you for the opportunity to comment on the Draft Management Plan for the George Washington (GW) National Forest. The George Washington and Jefferson National Forests make up a substantial part of Virginia's forest resource, and management of these lands is a significant responsibility. These comments were developed by primarily by John Hancock, who serves on the VFA Board of Directors. John has vested much time, thought and energy into the Forest Service process of developing its GW plan.

Founded in 1943, the VFA is a non-profit, privately supported organization with the purpose of encouraging wise use of forest resources in the Commonwealth for present and future generations. VFA membership consists of forest landowners, foresters, forest product businesses, loggers, forestry consultants, and a variety of individuals and groups who are concerned about the future well-being of Virginia's forest resources. Our organization is dedicated to sustaining, developing, protecting, and promoting the forests and related resources of Virginia. VFA seeks to maintain a political and economic climate favorable for forest ownership and forest industry in the state and to enhance the public's perception of forestry through effective outreach and communications.

We believe the goals of VFA and the GW National Forest are similar, and with that in mind, we would like to offer the following comments.

Our members believe that the National Forests should meet the multiple-use mandates outlined in Federal Congressional legislation. These include providing recreational opportunities, enhanced habitat for wildlife, clean drinking water, and wood products.

We are concerned that one part of this mandate, active timber management, has not received the attention it has needed. As a result, the GW is a rapidly aging forest. Forest health is declining. Wood products that could be produced through careful harvesting are not being provided to wood users in our Commonwealth. Quality wildlife habitat also suffers as a result

President
E. Glen Worrell, Jr. Charlottesville

Vice President
Edward H. Zimmer Charlottesville

Treasurer
Robert S. Wait Ashland

Ms. Maureen Hyzer
October 17, 2011; page 2 of 2

The current Draft Plan offers a range of harvest levels. VFA encourages the Forest Service to consider setting a higher target for harvests. Our belief is that the Forest could successfully be managed on an 80- to 100-year rotation. Based on acres identified as available for harvest, this would equate to at least 4,000 acres of harvests per year, substantially greater than actual harvest levels and higher than those outlined in the Draft Plan.

We recognize that budgets for government agencies have declined. In recent years the GW has not met the harvesting goals allowed under its current Plan. We encourage the Forest to look for new ways to stretch limited funding to accomplish needed work. This would include looking at improved efficiency in sale layout and planning and increased collaboration with partners outside the agency.

Our understanding is that the Forest Plan may preclude the removal of biomass from many of its harvested areas. Because of new demand that has recently been announced, we strongly encourage the Forest to allow for the removal of harvest residuals. Biomass is a renewable resource, and can be utilized to support Virginia industries and home-grown energy production as a part of a careful harvesting program.

Some of the Inventoried Roadless Areas border existing roads. When these areas were delineated, the roads themselves were not included in order to keep road densities below a certain threshold. We advocate moving these boundaries away from existing road systems. Areas that have good access should be taken out of IRAs and returned to active management.

VFA advocates for a multiple-use approach to the management of the George Washington National Forest. We recently endorsed a collaborative agreement with the GW "Stakeholders Group" which supports balanced management of the Forest. Because of its size and location, the GW is an integral part of Virginia's forests, and thus to its citizens. We look forward to continuing to work with the USDA Forest Service as it manages this important resource.

Thank you once again for the opportunity to comment on the GW plan. We also appreciate the ongoing USFS partnership and participation with VFA regarding other issues of interest to Virginia's forestry community.

Sincerely,

Paul R. Howe
Executive Director



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

17 OCT 2011

Mr. Kenneth Landgraf
Acting Forest Supervisor
George Washington Plan Revision
George Washington & Jefferson National Forests
5162 Valleypointe Parkway
Roanoke, VA 24019

Re: Draft Environmental Impact Statement and the Draft Revised Land and Resource Management Plan George Washington National Forest, WV CEQ # 20110174

Dear Mr. Landgraf,

Consistent with our responsibilities and authorities under the National Environmental Policy Act (NEPA), and Section 309 of the Clean Air Act, the U.S. Environmental Protection Agency (EPA) reviewed the Draft Environmental Impact Statement and the Draft Revised Land and Resource Management Plan (DEIS) for the George Washington National Forest. The Forest Service (FS) proposes to revise the 1993 Land and Resource Plan. The proposal updates the management direction for the Forest's 1.1 million acres of land in Virginia and West Virginia by describing desired conditions, goals, objectives, suitable uses, standards and monitoring requirements. The DEIS describes seven alternatives including a "no action" alternative which would continue managing the land resources of the Forest under the 1993 Forest Plan as amended. Alternative G is the Preferred Alternative. EPA has rated the environmental impacts of the DEIS as EC (Environmental Concerns) and the adequacy of the impact statement as 2 (Insufficient Information). A description of our rating system can be found at: <http://www.epa.gov/compliance/nepa/comments/ratings.html>. In addition, based on our review, we offer the following comments for your consideration.

The George Washington National Forest (GWNF) is located entirely within the Chesapeake Bay watershed. There are eight federally listed threatened or endangered species that reside in the Forest. The Forest contains 1,171 miles of perennial streams. At least 30 communities in Virginia and West Virginia (over 1 million people) use water from the Forest for all or part of their drinking water. The Forest transportation network has about 1,800 miles of National Forest System Roads. The Forest has about 12,000 acres leased under federal oil and gas leasing procedures. Mineral rights on about 16% of the forest are privately owned.

Alternative G was developed after reviewing public comments and agency concerns. This alternative would actively restore and maintain vegetative compositional and structural conditions needed to provide for a variety of terrestrial and aquatic species in certain areas of the forest. It would substantially increase the objective for using prescribed fire in ecosystem

restoration and incorporate the use of wildfire for resource enhancement. Road network mileage would be reduced through closure or decommissioning of roads not needed for ecosystem stewardship, restoration or dispersed recreation use. Many of the closed roads would be used to supplement the trail system for non-motorized uses.

A clear comparison of alternatives should be provided in the Final EIS. The DEIS as prepared is difficult to review and understand. It appears that Alternative G balances impacts associated with Forest activities, however additional avoidance and minimization of environmental impacts should be considered. For example, Alternative G has more miles of new road construction and more acres of soil disturbance than Alternative E. Soil disturbance could lead to sedimentation which should be minimized to avoid impacts. While the overall goal of the preferred alternative seems beneficial for the Forest, there will be potential impacts to many resources, including water quality, terrestrial habitats, and listed species.

Oil and gas (O&G) leasing is one of several “significant” issues flagged by the DEIS for more detailed examination as part of the alternatives analysis process. Because there are no active gas wells currently in production within GWNF lands, and a relatively small acreage of GWNF lands are currently under lease for possible future oil or gas development, this issue has been afforded limited attention in previous versions of the Forest Plan. However, with the availability of newer technology which can provide access to geologic deposits formerly considered unrecoverable (e.g., the Marcellus Shale play), the DEIS examines the potential for increased oil and gas development activity and the resultant potential direct, indirect and cumulative impacts from development of these energy sources.

Chapter 2 of the DEIS presents several alternative approaches for managing lands of the GWNF, including a No Action Alternative. Common to all alternatives are presumptions that (1) certain Congressionally designated areas are legally unavailable for O&G leasing; (2) existing O&G leases occupying about 1% of the GWNF (12,412 acres) are valid and will be managed under existing terms and conditions; and (3) private mineral rights representing about 16% of the GWNF lands can occur regardless of which alternative is selected. The differences among alternatives, then, from an O&G development standpoint, are reflected in varying stipulations or constraints as to the amount, type or timing of development on federally owned mineral rights occupying about 84% of the Forest.

Given the current uncertainties concerning the environmental and public health impacts associated with the use of horizontal drilling, we support the FS preference for Alternative G and the Stipulation of No Horizontal Drilling included in the Preferred Alternative G (as well as in Alternative E). The alternative Horizontal Drilling Moratorium and Horizontal Drilling Operations Control Stipulations would provide limited temporary benefits, while reopening the process for considering permits to drill after May 1, 2013. We, therefore, consider these stipulations to be of lesser value as mitigation measures. While there is some current oversight and regulation of hydraulic fracturing, the use of this technique as applied to deep well horizontal drilling, has been less extensively practiced, and the resulting impacts are not as well understood. Extensive, ongoing studies of the impacts of these approaches and technologies should provide more clarity over time, and can provide a better basis for informed decision making in the future.



Chapter 3 provides an assessment of the potential environmental impacts from the alternatives retained for consideration. Oil and gas leasing impacts are the subject of a specific standalone Section D within Chapter 3. Chief among the resources used to project impacts from O&G development on the GWNF is an analysis of reasonably foreseeable development (RFD) prepared by the Bureau of Land Management and described in Appendix K. This analysis contains a useful basis for comparing O&G impacts among the alternatives. The RFD projects a baseline scenario totaling an initial surface disturbance of approximately 1,515 acres due to both vertical and horizontal well drilling and associated infrastructure development. This figure is based on an assumption that 70 vertical and 249 horizontal wells will be drilled, primarily to access available reserves of Marcellus Shale natural gas. So, despite the fact that Marcellus reserves underlie about 50% of the GWNF, or approximately 570,000 acres, only a small fraction of these acres would be affected by future O&G development in the 15 year time horizon used by the RFD analysis. However, the RFD analysis also indicates that full development of the resource in the GWNF is not a likely scenario due to a number of factors. Thus, except for the No Action Alternative, all other alternatives are expected to cause even less impacts than the baseline O&G development projection.

We find the RFD analysis to be a reasonable approach to considering future development and environmental impacts from oil and gas exploration and production, and for allowing for a comparison of alternative approaches to management of the GWNF lands. While some of the assumptions could be questioned (e.g., the number of miles of all pipelines, including smaller gathering lines, could be significantly higher than projected, and the number of wells per pad using horizontal drilling could be more than three), given the vagaries of the energy markets and uncertain future economic conditions, the RFD analysis appears to be an acceptable basis from which to evaluate potential future O&G impacts.

From a purely environmental impact viewpoint, and considering only the impacts due to future oil and gas development, it appears that Alternatives C and E would cause the least environmental impact, since they would either prohibit any horizontal drilling (Alternatives E and G) or make GWNF lands administratively unavailable for leasing (Alternative C). We recommend that the Final EIS identify the environmentally preferable alternative (it must be identified in any Record of Decision per 40 CFR Part 1505.2). Chapter 3 could also be improved in the Final EIS by providing tables comparing, where available, estimates of pollutant impact (e.g., emissions or watershed indicators) with current standards or guidelines, rather than referring the reader back to Chapter 2 for this information.

In the cumulative impacts analyses presented under various categories (soils, air quality, water resources, etc.), in most cases only the effects from current and projected future oil and gas development are included, and in some cases, only those activities within the GWNF are considered. It would be more appropriate in certain cases, e.g., air quality, to consider cumulative impacts including sources from beyond the boundaries of the GWNF, and to include sources other than simply oil and gas facilities, e.g., mining, highways, other industrial development. While in most cases these non-gas or oil sources and facilities admittedly represent a currently limited source of combined effects on environmental resources, their future aggregated impacts could become significant over time and should be included in the analyses.



