



December 1, 2016

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Sent Via Email

Re: Hearthstone Lake Dam, Application for Temporary Construction Special Use Permit

Board of Directors:

Dear Mr. Miller:

Devon Callan

Bette Dzamba

Howard Evergreen

Jennifer Lewis

Laurie Miller

Ernie Reed

David Sellers

Deirdre Skogen

Elizabeth Williams

I am submitting these comments on the referenced project on behalf of Wild Virginia. We have a number of concerns with this proposal, both procedural and substantive. Of primary importance is our belief that, as an alternative to the rehabilitation of Hearthstone Dam, the U.S. Forest Service (“USFS” or “Forest Service”) must seriously consider the relative merits of decommissioning the dam and restoring the natural stream environment, and must address climate change issues related to the dam.

Procedural Issues

Public Notice Date:

Wild Virginia and other members of the public depend on the George Washington and Jefferson National Forest (GW&JNF) web site for up-to-date information on opportunities to participate in projects being reviewed under the National Environmental Policy Act (NEPA). In this case the scoping notice was, according to the web site, published on-line on November 4, 2016. The comment period, as defined in the scoping letter, was to run 30 days from the date of publication in the Roanoke Times but neither a dated copy of that newspaper notice nor other information on the web site informed the public of the actual date on which the public comment period was to begin. Upon inquiry to Karen Overcash in the GW&JNF office, we were informed that the Roanoke Times notice appeared on November 1 and a copy of the newspaper notice has now been placed on the web site (“date published” 11/22/16). Based on that publication date, the deadline for comments for those wishing to be official parties in this action is December 1, 2016.

The confusion and lack of timely information as to the operative dates for public participation have left the public with a shorter period for reviewing and making effective comments on this proposal than is intended by Forest Service rules and NEPA. We understand and are sympathetic to the difficulties in coordinating the web site listings and newspaper publications but believe the GW&JNF must address this issue in the draft Environmental Assessment (DEA) and consider whether this notice met all legal requirements. For the future, we recommend a different approach to alleviate these concerns. We ask that Forest Service staff consider publishing the scoping notice on the web site on the date that the notice is transmitted to the newspaper or on the date the newspaper notice is published and clearly state which of these options was chosen. Then a copy

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of the newspaper notice can be placed on the web site as soon as it is published. This method would improve the public's ability to file timely and complete comments.

Pre-decisional Commitments by Federal Agencies:

An important principle that underlies federal procedure under NEPA is that commitments of resources should not be made prior to the completion of the decisional process, because such commitments can prejudice the final decision. The Council on Environmental Quality (CEQ) regulations implementing NEPA discuss this issue at 40 C.F.R. § 1502.2(f). An EA is to assess environmental impacts and not to justify decisions already made. Project purpose and need must not be tailored to simply reflect or enable any actions taken by federal agencies or other parties prior to the start of the NEPA process.

No action may be taken by a federal agency that could limit the reasonable alternatives to be addressed in the NEPA review and, if a lead agency learns that an applicant is going to take action that would impose such limits, the agency *must* notify the parties that it will take strong action to insure that NEPA's objectives and procedures are fulfilled. See 40 C.F.R. § 1506.1(b). The CEQ has described one option the lead agency should consider in such a situation, stating that "the agency might advise an applicant that if it takes such action the agency will not process its application." Id.

In this case, the USDA Natural Resources Conservation Service (NRCS) has already formed an agreement with the local sponsors to complete this dam rehabilitation project. As shown in the attachment to this scoping notice the NRCS signed the agreement on July 21, 2015. We are concerned that this action by the federal entity proposing the action could unduly and inappropriately influence and constrain the NEPA decision-making process undertaken by the Forest Service. The commitment of resources by the federal agency and partners in this effort will have been wasted if the Forest Service were to deny the Special Use Permit and this circumstance cannot fail to affect the deliberations in this NEPA review. We ask that this concern be addressed in the draft Environmental Assessment. Clearly, the chance for the Forest Service to provide prior notice of this problem, as mandated by 40 C.F.R. § 1506.1(b), is past. Therefore, the DEA must clearly explain how the USFS has and will avoid any undue influence that could be caused by NRCS's prior commitments.