Environmental Protection under Current Laws and Regulations – Chapter 3, on pages 3-307 through 3-310, discusses a number of “environmental protections” common to Federal oil and gas leasing in all of the alternatives. These include Federal and state laws, regulations and guidance documents. While most of these “protections” have been available for many years and have been applied to conventional O&G development, their application to unconventional, horizontal drilling activities is fairly limited. Also, the 2005 Energy Policy Act exempted certain aspects of oil and gas drilling and/or hydraulic fracturing from the requirements of certain Federal laws and regulations. These exemptions should be identified in the Final EIS. The applicable state laws and programs described for Virginia have, again, mainly been applied to conventional drilling using vertical wells. And while the State of West Virginia has in place a framework of laws, regulations and permit requirements, until recently these controls did not apply to deep well, horizontal drilling required to access most Marcellus gas reserves. The Final EIS should reference West Virginia’s new requirements and any updates to other state or Federal regulations.

We recommend that the Forest Service coordinate with the US Fish and Wildlife Service on all federally listed species to ensure new information is considered, etc. We also recommend that the FEIS discuss the Chesapeake Bay Executive Order and Action Plan and how these priorities apply to the activities at the forest.

EPA looks forward to working with the Forest Service as they develop additional NEPA analysis for O&G leasing and other forest activities. EPA recommends opportunity for public involvement as conditions are developed for these actions. Thank you for the opportunity to offer comments on the Draft EIS. If you have any questions, please contact Barbara Okorn at (215)814-3330.

Sincerely,



Barbara Rudnick
NEPA Team Leader





Erik Milito
Group Director
Upstream and Industry Operations

1220 L Street, NW
Washington, DC 20005-4070 USA
Telephone 202-682-8273
Fax 202-682-8033
Email militoe@api.org

October 17, 2011

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

SUBJECT: George Washington National Forest Draft Environmental Impact Statement (EIS No. 20110174, Draft EIS, USFS, 00) and Draft Revised Land and Resource Management Plan

The American Petroleum Institute (API) offers the following comments on the U.S. Forest Service's (USFS) April 2011 Draft Environmental Impact Statement (DEIS) and Draft Revised Land and Resource Management Plan (Plan) for the George Washington National Forest (GWNF). These comments address the significant potential implications for local economies and U.S. national and energy security raised by these draft documents, in particular their attempt to impose a wholesale ban on horizontal drilling for oil and natural gas in the GWNF.

The U.S. oil and natural gas industry supports 9.2 million domestic jobs and comprises more than 7.5% of the U.S. economy. The industry has paid more than \$150 billion in royalty revenues to the federal treasury for oil and gas produced on federal lands. API is a national trade association that represents over 480 members involved in all aspects of the oil and natural gas industry. API represents operators and service companies involved in the exploration and production of onshore federal resources, including companies currently involved in horizontal drilling operations on federal lands.

API strongly urges the USFS to reject Alternatives C,¹ E, and Preferred Alternative G of the DEIS, as well as Forestwide Standard FW-218 in the Plan, all of which would ban horizontal drilling in the Marcellus Shale, the hydrocarbon-rich geologic formation underlying a significant portion of the GWNF. API also urges the rejection of Alternatives B and D, which would

¹ Alternative C would ban all federal oil and gas leasing in the GWNF, a result plainly at odds with the USFS's own recognition in the DEIS that "[e]nergy production has long been a component of National Forest System management and gas development provides energy to meet national needs." DEIS, at 1-10.

impose an arbitrary moratorium on horizontal drilling until May 1, 2013, as well as Alternative F, which would impose a similarly arbitrary and unjustified ban on horizontal drilling in public water supply watersheds in the GWNF. Because the DEIS does not include a viable range of options for oil and gas development, API supports the adoption of Alternative A of the DEIS, the No Action alternative.² To accommodate the federal government's multi-use mandate, we recommend in the alternative that the USFS develop an eighth alternative for the final EIS that does not impose a ban on horizontal drilling or hydraulic fracturing.

API is concerned that the USFS is attempting to affect an arbitrary and unprecedented shift in national energy policy through the forest management planning process. API's concern is underscored by the fact that no ban on horizontal drilling was sought for the neighboring Jefferson National Forest (JNF), which also sits atop substantial Marcellus Shale resources, by the USFS during its recent 15-year plan revision for that forest.

In addition, a ban on horizontal drilling would run directly counter to Administration policy on shale gas development. This in turn would frustrate efforts to reduce U.S. reliance on foreign sources of energy and hurt efforts to reduce greenhouse gas (GHG) emissions by preventing more cost-competitive, clean-burning natural gas from coming to markets. Finally, and perhaps most critically, a ban on horizontal drilling in the GWNF would foreclose the creation of new local government revenue streams and thousands of new jobs in communities in and around the forest in the oil and gas, technology, service, transportation and related sectors.

Because of the arbitrary and inconsistent approach taken by the USFS with respect to the GWNF DEIS and draft Plan, which has the potential to set policy unsubstantiated by science, API urges the USFS to adopt Alternative A of the DEIS and reject Standard FW-218 in the Plan.

Specific Comments on the Draft Revised Land Resource Management Plan and Draft Environmental Impact Statement

***Issue 1:** It is unclear whether Alternatives B, D, E and F would ban horizontal drilling, hydraulic fracturing, or both.*

Comment: As an initial matter, it is unclear from the face of the DEIS and the Plan what the USFS is proposing to do with respect to the restrictions on oil and gas drilling in Preferred Alternative G and Alternatives B, D, E and F. According to the DEIS, "Alternatives E and G do not allow any horizontal drilling and hydrofracturing." DEIS, at 2-27. But it is ambiguous

² Noting that the USFS "considers the leasing availability decision to be separate from planning decisions," DEIS at 1-4, API only endorses Alternative A with respect to oil and gas leasing availability and associated stipulations. API expresses no opinion on planning decisions unrelated to oil and gas leasing in the GWNF.

whether this would ban all hydraulic fracturing operations in the GWNF, including hydraulic fracturing of vertical wells (vertical wells are allowed under Alternatives E and G), or whether it would only ban hydraulic fracturing of horizontal wells. A plain reading of the text – “not allow any horizontal drilling *and* hydrofracturing” – certainly suggests that Alternatives E and G would ban all hydraulic fracturing, including fracturing of vertical wells (emphasis added). Elsewhere in the DEIS, however, the ban in Alternatives E and G is characterized as meaning “[n]o areas available for horizontal drilling (Marcellus Shale development),” with no reference to hydraulic fracturing. DEIS at 2-13, 2-17. Similarly, Alternative F would impose a “No Horizontal Drilling Stipulation” in public supply watersheds. DEIS, at 2-27. This would appear not to affect hydraulic fracturing, but the “No Horizontal Drilling Stipulation,” which is referenced only once in the entire DEIS in a footnote, is undefined. To further confuse matters, the Plan notes that it “does not allow horizontal drilling,” and Forestwide Standard FW-218 plainly states “[h]orizontal drilling for gas or oil is not allowed,” but the Plan does not mention hydraulic fracturing. Plan, at 3-15, 4-22.

In addition, Alternatives B and D allow horizontal drilling, but only with the “Horizontal Drilling Moratorium Stipulation.” That stipulation imposes a moratorium until May 1, 2013 on “any horizontal well and associated hydraulic fracturing.” DEIS, at 2-27. The term “associated hydraulic fracturing” would appear to refer only to hydraulic fracturing of horizontal wells, but it remains unclear under Alternatives B and D whether hydraulic fracturing of vertical wells would be deemed “associated hydraulic fracturing” by the USFS or the Bureau of Land Management (BLM).

To clarify these conflicting statements, at a recent joint hearing of two House Subcommittees on the DEIS and Plan, USFS Deputy Chief Joel Holtrup noted that Preferred Alternative G “does allow hydrofracturing for vertical wells.” *Challenges Facing Domestic Oil and Gas Development: Review of Bureau of Land Management/U.S. Forest Service Ban on Horizontal Drilling on Federal Lands: Hearing before the Subcomm. on Energy and Mineral Resources of the H. Comm. on Natural Resources and the Subcomm. on Conservation, Energy and Forestry of the H. Comm. on Agriculture*, 112th Cong. (July 8, 2011) (hereinafter “July 8 Hearing”). However, the USFS did not address this issue with respect to any other alternative in the DEIS at the July 8 Hearing.

Therefore, as a threshold matter, API requests that the USFS clarify whether Alternatives B, D, E and F would prohibit all hydraulic fracturing or only hydraulic fracturing of horizontal wells. Until such a clarification is made, API will assume, based on a plain reading of the DEIS, that all hydraulic fracturing, including hydraulic fracturing of vertical wells, would be prohibited by the USFS under Alternatives B, D, E and F.

Issue 2: The Preferred Alternative and Alternatives B, C, D, E and F are not based on adequate evidence and reasoning on the face of the Plan and the DEIS.

Comment: The USFS has failed to take the requisite hard look into the issues associated with its proposed ban on horizontal drilling in the GWNF. The Plan and DEIS contain little information on the alleged environmental impacts that horizontal drilling would have in the GWNF, and it is difficult to say what the major concerns of the USFS even are (or, as discussed above, what exactly it intends to do to address them). This is one of the reasons why the July 8 Hearing was convened by the elected officials who oversee the USFS. Even with the benefit of a full Congressional hearing on the record, it is still tough to point to the objective data and other reasoning required to support a final EIS and 15-year forest management plan.

The DEIS reports comments received at public meetings regarding “the quantity of water needed in the process [of hydraulic fracturing], negative effects on water quality (ground and surface), wildlife, air quality, viewsheds, forest fragmentation, and ecotourism.” DEIS, at 1-11; *see also* Plan, Appx. E, at 17. It cites “potential effects on groundwater,” DEIS at 3-325, which it analyzes in some additional depth at 3-336 through 3-337, but nowhere in this discussion does the DEIS link “potential effects on groundwater” with horizontal drilling and the need for a ban. Finally, the DEIS discusses geologic hazards, soil impacts and air quality, but these discussions encompass all oil and gas leasing, not horizontal drilling specifically. DEIS, at 3-325 through 3-329 (the DEIS’s soil, water and air quality analyses are addressed in more detail below under Issue 7). The Plan contains little more, noting summarily that “[h]orizontal drilling and the associated hydrofracturing of the Marcellus shale formation may impact water quality.” Plan, at 3-15. While the USFS’s Preferred Alternative for the GWNF would impose a total ban on all horizontal drilling, the DEIS and Plan contain virtually no evidence regarding the potential impacts of horizontal drilling in the GWNF.

At the July 8 Hearing, Deputy Chief Holtrup again cited USFS concerns over “potential effects on both surface water and ground water resources, and ... a concern over what might be the chemical makeup of the material following the use for hydrofracturing.” At the same hearing, however, BLM Director Bob Abbey testified that BLM “has never seen any evidence of impacts to groundwater from the use of fracking technology on wells that have been approved by” BLM (as any well drilled in the GWNF would be). Director Abbey added that BLM believes “that based upon the track record so far, [hydraulic fracturing] is safe.” Director Abbey's recent statements on the safety of hydraulic fracturing are in accord with recent Congressional testimony by U.S. Environmental Protection Agency (EPA) Administrator Lisa Jackson before the House Oversight and Government Reform Committee that the EPA is not aware of “any proven case where the fracking process itself has affected water.” *Pain at the Pump: Policies that Suppress Domestic Production of Oil and Gas: Hearing before the H. Comm. on Oversight and Gov’t Reform*, 112th Cong. (May 24, 2011). There appears to be virtual unanimity among

key Administration officials regarding the safety of hydraulic fracturing, and no testimony from USFS or BLM officials at the July 8 Hearing attempted to link a ban on horizontal drilling in the GWNF to any specific environmental concern.

This is surprising given the USFS's recent experience in the JNF, which borders the GWNF to the South and West in Virginia. In January 2004, the USFS issued its Final EIS and Revised Land and Resource Management Plan for the JNF.³ The JNF Plan imposes several significant stipulations related to oil and gas leasing in the JNF. Notably, the JNF Plan does not ban horizontal drilling or hydraulic fracturing. As of July 2011, over a dozen natural gas wells have been drilled in the JNF. If any specific concerns related to horizontal drilling or hydraulic fracturing in the JNF have arisen in the course of the drilling of these wells, or in the seven years since the JNF Plan was revised, the USFS did not identify or address any in the GWNF DEIS and Plan. The Preferred Alternative's inconsistency with the JNF 15-year Plan is especially alarming in light of the USFS's public notice in March 2010 that a "desire for both the GWNF and JNF Forest Plans to provide some level of consistent management direction has been expressed by members of the public, our state agency partners and our forest employees. This will improve efficiency in plan implementation and monitoring and in responding to regional or landscape level analysis of issues that cross broad landscapes. Therefore, consideration of the management direction in the JNF Revised Forest Plan is important in the revision of the GWNF Forest Plan." Revision of Land Management Plan for the George Washington National Forest, Virginia and West Virginia, 75 Fed. Reg. 11109 (March 10, 2010).

GNWF Supervisor Maureen Hyzer was asked at the July 8 Hearing if there is "a safety difference between the two" forests. She responded "[t]hat's a point that we need to look into and consider." Not only does the USFS need to examine and analyze this issue, it is also required to present the results of such examination and analysis for public comment before finalizing a 15-year plan for the GNWF. On August 11, the USFS posted a revised Frequently Asked Questions document to its website on the GNWF Plan revision. This document, without evidentiary support, claims that:

There has not been any development of the Marcellus formation near the GNWF. The locations where the Marcellus formation is being actively developed in other States contain flat beds of the shale that are conducive to horizontal drilling. On the GNWF the formation is folded and fractured, so the ability to develop it using horizontal drilling is questionable.⁴

Unfortunately, this post-hoc rationalization raises more questions than it answers. On what basis has the USFS concluded that the Marcellus Shale in the GNWF is "folded and fractured" to such

³ Available at http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fsbdev3_000381.pdf.

⁴ See http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5328551.docx.

an extent that horizontal drilling of the formation would be “questionable”? How is the folded and fractured shale different from the shale that underlies the JNF, which literally borders the GWNF along its southwestern boundary, or from shale formations currently being explored in other national forests such as the Allegheny National Forest and the Ozark-St. Francis National Forests? And most importantly, why does this vague, unsupported, unilateral finding by the USFS in a document outside the DEIS and Plan noticed for public comment justify a total ban on horizontal drilling in the GWNF?

Issue 3: The Plan and DEIS are inconsistent with Administration policy on shale gas production, energy security, climate change and job creation.

Comment: It is indisputable that the current Administration has stated its commitment to increasing America’s energy security, reducing GHG emissions, and, perhaps above all, creating new jobs at home. Every alternative in the DEIS except Alternative A runs counter to these policy goals.

In his March 30, 2011 speech on U.S. energy security, President Obama stated that “recent innovations have given us the opportunity to tap large reserves – perhaps a century’s worth – in the shale under our feet.” He added that “the potential here is enormous. It’s actually an area of broad bipartisan agreement.” In the President’s accompanying “Blueprint for a Secure Energy Future,”⁵ various issues related to hydraulic fracturing are raised, issues which already are being addressed by industry and by other federal government agencies (see Issue 5 below). President Obama did not propose a ban on horizontal drilling in his speech or in his “Blueprint for a Secure Energy Future,” nor has any Administration official ever proposed such a drastic limitation on the development of domestic shale resources until now.

Related to the Administration’s efforts on energy security are its attempts to address climate change through government regulation. The USFS itself is seeking to reduce GHG emissions via the DEIS and Plan, albeit it in such a way that halts production of what the USFS acknowledges is “a cleaner source of energy,” Plan at 3-14. One of the ways in which the Administration can reduce GHG emissions without resort to proscriptive federal government intervention is to bring more cost-competitive, clean burning natural gas to markets through exploration, development and production on government lands. And as an August 2011 Carnegie Mellon University report on lifecycle GHG emissions from Marcellus Shale production (funded by the Sierra Club) found, “GHG emission estimates ... for Marcellus gas are similar to current domestic gas.”⁶ That report

⁵ Available at http://www.whitehouse.gov/sites/default/files/blueprint_secure_energy_future.pdf.

⁶ Available at <http://iopscience.iop.org/1748-9326/6/3/034014/fulltext>.

refutes another study by Cornell University that erroneously asserts that lifecycle GHG emissions from shale gas production are much higher than conventional gas production.⁷

What’s more, potential natural gas development in the GWNF is uniquely poised to help bolster energy security and displace more GHG-intensive sources of electricity. As the BLM acknowledges, “[o]ne reason for the interest [in the GWNF] is the proximity of natural gas pipelines,” which would allow producers to ship more gas to markets quicker and more efficiently than gas produced elsewhere in the Marcellus. DEIS, Appx. K, at K-9.

Finally, a ban on horizontal drilling would present a significant and totally unnecessary hurdle to job creation, while the adoption of Alternative A would create tens of thousands of jobs in Virginia and West Virginia for years to come. While the specific – and flawed – jobs analysis offered by the USFS is discussed further in Issue 6 below, a recent Wood Mackenzie study conducted for API⁸ reveals the extent to which policies that encourage more oil and gas development in the U.S. would impact unemployment, including in localities in and around the GWNF. A summary of the study’s findings with respect to new annual job creation in Virginia and West Virginia is below:

	2015	2020	2025	2030
Virginia	3,606	16,401	19,163	18,185
West Virginia	5,487	7,037	8,683	7,986

While these numbers include jobs that are not specific to development of the GWNF, they certainly do not presuppose a ban on all horizontal drilling in a significant portion of the Marcellus Shale. Such a ban would only frustrate ongoing Administration and Congressional attempts to create more jobs, a conclusion reinforced by a recent report from the National Petroleum Council (NPC).⁹ The NPC report states that a robust oil and natural gas industry “is vital to the U.S. economy, generating millions of jobs, widely stimulating economic activity and providing significant revenues to the governments.”

Issue 4: *A ban on horizontal drilling is tantamount to a total ban on all oil and gas exploration and production activity in the portion of the GWNF that sits atop the Marcellus Shale, a plainly unsupported and absurd result.*

⁷ Available at <http://www.sustainablefuture.cornell.edu/news/attachments/Howarth-EtAl-2011.pdf>

⁸ Available at http://www.api.org/Newsroom/upload/API-US_Supply_Economic_Forecast.pdf.

⁹ Available at <http://www.npc.org>.

Comment: As the USFS acknowledges, “[d]evelopment of the Marcellus shale is generally done with horizontal drilling and use of hydrofracking at numerous locations throughout the horizontal bore holes.” Plan, Appx. E, at 10. Indeed, it is commonly understood that recent development in shale and other tight formations in the U.S., including in the Marcellus Shale, is only technologically and economically possible because of recent advances in the uses of hydraulic fracturing and horizontal drilling, even though these technologies have been conducted safely and effectively in some form by operators for decades. This is because the “economics of developing those types of resources hinges on the use of horizontal drilling and hydraulic fracturing.” Statement of Lee Fuller, July 8 Hearing. The BLM has also noted that the Barnett Shale in Texas “was only marginal from an economic standpoint until new drilling and completion techniques were applied,” DEIS, Appx. K, at K-8. This is why, as the USFS rightly points out, only “a few exploration wells have [ever] been drilled on the [GWNF],” Plan at 2-31, and “[t]here are no active gas wells currently in production on the Forest,” DEIS at 1-10. Stated another way, without horizontal drilling, development of the Marcellus Shale would be impossible.

In addition, it should be emphasized that, as the DEIS recognizes, “[p]rivate mineral rights are constitutionally protected property rights. In each alternative, decisions on federal oil and gas leasing apply to federally-owned mineral rights, and do not apply to privately-owned mineral rights (outstanding or reserved mineral rights) on NFS lands. Oil and gas exploration and development on private minerals on NFS lands can occur regardless of which alternative is chosen.” DEIS, at 3-307. Hydraulic fracturing and horizontal drilling are likely to be employed in developing hydrocarbon resources from privately-owned mineral estates within the GWNF. Without these important tools, development of most private minerals likely would be uneconomical.

For the reasons described above, any ban on horizontal drilling is both unjustified and inconsistent with Administration policy. A total ban on *all* oil and gas development in the Marcellus Shale resources beneath the GWNF, therefore, would be completely unsupported and so at odds with current policies as to be absurd. As stated at the July 8 Hearing by Chairman Lamborn, the Plan “would essentially close the entire resource to energy development, eliminate a key priority in the multiple-use mission of Forest Service lands, and further erode our efforts to generate domestic energy security.” The Preferred Alternative and Alternative E (as well as Alternatives B and D through May 1, 2013, and Alternative F in over 31,000 acres of the GWNF) are really no different from Alternative C, the total ban on all oil and gas leasing activity alternative, at least with respect to those portions of the GWNF with underlying Marcellus Shale resources. The USFS should present an honest assessment of the realities of drilling in shale formations and not give the impression that significant vertical well development without the benefit of hydraulic fracturing will proliferate under any alternative that does not permit horizontal drilling.

It is also apparent, as was made clear at the July 8 Hearing, that any vertical well development that does occur in the GWNF will have a much more significant footprint than would natural gas development using horizontal drilling. One horizontally drilled well replaces several vertical wells with respect to the amount of gas each well produces, yet the DEIS and Plan erroneously compare the soil, air and other impacts of one horizontally drilled well to one vertical well. The extent to which vertical wells would exceed horizontal wells in terms of physical footprint, soil impacts and effects on air quality in the forest is discussed further in Issue 7 below.

***Issue 5:** A 15-year Forest Management Plan is an inappropriate tool with which to implement piecemeal regulation of the oil and gas industry.*

Comment: While the 15-year Forest Management Plan is an appropriate tool with which to *manage* forest resources, using the Plan to dictate the technologies used to develop mineral resources is wholly outside of USFS mineral administration authority. The oil and gas industry is heavily regulated by multiple federal, state and local authorities under various statutes, regulations and policies. Well bore construction and environmental impacts of oil and gas activity on federal lands are regulated by multiple layers of authorities, including BLM and the various states' oil and gas administration programs and regulations.