We understand that the potential threats posed by the inadequate capacity of the dam's spillway to pass flood waters are of significant concern and that appropriate action to lessen those threats is of great importance. However, we note that, according to the *NRCS Upper North River Watershed Agreement* (Agreement), "[t]he Sponsors were aware of potential problems with the Hearthstone Lake dam in 2007" and that "[i]n November 2011, the Virginia Division of Dam Safety issued a conditional certificate for Hearthstone Lake because the auxiliary spillway did not have sufficient capacity to pass the PMF without overtopping the dam embankment." Agreement, p. 2. Given this prior knowledge of the need to act and the fact that a Special Use Permit would be required before corrective action could be taken, we assert that the NEPA process through which the NRCS analyzed this federal action should have included the Forest Service as a cooperating agency and incorporated the analysis now underway as an integral component of that review and decision.

Substantive Issues

Green House Gas/Climate Change Analysis:

In accordance with the *Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews* (Guidance), issued by the CEQ,

when addressing climate change agencies should consider: (1) The potential effects of a proposed action on climate change as indicated by assessing GHG [Greenhouse

Gas] emissions (e.g., to include, where applicable, carbon sequestration); and, (2) The effects of climate change on a proposed action and its environmental impacts.

Guidance, p. 4 (footnote omitted). Adequate analysis must be included in the DEA for this project to satisfy both of these needs. To address item (1) above, the Guidance recommends “that agencies quantify a proposed agency action’s projected direct and indirect GHG emissions” and provides that

where agencies do not quantify a proposed agency action’s projected GHG emissions because tools, methodologies, or data inputs are not reasonably available to support calculations for a quantitative analysis, agencies include a qualitative analysis in the NEPA document and explain the basis for determining that quantification is not reasonably available.

Id.

In addressing item (2) above, the Guidance “[d]iscusses methods to appropriately analyze reasonably foreseeable direct, indirect, and cumulative GHG emissions and climate effects” and “[c]ounsels agencies to use the information developed during the NEPA review to consider alternatives that would make the actions and affected communities more resilient to the effects of a changing climate.” Id. at p. 5.

The scientific literature demonstrates that reservoirs produce significant amounts of methane, a potent greenhouse gas, and lesser amounts of carbon dioxide. We have performed an initial review of papers addressing this topic and assert that the Forest Service is obligated to review these sources and other available studies in comparing the possible alternatives for action on this Special Use Permit application. We attach some of the papers that we have reviewed to these this letter and offer the following findings as pertinent to this NEPA analysis:

- Researchers in one study stated that “[u]sing high-resolution, spatially resolved water quality sensor measurements along 1385 river kilometers, we show that primary productivity and organic matter accumulation affect river carbon dioxide and methane emissions to the atmosphere. Phytoplankton drive CO₂ to near or below atmospheric equilibrium during the growing season, while anaerobic carbon oxidation supports a large proportion of the CO₂ and CH₄ production.” John T. Crawford, Luke C. Loken, Emily H. Stanley, Edward G. Stets, Mark M. Dornblaser, Robert G. Striegl, *Basin scale controls on CO₂ and CH₄ emissions from the Upper Mississippi River*, *Geophysical Research Letters*, Vol. 43, Issue 5, pages 1973 - 1976 March 16, 2016.
- It is important to note that, in many of the papers discussing GHG emissions from reservoirs, the authors address the impacts of impoundments formed by hydropower dams. e.g. Luiz Pinguelli Rosa, Marco Aurélio dos Santos, Claudio Gesteira, and Adilson Elias Xavier, *A model for the data extrapolation of greenhouse gas emissions in the Brazilian hydroelectric system*, *Environ. Res. Lett.* 11 (2016) 064012. In those cases, the GHG emissions from the reservoirs are compared to those that would otherwise result from fossil fuel burning but are replaced by the hydropower operations. Of course, the situation presented in this NEPA review requires no such comparison.
- In a study comparing the volumes of methane (CH₄) emitted from various sized reservoirs, the researchers found that “[o]verall, CH₄ concentrations were significantly higher in the strongly stratified LND (0.03-361 A mu M) with a more forested catchment and sheltered landscape, intermediate in LB (0.05-220 A mu M) and lowest in the relatively well-mixed LW (0.04-150 A mu M) in a more open grassland landscape.” Ronald S. Musenze, Lu Fan, Alistair Grinham, Ursula Werner, Deborah Gale, James Udy, Zhiguo Yuan, *Methane dynamics in subtropical freshwater reservoirs and the mediating microbial communities*, *Biogeochemistry* (2016) 128: 233. In the case of Hearthstone Dam, we have a watershed that is almost totally forested but we are unable to determine the depth of water or whether the impoundment stratifies. We also note that the materials entering Hearthstone lake are described as “primarily . . .