As the USFS is aware, the GWNF DEIS and Plan come on the heels of multiple parallel and arguably duplicative federal efforts to increase regulation of oil and gas development in shale and other tight formations. As of October 17, these new efforts include, but are not limited to:

- Stricter BLM regulation of hydraulic fracturing and related operations on federal lands
- The Department of Energy's SEAB 90-day Report and Shale Gas Subcommittee Recommendations
- Multiple rulemaking and other initiatives by the EPA, including:
 - The Congressionally-mandated Hydraulic Fracturing Study
 - New rules under the Clean Air Act for hydraulically-fractured wells
 - New guidance documents on the use of diesel fuel in hydraulic fracturing operations

This non-exhaustive list of new federal efforts is in addition to existing rigorous state oversight of drilling on private lands in the Marcellus Shale, including new proposed regulations currently being considered in West Virginia that would potentially impact development of privately-held mineral estates in the GWNF. However, the DEIS and Plan make no mention of any of these federal or state efforts to increase regulation of horizontal drilling and hydraulic fracturing (apart from briefly acknowledging comments received at a public meeting suggesting that a moratorium be imposed until new federal regulations and the EPA Study are complete). Worse, they make no attempt to explain why the additional total ban on oil and gas development in the GWNF is needed in light of these significant federal efforts. API believes that, at a minimum, the USFS should defer additional regulation of industry via its 15-year plan for the GWNF until these agencies have completed the above-described studies and rulemakings in order to avoid duplicative and unnecessary regulation and conserve taxpayer resources. Moreover, the USFS should not impose a moratorium on drilling in the GWNF in the interim if it decides to adopt this approach.

While the federal government has sought to increase regulation of shale development in spite of robust state regulation, API has created new standards, recommended practices and other guidance to augment the already safe and compliant operations of companies extracting oil and gas from shale deposits. API is the worldwide leading standards-making body for the oil and gas industry and has recently promulgated five new guidance documents that specifically address hydraulic fracturing: HF 1 (well construction and integrity guidelines), HF 2 (water management), HF 3 (mitigating surface impacts), Std. 65 Part 2 (isolating potential flow zones during well construction), and RP 51R (environmental protection).¹⁰ API's standards, including this new guidance series, are informed by governmental regulations and serve to fill gaps in regulatory schemes. Neither the DEIS nor the Plan discuss how this new API guidance may have already addressed the concerns of the USFS.

Apart from the fact that the USFS has essentially ignored the contributions already being made with respect to regulation of shale development by the federal government, state governments and industry, a 15-year Forest Management Plan is generally a poor tool with which to regulate oil and gas development. Given the scope of other issues that a 15-year plan must address besides oil and gas leasing, it isn't apparent to what extent, if at all, the USFS proactively engages industry when preparing a plan. Indeed, it isn't clear that any industry input was sought or desired for the GWNF DEIS and Plan. In the various Federal Register notices released prior to the GWNF Plan revision, the USFS was silent with respect to consideration of a ban on horizontal drilling.

In addition, a federal appeals court has recently rejected USFS efforts to impose a ban on oil and gas development in national forests. *See, e.g., Minard Run Oil v. U.S. Forest Service*, 2009 WL

¹⁰ Available at <http://www.api.org/policy/exploration/hydraulicfracturing/index.cfm#guidance>.

4937785 (W.D. Pa. Dec. 15, 2009) (enjoining enforcement of Marcellus Shale development moratorium in Allegheny National Forest), *aff'd*, -- F. 3d --, 2011 WL 4389220 (3d Cir. Sept. 20, 2011). Other courts have held that the USFS's governing statutes do not apply to oil and gas development. *See Rocky Mountain Oil & Gas Assoc. v. U.S. Forest Service*, 157 F.Supp.2d 1142, 1145 (D. Mont. 2000) ("the [National Forest Management Act] and the [Multiple-Use Sustained Yield Act] do not apply to oil and gas leasing"), *aff'd*, 12 Fed. Appx. 498 (9th Cir. 2001). Given the clear disinclination by federal courts to uphold unreasonable USFS action with respect to oil and gas leasing, the final Plan and EIS should refrain from piecemeal regulation of drilling in the GWNF.

Issue 6: *The economic analysis in the DEIS is inconsistent with USFS regulations and underestimates new jobs and royalty revenues resulting from oil and gas exploration and production.*

Comment: Under its own regulations, the USFS is required as part of the 15-year forest management planning process to include "[e]conomic analyses [that] address economic trends, the effect of national forest and grassland management on the well-being of communities and regions, and the net benefit of uses, values, products, or services provided by national forests and grasslands." 36 C.F.R. § 219.21(a).¹¹ API believes that the economic analysis reflected in the DEIS and in Appendix K is inconsistent with Forest Service regulations. As a result, it grossly underestimates the economic impact that horizontal drilling in the GWNF would have, especially in terms of job creation and new revenue streams in the form of tax, royalty and other payments that will benefit the surrounding counties.

The Reasonably Foreseeable Development Scenario for Oil and Gas for the GWNF (DEIS, Appendix K) envisions over \$2 billion in spending on drilling, completion and production, resulting in over 0.8 trillion cubic feet (Tcf) of natural gas brought to market over a fifteen year period. It also envisions the construction of facilities for compression, processing, produced water and material storage, as well as reclamation activities and the construction of utility lines and gathering pipelines. However, it is not clear whether the spending on construction of these facilities is in addition to or included in the \$2 billion of spending on drilling, completion and production. The plain reading of the text on page K-11 would suggest they are in addition to, and as such, the \$2 billion total underestimates the direct economic impact of estimated development and related activities in the GWNF over the next fifteen years.

Additionally, using the \$2 billion as an input to a simple IMPLAN model suggests that the economic impacts presented in Chapter 3, Section C12 of the DEIS are too small. DEIS, at 3-

¹¹ API is aware that this regulation is currently the subject of an ongoing rulemaking, *see* 76 Fed. Reg. 8480 (Feb. 14, 2011), but the cited language applies to the GWNF DEIS and Plan.

278. Running an IMPLAN model for Virginia yields impacts similar to what the USFS forecasts under Alternative A (*i.e.*, 366 annual jobs versus 339 in the USFS analysis, see DEIS at 3-293). However, these results should not be so similar since the \$2 billion estimate does not include the economic activity generated by distributing the value of production (*e.g.*, shared royalties, severance taxes, etc.). These IMPLAN results suggest that such positive economic impacts from oil and gas development have not been included in the USFS's analysis, a major oversight in the DEIS that presents a misleadingly low assessment of the economic impact of oil and gas development in the GWNF.

In particular, API questions whether induced impacts – spending resulting from the value of production – have been taken into account. The heading on page 3-293 of the DEIS refers only to direct and indirect impacts. The absence of induced impacts is consistent with the results of the model run conducted by API. Induced impacts should be accounted for in the DEIS, particularly in the case of oil and gas development given the above average wages associated with the industry and the large government revenue streams from royalties and other assessments. The USFS's 0.8 Tcf production estimate, multiplied by an assumed 2010 well head value of \$4.16 per Mcf,¹² yields a value of production of \$3.4 billion. Some of these revenues will go to pay taxes, royalties and other fees. As county and local governments spend these collections, they will generate additional economic activity, activity that is nowhere accounted for in the DEIS or Plan.

While it is apparent that spending and job creation related to construction of various facilities, utility lines and pipelines has been overlooked by the USFS, it is also worth asking whether the following impacts, which generally affect induced impacts, have been considered:

- Bonuses, rents and royalties received via revenue sharing with the federal government;
- County severance taxes (The Virginia Oil and Gas Association notes on its website that there is a 3% severance tax on natural gas production at the county level);
- *Ad valorem* property taxes on production and field equipment;
- Payments in lieu of property taxes; and
- Increases in land value and property taxes (most of the compression, processing, produced water and material storage facilities are to be located on private lands)

Apart from whether the USFS has done a full accounting of the impacts of oil and gas development in the GWNF, API also questions whether the USFS has properly modeled the

¹² See <http://www.eia.gov/dnav/ng/hist/n9190us3a.htm>.

impacts.¹³ Specifically, one of the most important elements that may have been modeled incorrectly is the changing location of industry spending. Currently, there is limited oil and gas activity in the area around the GWNF and a limited industry presence. Accordingly, a certain percentage of spending will occur outside of the study area. For example, the IMPLAN model run by API estimates that about 64% of spending on oil and gas drilling in Virginia will be spent within Virginia and the remainder will be spent hiring contractors from outside the state. However, it would be inappropriate to assume that that ratio will remain constant over the fifteen year time frame, particularly given the large volume of gas expected to be produced. It would be more appropriate to adjust the ratio over time to account for a larger percentage of business being conducted locally.

Issue 7: The environmental impacts of oil and gas leasing described in Chapter 3, Section D of the DEIS vastly overstate the impacts of horizontal drilling based on erroneous assumptions, including that horizontal wells have equivalent surface footprints to vertical wells.

Comment: As described in Congressional testimony at the July 8 Hearing, “[h]orizontal drilling technology is recognized as an option that reduces the surface footprint” of gas drilling operations. In fact, in 2009, the USFS itself stated in an informational poster regarding gas drilling in the Marcellus Shale that “[c]onventional shallow gas operations create a much larger footprint on a landscape than would a Marcellus shale operation that taps an equivalent area The difference in impact is even greater when considering core forest habitats.”¹⁴ Also in 2009, BLM wrote in its Instruction Memorandum No. 2009-078¹⁵ regarding horizontal drilling that it “strongly supports this *environmental Best Management Practice* as a means of providing *substantial reductions in surface disturbance and overall impacts from oil and gas development.*” (emphasis added). Both of these statements are in accord with BLM Director Abbey’s testimony at the July 8 Hearing that “both the U.S. Forest Service, as well as the Bureau of Land Management, recognize[] the advantages of horizontal drilling.” Moreover, the environmental advocacy group PennFuture recently endorsed the use of horizontal drilling to minimize the surface impacts of gas drilling in state parks.¹⁶

The DEIS ignores the critical environmental advantages afforded by horizontal drilling – advantages recently recognized by BLM, the USFS and environmental advocacy groups –

¹³ Given the deficiencies of the economic analysis performed for the GWNF, API would like to point to the BLM/USFS FEIS for the Northern San Juan Basin CBM Project as an example of a more complete analysis. This FEIS gives a detailed accounting of all the elements mentioned above. More importantly, it provides a more detailed explanation of the economic modeling undertaken (*see* DEIS, at 3-480).

¹⁴ A copy of the poster is enclosed with these comments.

¹⁵ Available at http://www.blm.gov/wo/st/en/info/regulations/Instruction_Memos_and_Bulletins/national_instruction/2009/IM_2009-078.html.

¹⁶ See “Group Hopes Drillers Will Agree to Spare Parks,” PHILADELPHIA ENQUIRER, available at http://www.philly.com/philly/health_and_science/130825873.html (Sept. 30, 2011).

treating horizontal wells as equivalent to vertical wells for purposes of its Soil and Air Quality analyses in Chapter 3, Section D of the DEIS. DEIS at 3-327 to 3-331. For example, the DEIS states that long-term effects of oil and gas leasing on soil displacement and compaction “will be due to well site construction and road building.” DEIS, at 3-328. However, fewer sites will need to be constructed and fewer roads built under alternatives in which horizontal wells are permitted to be drilled laterally from a single vertical well pad, thereby limiting the impacts to soil in the GWNF. Similarly, the USFS “assumed that each well would require construction of a separate well pad” for purposes of its Air Quality analysis. DEIS, at 3-330. This assumption is clearly erroneous for the alternatives that permit some horizontal drilling. Those alternatives will result in fewer air emissions generated by well site construction than alternatives that ban horizontal drilling.

Additionally, the Water Resources and Aquatic Species analysis is based on a similar misunderstanding of the footprints of horizontal and vertical drilling, as well as water withdrawal and surface and groundwater issues associated with drilling activities. First, this analysis assumes an estimated three horizontal wells per pad. DEIS, at 3-331. API believes this estimate is too low. Although this estimate is based on Appendix K, the Reasonably Foreseeable Development Scenario for Oil and Gas, Appendix K only refers to “a maximum of 3 laterals [that] can be drilled in each horizontal well unit” under Virginia law, *i.e.*, the maximum number of laterals that can be drilled at a given depth along the vertical. DEIS, Appx. K, at K-11. If there are multiple hydrocarbon-bearing zones at differing depths along the vertical, which is common in the Marcellus Shale, more than three horizontal wells may be drilled.¹⁷ In any event, even if an average of three horizontal wells per drill pad is a reasonable assumption for the GWNF, the USFS should not base that assumption on a technical application of Virginia law without reference to, for example, common industry practices or statistics (or, for that matter, to West Virginia law, which would apply to horizontal wells drilled under the West Virginia portion of the GWNF).

Second, the underlying assumption of the Water Resources and Aquatic Species analysis with respect to water withdrawals (which is an issue more directly related to hydraulic fracturing, not horizontal drilling) is unsupported. The DEIS states that it is “important to understand the hydrologic relationship between surface water, groundwater, and wetlands within a water to appropriately manage rates and quantities of water withdrawal.” DEIS, at 3-335. API agrees. Unfortunately, the USFS did not conduct a water budget analysis for the GWNF revised 15-year Plan. API understands that such an analysis was conducted for the Ozark-St. Francis National

¹⁷ A September 2011 report by researchers at Cornell and Penn State Universities describes several average horizontal-well-per-vertical-well estimates in the Marcellus, which range from four to “12 or more.” See http://devsoc.cals.cornell.edu/cals/devsoc/outreach/cardi/publications/upload/Policy_Brief_Sept11-draft02.pdf. It also notes that “[t]he practice of drilling multiple wells on a single location holds great benefit for reducing ecological and other impacts from development of the Marcellus Shale,” *id.* The report does not cite any estimate as low as three laterals per vertical well.

Forests, where horizontal drilling and hydraulic fracturing are currently taking place, so it is unclear why one was not conducted here. Without a water budget analysis for the GWNF, the assumption that “[s]urface and subsurface sources of public and private water supply may be reduced” by oil and gas leasing over a 15-year period is baseless. Even if the USFS had an evidentiary basis for its concerns about water withdrawal issues, such concerns would, if anything, justify a ban on hydraulic fracturing (which is permitted under the Preferred Alternative), not horizontal drilling.

Third, the Water Resources and Aquatic Species analysis regarding surface water and groundwater contamination is also unsupported or contradicted by more recent studies. The DEIS asserts that “contamination of surface water bodies and groundwater resources during well stimulation could occur as a result of failure to maintain stormwater controls, ineffective site management and surface and subsurface fluid containment practices, poor well construction and grouting, or accidental spills and releases.” DEIS, at 3-335. Notably, the DEIS does not cite any specific cases of water contamination. As noted under Issue 2, BLM Director Abbey and EPA Administrator Jackson have both recently testified that unconventional gas development has not resulted in a single case of water contamination. In addition, a September 2011 study by the Ground Water Protection Council (GWPC) found that of 396 documented incidents of contamination in Texas and Ohio from oil and gas operations, none were determined to have been caused by hydraulic fracturing or by site preparation.¹⁸ Likewise, recent USGS testing of water wells near hydraulically fractured gas wells in Arkansas revealed no contamination.¹⁹ Such recent findings are in keeping with a 2009 report by the GWPC that pegged the probability of contamination of groundwater as a result of hydraulic fracturing at one in 200 million.²⁰ To ensure that contamination of groundwater does not occur as a result of drilling and production activity, many companies operating in shale formations, including the Marcellus, typically drill monitoring wells within several hundred yards of a well site, which are continuously tested for the presence of hydraulic fracturing fluids and other contaminants, including chlorides.

The DEIS erroneously claims that additives used in hydraulic fracturing fluids “are proprietary information and unavailable for analysis.” DEIS, at 3-336. In fact, well before new BLM and several new state regulations mandating disclosure of fluids used in hydraulic fracturing were promulgated, the GWPC and the Interstate Oil and Gas Compact Commission established FracFocus.org, a voluntary registry that makes formulas used in hydraulic fracturing fluids in over 4,300 natural gas wells across the country publicly available on the internet. And in recent testimony before Congress, former Pennsylvania Department of Environmental Protection Secretary and White House Council on Environmental Quality Chair Kathleen McGinty said

¹⁸ Available at <http://www.gwpc.org/e-library/documents/general/State%20Oil%20&%20Gas%20Agency%20Groundwater%20Investigations.pdf>.

¹⁹ See <http://www.todaysthv.com/news/story.aspx?storyid=176634>.

²⁰ Available at <http://www.gwpc.org/e-library/documents/general/State%20Oil%20and%20Gas%20Regulations%20Designed%20to%20Protect%20Water%20Resources.pdf>.

FracFocus is “very effective in the collection and presentation of fracturing fluid data, painstakingly reported on a well by well basis. FracFocus has come together in a remarkable way and in short order.” *Testimony on the Secretary of Energy Advisory Board’s Shale Gas Production Subcommittee’s 90-day Report: Hearing before the S. Comm. on Energy and Natural Resources*, 112th Cong. (Oct. 4, 2011).

In light of these errors and inconsistencies, API requests that the analyses for Soil, Air Quality and Water Quality and Aquatic Species be revised in the final EIS to reflect the environmental advantages afforded by horizontal drilling, as well as industry’s environmental protection record and voluntary efforts to increase transparency. API also requests that the USFS conduct a hydrology and water budget analysis for the GWNF.

Issue 8: *Recent USGS data on Marcellus Shale gas resources should not be interpreted to mean that the GWNF does not hold significant reserves.*

Comment: The U.S. Geological Survey’s (USGS) recent “Assessment of Undiscovered Oil and Gas Resources of the Devonian Marcellus Shale of the Appalachian Basin Province, 2011”²¹ reveals that the Marcellus Shale is estimated to contain a mean of 84 Tcf – and up to 144 Tcf – of undiscovered, technically recoverable gas. This represents a more than 4,000% increase over the last USGS estimate,²² and could provide many years’ worth of total current U.S. demand for natural gas. The assessment goes on to indicate, however, that some of the portion of the Marcellus Shale underlying the GWNF may only contain around 1% of that 144 Tcf, suggesting that the forest does not contain significant gas resources. API strongly disagrees with such a conclusion.

As an initial matter, the USGS estimate only includes “undiscovered” and “technically recoverable” gas. Any estimate with respect to “undiscovered” gas in areas like the GWNF that have seen very little historical exploratory drilling activity is necessarily going to be based on extremely limited data and, as such, should be considered incomplete at best. Moreover, the notion of what is “technically recoverable” gas is literally changing on a month-to-month basis, given the recent exponential advances made in horizontal drilling, hydraulic fracturing and other drilling technologies. Indeed, the rapid advances made in developing shale gas extraction technologies are a major reason why the USGS was forced to revise its estimates for Marcellus reserves by over 4,000%. What the USGS may not consider “technically recoverable” gas today may be easily recoverable over the course of the fifteen year life of the Plan.

²¹ Available at <http://pubs.usgs.gov/fs/2011/3092/pdf/fs2011-3092.pdf>.

²² Appendix K of the DEIS cites the outdated 2002 figures from the USGS. API requests that the reserve estimates in Appendix K, and the economic analysis that relies on Appendix K, be updated to reflect the more recent USGS data.

A close examination of the USGS estimates also shows that while some of the GWNF sits atop the smaller estimated gas reserves of the “Foldbelt Marcellus Assessment Unit,” other sections of the forest in Alleghany, Bath, and Highland Counties are in the “Interior Marcellus Assessment Unit,” which contains the highest estimated gas reserves in the Marcellus Shale, or around 97% of the total estimated undiscovered, technically recoverable gas. Even the smaller reserves of the Foldbelt Marcellus Assessment Unit are estimated at 765 Bcf of undiscovered, technically recoverable gas, or roughly 3% of current average U.S. annual consumption. And as BLM has already pointed out, “the oil and gas potential of the GWNF is considered as high.” DEIS, Appx. K, at K-9. Simply put, according to the most recent USGS assessment and BLM, there are substantial gas resources beneath the forest, with the potential for significantly more to be discovered and extracted over the course of the next fifteen years, provided that the USFS does not go forward with a ban on horizontal drilling.

* * *

For the foregoing reasons, API strongly urges the USFS to reject the Preferred Alternative and Alternatives B, C, D, E and F of the DEIS, as well as Forestwide Standard FW-218 of the Plan. Should you have any questions on these comments, please feel free to contact me at (202) 682-8273 or by email at militoe@api.org.

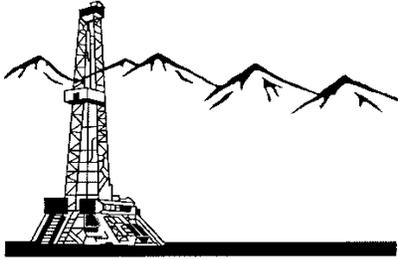
Sincerely,



Erik Milito, Group Director

Upstream and Industry Operations

Enclosure



PUBLIC LANDS ADVOCACY

CLAIRE M. MOSELEY
EXECUTIVE DIRECTOR

WWW.PUBLICLANDSADVOCACY.ORG

1155 SOUTH HAVANA STREET, #11-327, DENVER, CO 80012 • PHONE 303-506-1153 • FAX 866-837-4560
EMAIL CLAIRE@PUBLICLANDSADVOCACY.ORG

October 17, 2011

George Washington Plan Revision
George Washington & Jefferson National Forests
5162 Valleypointe Parkway
Roanoke, VA 24019
comments-southern-georgewashington-jefferson@fs.fed.us

RE: GEORGE WASHINGTON NATIONAL FOREST PLAN AND DRAFT ENVIRONMENTAL IMPACT STATEMENT

Dear Sir/Madam:

Public Lands Advocacy (PLA) is submitting the following comments to the U.S. Forest Service (FS) regarding the April 2011 Draft Environmental Impact Statement (DEIS) and Draft Revised Land and Resource Management Plan (Plan) for the George Washington National Forest (GWNF). PLA is a non-profit nation-wide trade association whose members include major and independent petroleum companies as well as non-profit trade and professional organizations that have joined together to promote the interests of the oil and gas industry relating to responsible and environmentally sound exploration and development oil and gas resources on federal lands. Many of PLA's members produce natural gas from the Marcellus Shale, which requires horizontal drilling and hydraulic fracturing to recover.

Our comments focus on the onerous and unfounded precedent setting measures contemplated in the DEIS to limit horizontal drilling and hydraulic fracturing for oil and natural gas development in the GWNF. In addition, PLA incorporates by reference the comments prepared by the American Petroleum Institute (API) on this document.

HORIZONTAL DRILLING MORATORIUM STIPULATION

A major issue in this draft plan is the marked disconnect between the plan itself and the Reasonably Foreseeable Development (RFD) document prepared by the Bureau of Land Management (BLM) incorporated as Appendix K to the DEIS. While Alternatives B and D allow horizontal drilling, it is only with the "*Horizontal Drilling Moratorium Stipulation*," which would

impose a moratorium until May 1, 2013, on *“any horizontal well and associated hydraulic fracturing,”* (DEIS, at 2-27).