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sediments plus leaf and other organic debris” but that “the sediment delivery is less than anticipated during the original design.” Agreement, p. 3. Thus, the prominence of organic materials in the lake’s bottom, which are subject to decomposition and production of methane gas, is of importance in analyzing GHG emissions here.

- Findings from one assessment of methane emissions from streams and small reservoirs demonstrate that quantitative methods for assessing GHG emissions are viable for this NEPA review. Andreas Maeck, Tonya DelSontro, Daniel F. McGinnis, Helmut Fischer, Sabine Flury, Mark Schmidt, Peer Fietzek, and Andreas Lorke, *Sediment Trapping by Dams Creates Methane Emission Hot Spots*, Environ. Sci. Technol. 2013, 47, 8130–8137. The same paper found that “sediment accumulation in deposition zones, such as dam forebays, fuels high CH₄ emissions that can account for a large proportion of the total CH₄ evasion from the entire aquatic system. In the case of the River Saar, sediment accumulation accounts for over 90% of the CH₄ emissions, and most of the CH₄ is transported from the sediments to the atmosphere by rising gas bubbles.” Maeck et al. note a “direct link between the deposition of organic matter and CH₄ ebullition,” a significant concern given the heavily-forested nature of the Hearthstone Lake watershed.

Need for Up-to-date Flood Control Analysis:

The NRCS Environmental Assessment asserts that the continued existence of Hearthstone Dam, separate from the concerns of a possible spillway failure, is necessary to prevent damage from floods downstream in North River but fails to provide any detailed analysis to support this claim. We offer some observation and pose a number of questions that should be addressed in this NEPA review to determine the degree to which the continued existence of the dam and reservoir provide flood-control benefits and how any benefits should be weighed against other factors:

- Where are the predicted flood damages predicted to occur and what is the basis for the estimates of cost and benefits of the dam’s continued existence? If substantial damages are predicted to occur in areas just downstream of the National Forest, then the contributions of Little River and the Hearthstone Dam watershed will be of greater concern than if the predicted damages are likely to occur downstream of the less forested areas in the North River drainage.
- Given that the watershed upstream of Hearthstone Dam is estimated to be more than 99% forested, we question whether runoff from this area contributes significantly to flooding problems that may occur downstream. What are the storm-induced flows in this stream that would be controlled by this dam? Have conditions in the watershed changed since the dam was built and will any such changes lessen the perceived need that were deemed to justify its use for flood control?
- As shown in Figure 1, at the end of this report, the watershed draining to Hearthstone Lake is a relatively small part of the upper North River drainage, much of which is controlled by reservoirs on North River and Skidmore Fork. The drainage to Hearthstone Lake is 15.9 square miles in aerial extent, just 23% of the upper North River watershed which covers 69.1 square miles. The drainages controlled by the other three reservoirs in the upper North River area cover 27.5 square miles, approximately 40% of the entire drainage.
- Has the work completed on other dams in the North River’s headwaters changed and possibly increased or decreased the overall flood impacts? Have other changes in the watershed changed the nature and extent of likely flood damage downstream? Have other remedies to possible flooding effects downstream been studied and, if so, what were they and how will they likely affect flood frequencies and possible damages? These questions must be answered in assessing the cumulative impacts of this project.

Proper Weighing of the Value of Stream Habitat Restoration:

The importance of headwater streams as valuable habitats in their own right and as vital components of the larger stream systems in which they lie, has been recognized on a much wider scale and has been

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studied intensively in recent decades. See e.g. Winsor H. Lowe and Gene E. Likens, *Moving Headwater Streams to the Head of the Class*, *BioScience*, March 2005 / Vol. 55 No. 3, pages 196-197. The forested setting of the upper North River drainage, with few pollution sources, good shading and input of organic matter, and surviving populations of sensitive species, such as Brook Trout, all make the value of the streams in this area very high. However, the one significant habitat alteration that is obvious in this drainage is the presence of four reservoirs and the effects they exert both upstream and downstream from the dams. In this setting, the potential for positive impacts from decommissioning Hearthstone Dam seems great.