This proposed management prescription clearly conflicts with statements in the RFD, which declares on page 10, *“Both vertical and horizontal wells will be utilized for the exploration and development of the Marcellus Shale resource in the GWNF.”* It is also acknowledged on page 11 of the RFD that *“Although the well cost for a horizontal well is 2 to 4 times higher than that for a vertical well, the potentially productive formation exposed in the horizontal borehole is 10 or more times greater.”*

It is crucial for the FS to adopt a balanced approach between environmental protection and the development of the oil and gas resource. This would be accomplished not only by the standard terms and conditions found in Appendix I of the DEIS, but also by utilizing reasonable conditions of approval developed for individual case-specific Applications For Permit To Drill (APD) as they are submitted to the FS by operators. This is the process by which the consideration of environmental protection and oil and gas development can be balanced and achieved. However, to preclude an important drilling technology noted by BLM in the RFD is unprecedented and unwarranted and we urge its elimination from consideration in the Final Environmental Impact Statement and Record of Decision.

HYDRAULIC FRACTURING LIMITATIONS

A principal objection related to the DEIS is the apparent ban on hydraulic fracturing as described in two alternatives. According to the DEIS, *“Alternatives E and G do not allow any horizontal drilling and hydrofracturing”* (DEIS, at 2-27). The ambiguity of the language is cause for great concern. Whether the FS would ban all hydraulic fracturing operations in the GWNF, including hydraulic fracturing of vertical wells (vertical wells are allowed under Alternatives E, F and G), or whether it would only ban hydraulic fracturing of horizontal wells is unclear. The text, *“not allow any horizontal drilling and hydrofracturing”* certainly suggests that Alternatives E and G would ban all hydraulic fracturing, including fracturing of vertical wells. Later in the DEIS, however, the ban in Alternatives E and G is characterized as meaning *“no areas available for horizontal drilling (Marcellus Shale development),”* with no reference to hydraulic fracturing. DEIS at 2-13, 2-17. The Plan notes that it *“does not allow horizontal drilling,”* and Forest-wide Standard FW-218 plainly states *“horizontal drilling for gas or oil is not allowed,”* again with no mention of hydraulic fracturing. DEIS at 3-15, 4-22. The notion that hydraulic fracturing may not be allowed on the GWNF is unwarranted, scientifically unjustified and contributes to a high level of uncertainty for operators who have significantly invested their resources on the GWNF.

The RFD clearly recognizes that *“Hydraulic fracture stimulation is utilized in many wells, but is a necessary process for wells drilled in low permeability reservoirs like shales. An estimated 90% of the natural gas wells in the US use hydraulic fracturing to produce gas at economic rates.”* The phrase *“to produce gas at economic rates”* is **critical**. A prohibition on fracture stimulation

will preclude recovery of the resource on the GWNF within the Marcellus shale. It is important to note that hydraulic fracturing has been demonstrated to be a safe and environmentally compatible procedure. To limit its use poses the same problem as with horizontal drilling – federal agencies will irrationally forego a valuable technical option critical to oil and gas development in the Marcellus Shale. Pursuing this approach is unprecedented, unwarranted and must not be considered in any alternative included in the Final Environmental Impact Statement and the Record of Decision.

CONCLUSION

In conclusion, limiting options which address technological solutions in oil and gas development would signify a significant departure from current FS policy and has never been included in the numerous Forest Plans previously adopted and implemented. PLA urges the agency to eliminate any limitation on horizontal drilling and hydraulic fracturing for any alternative presented in the plan analysis. Both are critical to meeting the energy needs of our country and, as noted in BLM's RFD to the EIS, critical factors to successful development of oil and gas resources on the GWNF.

Thank you for considering our comments. Please do not hesitate to contact me if you would like to discuss our views and concerns in greater detail.

Sincerely,

A handwritten signature in cursive script that reads "Claire Moseley".

Claire Moseley



October 17, 2011

Maureen T. Hyzer, Forest Supervisor
Attn: George Washington Plan Revision
George Washington & Jefferson National Forests
5162 Valleypointe Parkway
Roanoke, VA 24019-3050
mhyzer@fs.fed.us
comments-southern-georgewashington-jefferson@fs.fed.us

Re: Support for prohibition on horizontal drilling on future federal oil and gas leases and request for further study of impacts of vertical drilling proposed in George Washington National Forest draft revised forest plan.

Dear Ms. Hyzer:

We write to express our strong support for the U.S. Forest Service's proposal to prohibit horizontal drilling on future federal oil and gas leases in the George Washington National Forest ("GW") and to encourage further study of and, at a minimum, reasonable limitations on areas available for potential vertical gas drilling in the revised forest plan. Currently the plan is offered for public comment until October 17.

The GW contains about 1.06 million acres, primarily in Virginia, with some in West Virginia. The GW is a direct source of drinking water for about 262,600 people in local communities in and around the Shenandoah Valley, including Staunton and Harrisonburg.¹ Further, the GW is located entirely within the watershed of the James and Potomac Rivers, which supply drinking water to Richmond, VA, and Washington, D.C., among other cities, and ultimately flow into the Chesapeake Bay.² The GW is the largest federal landholding in the Bay watershed.³

This forest plays a key role in the local and regional culture and economy. The rugged national forest lands in the Allegheny and the Blue Ridge Mountains set the recreational and scenic backdrop for the Valley's farms and communities, and its waters sustain them. The GW is very popular for all forms of outdoor recreation, such as hunting, fishing, hiking, camping, mountain biking, bird-watching, and more. More than 9.2 million people live within a couple of hours' drive of the forest,⁴ and nearly a million people visit the GW annually.

¹ Wild Virginia, State of Our Water, at 3 (2008).

² Draft Revised Forest Plan at 1-5.

³ Id.

⁴ Draft EIS for Revised Forest Plan at 3-280 (2011).

The GW also shelters cold mountain streams, which support some of the strongest brook trout populations in the southeast.⁵ Its forests provide important habitat for game and non-game wildlife, including black bear and migratory songbirds. The GW supports eight federally-listed threatened and endangered species and dozens of other rare fish, wildlife and plants.⁶ The GW's forests and watersheds are perhaps the most intact of any national forest in the eastern U.S., as the GW has more land with few or no roads than any other eastern national forest.⁷

Gas and oil development in and around the GW is minimal. There are no active, producing natural gas wells on the GW and there never have been (exploratory wells drilled in the 1970s and 1980s were dry holes).⁸ Moreover, there is little history of gas production on private lands surrounding the GW in Virginia.⁹ The federal government owns the mineral rights to the vast majority (84%) of the GW, and most of those rights have not been leased for gas development.¹⁰ Currently, only 12,412 acres (1.4% of GW's federal mineral ownership) are subject to federal oil and gas leases.¹¹

There are as yet no Marcellus Shale gas wells in Virginia, so the Forest Service and the state agencies lack experience with the horizontal drilling and hydraulic fracturing used in the Marcellus. About half of the GW is underlain by Marcellus.¹² However, as the Forest Service noted, the GW is located in the Ridge and Valley region, where the Marcellus "is folded and fractured, so the ability to develop it using horizontal drilling is questionable."¹³

The development of Marcellus Shale natural gas—from drilling, to distribution, to waste management—poses a number of risks to environmental and public health. Horizontal drilling and large-volume hydraulic fracturing requires about 4-5 million gallons of water per well, and perhaps more (figures vary).¹⁴ Water mixed with chemicals, including known toxics, is pumped down wells at high pressure to fracture rock and release natural gas. There are concerns about adequacy of water supplies and instream flow, particularly if fracturing water is withdrawn from small headwater streams. Natural gas drilling using hydraulic fracturing has been linked to contamination of drinking water wells with methane gas. There also is concern about potential contamination of groundwater with fracturing fluid, which is being studied. Roughly 1/3 of the fracturing fluid (again, figures vary) returns to the surface as flowback, often mixed with naturally occurring brines and/or radioactive materials, and must be disposed of. Millions of gallons of flowback, which public wastewater treatment plants often cannot adequately treat, have been discharged to rivers and streams, and flowback has been accidentally spilled into waterways as well. Land application of flowback has killed trees and other vegetation, as

⁵ Trout Unlimited for Eastern Brook Trout Joint Venture, Eastern Brook Trout: Status and Threats, at 10 (2006).

⁶ DEIS at 1-2, and at Appendix F-52 to 54.

⁷ The GW has about 386,700 acres of roadless areas. DEIS at 3-225.

⁸ DEIS, Appendix K, BLM, RFD Scenario, at K-6 to 7 (2010).

⁹ Id. The Thornwood-Horton Field in Pocahontas County, WV, is a conventional gas field adjacent to a small portion of the GW in Highland County, VA. One well, not located on the GW, in that field drains gas from beneath some GW land. BLM RFD at K-7.

¹⁰ DEIS at 3-312.

¹¹ DEIS at 3-313.

¹² DEIS at 3-317

¹³ USFS, FAQ re Draft Revised Plan, at 10 (2011).

¹⁴ BLM RFD at K-12; DEIS at 3-331.

documented in a study on the neighboring Monongahela National Forest.¹⁵ Drilling also produces other wastes, such as tons of drilling cuttings which must be dealt with. Finally, this type of gas development is a major industrial activity with a large footprint. It fragments forests and wildlife habitat¹⁶ and industrializes rural areas with well-pads and associated brine and flowback pits, compression tanks, access roads, traffic by hundreds of trucks, pipelines and compressor stations. It also can adversely affect air quality.

This type of gas development would harm the GW's many natural values, including: drinking water supplies; high-quality rivers and streams; brook trout and other aquatic species; wildlife and their habitats; outdoor recreation experiences; scenic views; air quality; and the forest's contribution to the existing local economy, which is based on tourism and agriculture. Further, it likely would seriously interfere with the Forest Service's ability to meet its obligations under the National Forest Management Act and other authorities to provide for fish, wildlife, watersheds, outdoor recreation, and conservation of soil and water resources on the GW.¹⁷

In fall 2010, three counties (Augusta, Rockingham, and Shenandoah) and two cities (Staunton and Harrisonburg) in the Shenandoah Valley requested that the Forest Service prohibit or adopt a moratorium on horizontal drilling and/or hydraulic fracturing on the GW, citing concerns about water quality, recreation and other resources, as well as the industrialization of public national forest lands. Many local citizens, as well as conservation organizations, made the same request.

Due to the documented risks of horizontal drilling and high-volume hydraulic fracturing and the numerous public benefits that could be impacted through this type of gas drilling, our organizations feel strongly that the Forest Service would be well justified in prohibiting horizontal drilling on future federal oil and gas leases in the GW.

While we support the GW's proposal to ban horizontal drilling, we are concerned that, under this proposal, roughly 993,200 acres (about 93%) of the GW would be available for federal leasing for vertical drilling.¹⁸ Given that about 90% of U.S. gas wells are fracked,¹⁹ such vertical drilling would, in all likelihood, also involve hydraulic fracturing. Vertical drilling also poses risks to ground- and surface- water quality, fragments wildlife habitat, and can disrupt recreation, among other impacts. The draft EIS does not adequately analyze the specific likelihood and significance of impacts from the vertical drilling that could occur in the GW under this proposal. The Forest Service should conduct further study before making a decision on the lands available for vertical drilling. At a minimum, the plan should make unavailable for leasing watersheds that supply local drinking water and other priority watersheds, as well as

¹⁵ Mary Beth Adams, et al., USDA-FS, Northern Research Station, *Effects of Development of a Natural Gas Well and Associated Pipeline on the Natural and Scientific Resources of the Fernow Experimental Forest*, General Technical Report NRS-76 (Jan. 2011).

¹⁶ Nels Johnson, The Nature Conservancy, *Pennsylvania Energy Impacts Assessment – Report 1: Marcellus Shale Natural Gas and Wind* (Nov. 2010).

¹⁷ See, e.g., 16 U.S.C. § 1604(g)(3)(A).

¹⁸ DEIS at 3-305.

¹⁹ BLM RFD at K-11.

other important natural, recreational, or scenic areas (for example, Special Biological Areas, roadless areas, etc.). Again, we applaud the Forest Service's sensible proposal to prohibit horizontal drilling on future federal oil and gas leases, and we urge you to include such a ban in the final forest plan. We also hope that the GW will study more carefully the potential impacts of vertical gas drilling before making a decision and, at a minimum, limit the lands available for leases for vertical drilling. Together, these steps would go a long way toward addressing legitimate concerns about the risks of future oil and gas development on the nationally significant lands and waters of the George Washington National Forest.

Thank you for your consideration of these comments. Please feel free to contact us for more information. The Choose Clean Water Coalition contact is Ryan Ewing, 443-927-8047, ewingr@nwf.org.

Sincerely,

Adkins Arboretum
Alliance for Sustainable Communities
American Rivers
Audubon Maryland-DC
Audubon Naturalist Society
Audubon Society of Northern Virginia
Baltimore Jewish Environmental Network
Chapman Forest Foundation
Chesapeake Audubon Society
Chesapeake Climate Action Network
Chesapeake Conservation Landscaping Council
Chesapeake Wildlife Heritage
Citizens for Smart Growth in Allegany County
Clean Water Action
Community Alliance for Preservation, Rockingham County
Community and Environmental Defense Services
Conservation Voters of Pennsylvania
Corsica River Conservancy
Defenders of Wildlife
Delaware Nature Society
Dorchester Citizens for Planned Growth
Earthworks
Environmental Working Group
Float Fisherman of Virginia
Food & Water Watch
Friends of Dyke Marsh
Friends of Herring Run Parks
Friends of Lower Beaverdam Creek
Friends of Powhatan Creek Watershed

Friends of the Blue Ridge Mountains
Friends of the Middle River
Friends of the Nanticoke River
Friends of the North Fork of the Shenandoah River
Friends of the Rivers of Virginia
Izaak Walton League of America
Little Falls Watershed Alliance
Lynnhaven River NOW
Maryland League of Conservation Voters
Maryland Native Plant Society
Mattawoman Watershed Society
National Aquarium
National Parks Conservation Association
National Wildlife Federation
Natural Resources Defense Council
Nature Abounds
One Thousand Friends of Maryland
Peach Bottom Concerned Citizens Group
Pennsylvania Council of Churches
Pennsylvania Organization for Watersheds and Rivers
Piedmont Environmental Council
Potomac Conservancy
Potomac Riverkeeper
Richmond Audubon Society
Sassafras River Association
Savage River Watershed Association
Save Western Maryland
Scenic 340 Project
Shenandoah Forum
Shenandoah Riverkeeper
Shenandoah Valley Network
Sierra Club- Virginia
Sierra Club- Maryland
Southern Environmental Law Center
St. Mary's River Watershed Association
Stewards of the Lower Susquehanna
The Center for the Celebration of Creation
Virginia Conservation Network
Virginia Forest Watch
Virginia League of Conservation Voters
Virginia Organizing
West Virginia Rivers Coalition
West/Rhode Riverkeeper
Wetlands Watch
Wicomico Environmental Trust
Wild Virginia

From: [Chris Anderson](#)
To: [FS-comments-southern-georgewashington-jefferson](#)
Subject: Comments on the draft GWNF Management Plan
Date: Monday, October 17, 2011 4:10:26 PM

Dear Ms. Hyzer:

I want to thank you and the other National Forest staff for listening to local citizens and elected officials in the Shenandoah Valley and banning horizontal natural gas drilling in the draft George Washington National Forest (GWNF) management plan.

Please continue to strenuously oppose this type of drilling in the Forest.

Also, we need a complete, unbiased study on vertical natural gas drilling and its impacts, particularly in our drinking water supply areas. Please continue to advocate for a ban on vertical drilling in the GWNF priority watersheds and sensitive natural, scenic and recreational areas.

Since our drinking water quality and quantity are so important, all of the drinking water supply areas need to be identified as priority watersheds and the standards for managing these priority watersheds need to be more clearly defined and road construction in these areas needs to be limited. I support the identification of all the drinking water supply areas in the GWNF and the expansion of protective buffers on the streams and reservoirs.

Thank You.
Chris Anderson
1312 Farmview Rd.
Luray, Virginia
(540) 743-4526

From: [Steven Kasdan](#)
To: [FS-comments-southern-georgewashington-jefferson](#)
Subject: Hydrofracking in the George Washington National Forest
Date: Monday, October 17, 2011 6:36:53 PM

I'm opposed to the practice of hydrofracking in our national forests because it has been shown to cause great damage to both wildlife and human habitat. It is an admittedly promising technology, but it must be strictly regulated to meet the same environmental standards as other industries, which currently it is clearly not. Thank you. Steve Kasdan, Waynesboro, Va.



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Saving a National Treasure

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AILEEN BOWDOIN TRAIN

VIA ELECTRONIC MAIL

October 17, 2011

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

mhyzer@fs.fed.us

comments-southern-georgewashington-jefferson@fs.fed.us

Subject: Support for prohibition of horizontal drilling on future federal oil and gas leases in George Washington National Forest Draft Land and Resource Management Plan

Dear Ms. Hyzer:

On behalf of our more than 200,000 members, I am writing to offer the Chesapeake Bay Foundation's (CBF) strong support for the U.S. Forest Service's proposal to prohibit horizontal drilling on federal oil and gas leases during the 10 to 15 year term of the George Washington National Forest Draft Land and Resource Management Plan ("draft plan"). This proposal will help protect the drinking water supply, environmental health, and quality of life for hundreds of thousands of Virginians.

Gas and oil development activity in and around the George Washington National Forest ("forest") to date is minimal. Vertical drilling technologies used in the Commonwealth for decades have to date not supported development of any producing conventional natural gas wells in the forest. However, the combination of horizontal drilling and hydrofracking ("fracking") technologies may make it newly technologically and economically feasible to develop "unconventional" natural gas from the Marcellus shale formation deep beneath the forest.

The industrial processes needed to bring new natural gas resources to consumers—from drilling, to well completion, to distribution, to waste management—have been linked to environmental problems across the nation. To better understand the facts, CBF completed an extensive review of publicly-available information, including peer-reviewed studies, government reports, state agency enforcement actions, eyewitness press accounts, and other sources that could be independently verified to our satisfaction. We found clear documentation of negative impacts from natural gas development that include the following:

1. **Contamination of shallow drinking water** aquifers with methane.
2. **Pollution of local streams and springs** with sediment-laden runoff from land-disturbing activities onsite, with salty water and other toxic material from spills of fracking fluids, flowback waters, and other wastes onsite, and with the discharge of partially treated wastewater offsite.
3. **Degradation of local air quality** where gas development activities are concentrated caused by the release of greenhouse gases like methane, ethane, propane, and carbon dioxide; particulate matter; carbon monoxide; air toxic chemicals like benzene and formaldehyde; and smog-forming compounds such as volatile organic compounds and nitrous oxide that together can contribute to increased ozone levels.
4. **Cumulative strains on natural and community resources** where wells are concentrated, including degradation of existing roads and municipal services, pollution of public drinking water sources, damage to and fragmentation of forests, impairment of aquatic life, and damage to rural economies and character.

A tabular summary of the documented environmental and community impacts is **attached**. Note that the attachment is not presented as a definitive compilation of the recorded impacts of natural gas development; investigations into how gas development affects water quality, stream flow, public health, and other issues are ongoing. Erroneous claims from the oil and gas industry and elected officials that natural gas development is completely safe ignore the negative impacts we found across the development process. In other words, the causes of these problems extend beyond the fracking step to the entire natural gas operation and its often extensive industrial footprint. These problems are real, evidenced by the damage on-the-ground in communities in Pennsylvania, West Virginia, Colorado, Wyoming, and other states where natural gas development is underway.

Unfortunately, these problems are not unforeseen. While natural gas offers the promise of an abundant source of domestically-produced energy that can create jobs and provide income, the history of resource extraction in this country is littered with environmental degradation and risks to the public. From the de-forestation that clear cut thousands of acres to power the industrial revolution to the coal boom that left abandoned mines and scared mountain ridges that pollute our waterways and views to this day, we must better examine and manage both the long-term risks and benefits of new energy resources.

CBF finds that today's natural gas development has simply outpaced our understanding of its risks and enactment of appropriate safeguards to protect our communities. The draft plan's prohibition on horizontal drilling appropriately responds to these risks, as well as the specific concerns expressed by the nearly 40 local government and civic organizations in the region that have adopted resolutions calling for management of the forest such that their public drinking water supplies are protected. Further, the draft plan's approach considers the critical role the forest plays in the local and regional economy, supporting unprecedented outdoor recreation opportunities, rare wildlife, and scenic beauty that draw millions of people every year.

Thus, due to the potential for horizontal drilling technology to open up the forest to new natural gas development and the absence of appropriate safeguards to protect local interests from the documented impacts of gas development, CBF strongly urges the Forest Service to maintain the proposed ban on horizontal drilling in the draft plan. We find the Forest Service's proposal to forestall

this activity in the forest for at least the next 10 years is a well justified and sensible course of action at this time.

CBF has not taken a position against natural gas development, nor have we called for a permanent ban on gas development in the region. Supporting the horizontal drilling policy in the draft plan is consistent with the cautious approach to natural gas development we have pursued across the Chesapeake Bay watershed, which includes a call for a federal study of cumulative impacts of Marcellus shale development in the region and active participation on the state commission developing programs to address rapidly expanding natural gas development in Pennsylvania. Our over-arching goal is to ensure that future energy development in the Chesapeake Bay region takes place in as safe a manner as possible.

We thank you for your work to protect the George Washington National Forest, its neighboring communities, and the invaluable natural resources it provides for our nation. Please feel free to contact me at (804)780-1392 or mgerel@cbf.org if you have any questions regarding these comments.

Sincerely,

A handwritten signature in black ink, appearing to read "Mike Gerel", with a long horizontal flourish extending to the right.

Mike Gerel
Virginia Senior Scientist
Chesapeake Bay Foundation

Attachment—*Documented Environmental and Community Impacts of Natural Gas Development*

cc: Ann Jennings, CBF, Virginia Executive Director
Peggy Sanner, CBF, Virginia Senior Attorney
Jon Mueller, CBF, Vice President of Litigation
Kate Wofford, Executive Director, Shenandoah Valley Network
Sarah Francisco, Senior Attorney, Southern Environmental Law Center

Documented Environmental and Community Impacts of Natural Gas Development

The four tables below summarize the environmental and community impacts of natural gas development documented by the Chesapeake Bay Foundation in peer-reviewed studies, government reports, state enforcement actions, eyewitness media accounts, and other sources that could be independently verified to our satisfaction. For the purposes of this document, the following broad steps make up a natural gas development: exploration, site preparation, drilling, well completion, fracking, production, distribution, waste management, and site restoration.