It is important to remember that actions authorized by the Forest Service must be done in accordance with the Clean Water Act (CWA) and that the objective of the CWA is “to restore and maintain the physical, chemical, and biological integrity of the nation’s waters.” The emphasis on restoration indicates that past degradation of aquatic environments and quality are not presumed to be permanent but are to be reversed where possible. We need not go into detail in describing the damaging effects of dams and reservoirs on stream systems; these effects include the outright replacement of stream habitats and the native organisms that inhabit them with still-water areas, changes to stream flows and connectivity in the watershed, increased chances for colonization by non-native invasive species, and effects on water temperature, nutrient cycling, and many others. When these effects are exerted in headwater streams they can be even more devastating, because of the extraordinary benefits these habitats provide.

The groundbreaking paper by Meyer et al. catalogs the many important functions headwaters streams play, recounting particularly many studies of headwaters in the Appalachian region. Judy L. Meyer, David L. Strayer, J. Bruce Wallace, Sue L. Eggert, Gene S. Helfman, and Norman E. Leonard, *The Contribution of Headwater Streams to Biodiversity in River Networks*, *Journal of the American Water Resources Association*, Vol. 43, No. 1, February 2007, pages 86 - 103. Among the important findings by Meyer et al.:

- “Headwater species include permanent residents as well as migrants that travel to headwaters at particular seasons or life stages. Movement by migrants links headwaters with downstream and terrestrial ecosystems, as do exports such as emerging and drifting insects.”
- “The influence of headwaters on downstream systems emerges from their attributes that meet unique habitat requirements of residents and migrants by: offering a refuge from temperature and flow extremes, competitors, predators, and introduced species; serving as a source of colonists; providing spawning sites and rearing areas; being a rich source of food; and creating migration corridors throughout the landscape.”
- “Degradation and loss of headwaters and their connectivity to ecosystems downstream threaten the biological integrity of entire river networks.”

Meyer et al., page 86.

As a component of the North River watershed, and particularly of the relatively high quality upper North River drainage area, Little River, both upstream and downstream of Hearthstone Dam is important for a number of reasons. One of these is as habitat for Brook Trout. Wild trout habitat is designated by the Virginia Department of Game and Inland Fisheries (DGIF), as shown on Figure 2 in the Attachment to this letter. The DGIF identifies approximately 28.2 miles of streams with wild trout populations and/or with suitable habitats. Of that total stream length, only about 6.5 miles (~23%) are downstream from the dams in this watershed, while the remaining 77% of these stream segments (~21.6

miles) are separated from downstream reaches. Those populations above the reservoirs, while they may remain viable, can be at risk of extirpation if there are significant disturbances in the “stranded” areas, due to drought, extreme flooding, or other events. Changes that are predicted to occur due to climate change will likely place stress on these populations (see e.g. , Nsikan Akpan, *How big droughts, forest fires could be the new normal in Appalachia*, PBS Newshour, <http://www.pbs.org/newshour/updates/widespread-forest-fires-claims-may-signal-new-normal-appalachian-mountains/#>), which are particularly dependent on cold-water habitats. Removing of the obstruction created by Hearthstone Dam, would open

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approximately 7.5 miles of additional wild trout waters to downstream sections, allowing re-population of species when necessary to recovery after extreme events. This would increase the percentage of wild trout habitat unobstructed by dams to nearly 50% of the total in the upper North River watershed.

Meyer et al. report that 1st order streams are particularly important components of watersheds. It appears that virtually all of the 1st order stream in the upper North River watershed are cut-off from downstream areas by dams. Exceptions are Big Run, a tributary to Little River, and a portion of Skidmore Fork that lies downstream from Todd Lake. Again, removal of the obstruction caused by Hearthstone Dam and reservoir would re-connect the 1st order streams of the North and South Forks of Little River to downstream waters.

Thank you for the chance to comment on this project and for your consideration of the issues we have raised.