(1) Contamination of shallow drinking water aquifers with methane.

Step	Common Causes	Details of Specific Impact, Incident, or Study	Where and When?
Exploration Drilling Well completion	Incomplete or improper well casings, over-pressurized wells, fractured formations, or interaction with abandoned wells.	Study of drinking water samples from wells within 1 km of active drilling sites had 17 times more deep “thermogenic” methane than wells further way.	Northeastern PA and Otsego County, NY, 2011 ¹
		Violations of state casing and cement standards that protect groundwater were issued to 64 wells in 2010 and 65 wells in the first 8 months of 2011.	Pennsylvania statewide, 2011 ^{2,3}
		Methane in the drinking water supply for 16 families because of improper well completion.	Bradford County, PA, 2010 ⁴
		Thermogenic methane in two residential drinking water wells from nearby deep gas drilling.	Parker County, TX, 2010 ⁵
		Thermogenic methane entering shallow groundwater wells because of improper well completion.	Dimock Township, Susquehanna County, PA, 2009 ^{6,7}
		Methane and ethane in two water supplies from over-pressurized wells and improper well completion.	Bradford Township, McKean County, PA, 2009 ⁸
		Methane in multiple private drinking water wells and surface waters caused by well casing failure.	McNett Township, Lycoming County, PA, 2009 ⁹
		Methane in two private drinking water wells likely linked to a recently drilled neighboring gas well.	Knox Township, Jefferson County, PA, 2009 ¹⁰
		Study showed temporal trend of increasing thermogenic methane in groundwater coincident with the installation of more gas wells in the area.	Garfield County, CO, 2008 ¹¹
		Methane in drinking water aquifer because of over-pressurized wells and improper well completion.	Bainbridge Township, Geauga County, OH, 2008 ¹²
		Methane in several private water wells caused by an over-pressurized gas well.	Hamlin Township, McKean County, PA, 2007 ¹³
		Methane in groundwater caused by over-pressurized wells.	Allegheny Forest, PA, 2007 ¹⁴
		Methane in soil near homes caused by recently drilled neighboring gas wells.	Millcreek Township, Erie County, PA, 2007 ¹⁵
		Methane in several private water supplies caused when fracking of new well interacted with improperly cased abandoned gas well.	Washington County, PA, 2006 ¹⁶

Documented Environmental and Community Impacts of Natural Gas Development

(2) Pollution of local streams and springs with sediment-laden runoff from land-disturbing activities onsite, with salty water and other toxic material from spills of fracking fluids, flowback waters, and other wastes onsite, and discharge of partially treated wastewater offsite.

Step	Common Causes	Details of Specific Impact, Incident, or Study	Where and When?
Exploration	Poor erosion and sediment control practice during site preparation, accidents during production, transport, and waste handling, and inadequate waste storage, treatment, and disposal.	Thousands of gallons of fracking fluids were spilled on farm land and into Towanda Creek (which empties into the Susquehanna River) from a well blowout.	LeRoy Township, Bradford County, PA, 2011 ¹⁷
Site preparation		Partially treated drilling wastewater containing bromide discharged by Beaver Falls Municipal Authority into Beaver River.	Beaver County, PA, 2011 ¹⁸
Production		Fifty-nine scientists from around the world wrote to New York State expressing concern that municipal drinking water filtration systems are not designed to adequately remove chemicals and other contaminants in flowback waters and could expose lakes, reservoirs, and municipal drinking water to contaminants.	New York, 2011 ¹⁹
Distribution		Conclusion by industry representatives and state officials that gas drilling is partly responsible for rising bromide levels in rivers.	Monongahela River, PA, 2011 ^{20,21}
Waste Management		Spill of between 4,200 to 6,300 gallons of flowback fluids into an unnamed tributary to Webier Creek (which drains to the Tioga River) because of a failed pump.	Armenia Township, Bradford County, PA, 2010 ²²
Site Restoration		Discharge of produced waters containing benzene and other hydrocarbons to ground waters and an unnamed tributary to Cascade Canyon because of a tear in a waste pit liner.	Garfield, CO, 2010 ^{23,24}
		Release of 13,000 gallons of fracking fluids that led to elevated salinity and conductivity in an unnamed tributary to Sugar Run and a spring caused by a failed storage tank.	Penn Township, Lycoming, PA, 2010 ²⁵
		Spill of 250 gallons of fracking fluids into an unnamed tributary of Bruch Creek (a high-quality warmwater fishery) because of a broken transmission line that killed fish and aquatic life.	Hopewell Township, Washington County, PA, 2010 ²⁶
		Spill of fracking fluid from a wastewater pit into an unknown tributary of Drake Run (a high-quality watershed).	Hopewell Township, Washington County, PA, 2010 ²⁷
		Discharge of flowback fluids into a drainage ditch and then an unnamed tributary of the south branch of Sugar Creek.	Troy Township, Bradford County, PA, 2010 ²⁸

Documented Environmental and Community Impacts of Natural Gas Development

(2) Pollution of local streams and springs (continued)

Step	Common Causes	Details of Specific Impact, Incident, or Study	Where and When?
Exploration	Poor erosion and sediment control practice during site preparation, accidents during production, transport, and waste handling, and inadequate waste storage, treatment, and disposal.	Discharge of petroleum-material to Buckeye Run and Buckeye Creek.	Doddridge County, WV, 2010 ²⁹
Site preparation		Spill of 8,000 gallons of fracking fluid into Stevens Creek and a nearby wetland caused by a failed pipe connection.	Dimock Township, Susquehanna County, PA, 2009 ³⁰
Production		Study by Arkansas Department of Environmental Quality (ADEQ) found that waste fluids from gas production have been improperly applied to land farms resulting in discharges to surface waters.	Arkansas, 2009 ³¹
Distribution			
Waste Management		Almost 1,000 spills of 5.2 million gallons of mostly fracking fluids and produced waters and petroleum materials, reported over 2 .5 years, with nearly 300 reaching surface or ground water.	Colorado statewide, but mostly Weld and Garfield Counties, 2008 ³²
Site Restoration		Runoff from gas well sites was found to contain high concentrations of total suspended solids and heavy metals, rates similar to typical construction activities and urban runoff, respectively.	City of Denton, TX, 2008 ³³
		Release of over 1 million gallons of flowback waters into the Parachute Creek drainage because of a ripped waste pit liner.	Garfield County, CO, 2008 ³⁴
		Release of benzene and other hydrocarbons into private wells and six springs flowing into Line Creek caused by well blowout.	Clark, WY, 2006 ³⁵
		Sediment discharge to two unnamed tributaries to Wolcott Creek from construction of a road without proper erosion and sedimentation control measures.	Athens Township, Bradford County, PA, 2005 ³⁶
	550 instances of groundwater contamination caused by failed waste pits.	New Mexico, 2003 ³⁷	

Documented Environmental and Community Impacts of Natural Gas Development

(3) Degradation of local air quality where gas development activities are concentrated caused by greenhouse gases like methane, ethane, propane, and carbon dioxide (CO₂); particulate matter; carbon monoxide; air toxic chemicals like benzene and formaldehyde; and smog-forming compounds such as volatile organic compounds (VOCs) and nitrous oxide (NO_x) that together can contribute to increased ozone levels.

Step	Common Causes	Details of Specific Impact, Incident, or Study	Where and When?
Exploration Drilling Well completion Production Distribution	Releases during drilling and well completion; venting and flaring from production; emissions from compressor engines, condensation tanks, and dehydrators; releases from waste pits and land application; fugitive leaks from production equipment, valves, and pipes; and exhaust from truck traffic and diesel engines.	Regional air studies found methane and other greenhouse gases near gas development at levels that “would seem to confirm” that this development, from wells to condensate tanks to compressors, are a source of pollution by direct or fugitive release.	Northcentral and Northeastern, PA, 2011 ^{38,39}
Study noted that 3.6% to 7.9% of the methane from shale gas production is vented or leaked to the atmosphere over the lifetime of the well and concluded that the greenhouse gas footprint of shale gas is twice that of coal over a 20-year horizon.		National Cornell study, 2011 ⁴⁰	
A new EPA analysis doubled the previous estimate for the amount of methane that vents and leaks during well completion, production, storage, and distribution.		U.S. EPA, 2010 ^{41,42}	
Study found that smog-forming emissions from natural gas drilling activities in the five county Dallas-Fort Worth area exceeded those from vehicle traffic in the area, and greenhouse gases releases were roughly equal to two 750 MW coal-fired plants.		Bend Arch-Fort Worth Basin, TX, 2009 ⁴³	
Monitoring near compressor stations showed benzene, xylene, carbon disulfide, and other air toxics above safe levels near or on residential properties in quantities above what would be anticipated in urban or rural residential areas.		Dish, Denton County, TX, 2009 ⁴⁴	
State of Wyoming recommends listing rural Sublette County as in non-attainment with ozone standards because of emissions from natural gas drill rigs, pumps, and dehydration units.		Sublette County, WY, 2009 ^{45,46, 47}	
A Northcentral Colorado region-wide oil and gas emissions inventory showed that compressor engines and drilling rigs combined account for almost 80% of NO _x and condensate tanks and pneumatic devices account for about 81% of VOCs.		Denver-Julesburg Basin, CO, 2008 ⁴⁸	
In EPA Region 8 (Rocky Mountain region), oil and gas development generates nearly 40% of the VOCs and 15% of the NO _x region-wide.		EPA Region 8, 2008 ⁴⁹	
The oil and gas industry was the highest contributor of NO _x , benzene, and sulfur dioxide in the County in 2007, contributing five times more benzene than any other source.		Garfield County, CO, 2007 ⁵⁰	

Documented Environmental and Community Impacts of Natural Gas Development

(4) Cumulative strains on natural and community resources where wells are concentrated, including degradation of existing roads and municipal services, pollution of public drinking water sources, damage to and fragmentation of forests, impairment of aquatic life, and damage to rural economies and character.

Step	Common Causes	Details of Specific Impact, Incident, or Study	Where and When?
Site preparation Drilling Production Distribution Waste management	Gas recovery is a major industrial activity with a large “footprint,” which introduces new well pads, structures, roads, wastewater pits, gas development equipment, pipelines, and significantly more truck traffic to forested, agricultural, or otherwise rural areas.	Study of gas development in federal forest found erosion and damage to new and existing roads and ditches from heavy truck traffic, significant damage to trees and vegetation in areas where fracking wastes were land applied, and increased forest fragmentation that altered wildlife movements and could facilitate the introduction of invasive exotic species.	Fernow Forest study, WVA, 2011 ⁵¹
		Preliminary study showed significant correlations between gas well density and riparian canopy coverage and indicators of stream health (chemical contaminants and the degradation of macroinvertebrate community structure) and suggested that increasing well density increases the cumulative impacts of extraction.	Academy of Natural Sciences study, Susquehanna County, PA, 2011 ⁵²
		Over 90 municipalities across the country have passed laws, resolutions, or other actions to ban or limit gas recovery using fracking technology in their community	Nationwide, 2011 ⁵³
		West Virginia Division of Highways notes significant damage to roads from vehicles carrying water, sand, and equipment for local gas recovery activities.	Wetzel County, WV, 2011 ⁵⁴
		Report of road damage and dust from heavy truck traffic that supports shale gas recovery in area.	Marshall County, WV, 2011 ⁵⁵

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