Sincerely,

/s/ David Sligh

David Sligh
Conservation Director

cc: Karen Overcash, GW&J NF

Attachment to Wild Virginia Comments on Hearthstone Dam Project

Figure 1: Hearthstone Lake watershed within entire upper North River watershed

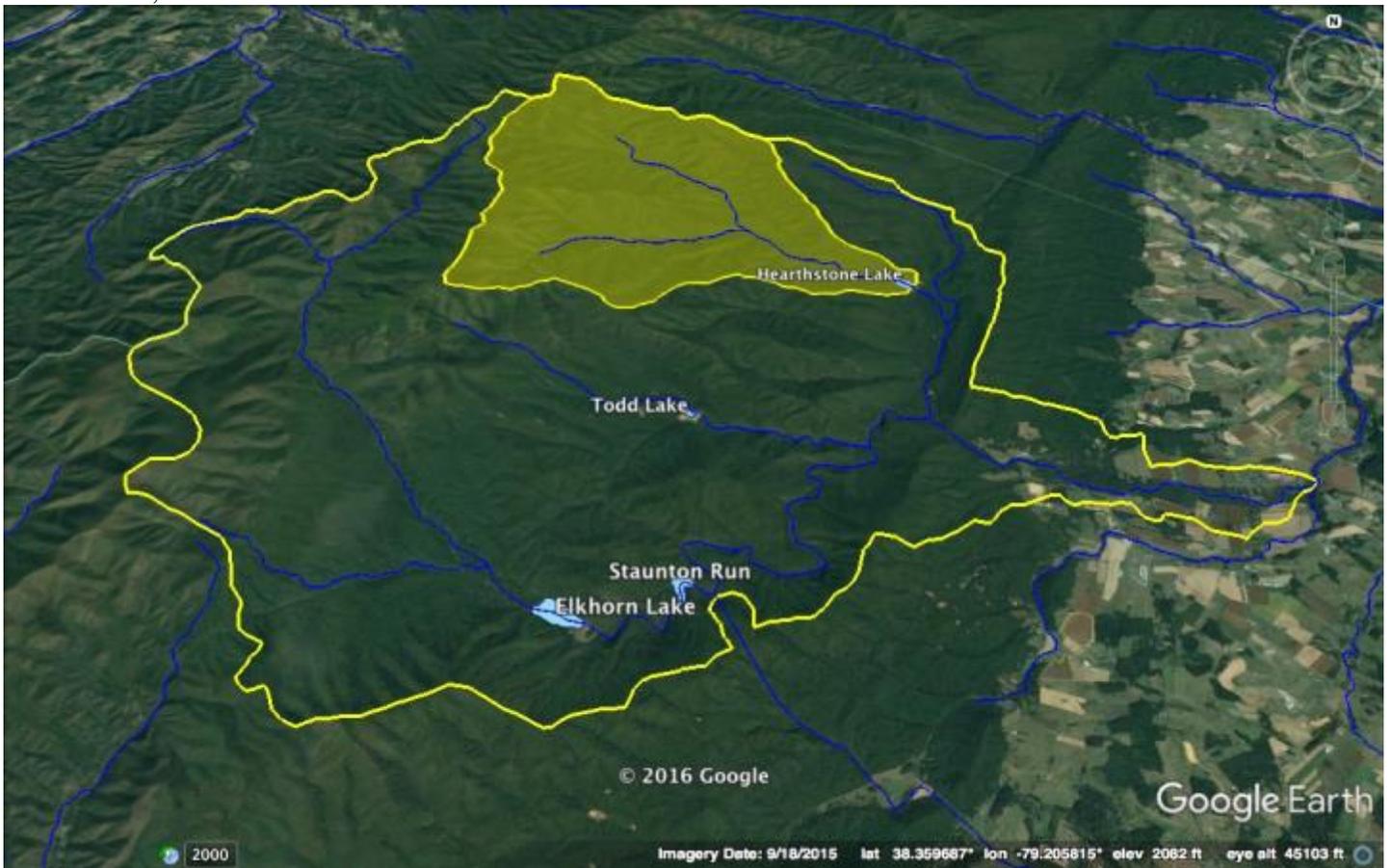


Figure 2: Wild trout streams in upper North River watershed shown in pink.

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