KENTUCKY HEARTWOOD
Protecting the Beauty and Wellbeing of Kentucky's Native Forests

Robert Claybrook
Redbird District Ranger
91 Peabody Road
Big Creek, KY 40914

December 6, 2019

RE: South Redbird Wildlife Habitat Enhancement Project

Dear Ranger Claybrook,

Thank you for the opportunity to submit comments on the South Redbird Wildlife Habitat Enhancement Project (hereafter "South Redbird project"). These comments are being submitted on behalf of Kentucky Heartwood, the Center for Biological Diversity, and the Kentucky Resources Council. Commenters are deeply concerned about the environmental impacts posed by this project. Our concerns are grouped in four main sections. Section 1 details our concerns relating to soil and water resources, including impacts to aquatic habitats and federally-listed aquatic species and critical habitat. Section 2 details our concerns related to interior forest, old-growth, and other silvicultural issues. Section 3 addresses invasive species, and Section 4 addresses oak regeneration, early seral habitat, and the range of alternatives.

Section 1: Soil and Water Resources

I. Logging Activities Can Cause Significant Erosion and Sedimentation

Logging can have significant adverse impacts on the aquatic environment. Logging activities can alter water chemistry, flow, temperature, and nutrient and sediment transport, and can interfere with normal watershed functioning.[1] Logging has multiple direct and indirect negative effects on aquatic biota, across taxa. Erosion from poor forestry practices degrades water quality.[2]

Ground-based timber harvesting and road building can significantly increase erosion and sedimentation.[3] Road systems can contribute to rill and gully erosion, at the outlet of cross-rain features,

[1] Folkerts, G.W. 1997. State and fate of the world's aquatic fauna. P. 1-16 In: Benz, G.W. and D.E. Collins (editors). 1997. Aquatic Fauna in Peril: The Southeastern Perspective. Southeast Aquatic Research Institute Special Publication 1, Lenz Design and Communications, Decatur, GA. 553 pp.
[2] Williams, J. D., M. L. Warren, K.S. Cummings, J.L. Harris, and R.J. Neves. 1993. Conservation status of the freshwater mussels of the United States and Canada. Fisheries 18(9):6-22.
[3] Megahan, W.F. and King, J.G. 2004. Erosion, sedimentation and cumulative effects in the northern Rocky Mountains. In: Ice, G.G., Stednick, J.D. eds. A century of forest and wildland watershed lessons. Bethesda, MD: Society of American Foresters: 202-222. Chapter 9; Croke, J.C. and Hairsine, P.B. 2006. Sediment delivery in managed forests: a review, Environmental Review. 14: 59-87.

such as culverts, broad-based dips, and waterbars.[4] These types of erosion can result in the largest volumes of soil movement in relatively short periods of time.[5] Roads increase sediment delivery to streams by impeding water infiltration into the soil and concentrating overland flow.[6]

The Forest Service has recognized that "soil erosion, the source of stream sedimentation, is the most serious land management conservation issue in Kentucky. Mining, agriculture, and silviculture are the most significant contributors to sedimentation."[7] In its 2001 Assessment and Strategy for Conservation of Aquatic Resources on the Daniel Boone National Forest (DBNF) Interim Report, the Forest Service explained that "sources of sedimentation from silvicultural activities include road construction and maintenance, and construction and use of log landings and skid trails. A portion of this sedimentation can be attributed to landslides and debris flows generated by road construction, skidding, or maintenance and use of roads and trails but most sediment input results from eroding road surfaces, slopes, and ditches, particularly at stream channel crossings."[8] Silvicultural activities can contribute to sediment to DBNF streams.[9]

In assessing the erosion potential for units proposed for timber harvesting, the Forest Service considers the unit's soil erosion hazard rating. The rating considers factors such as slope, texture, and rock fragment content. Slope is a major factor when assessing the risk of erosion as an increased slope gradient increases the risk of erosion, mass wasting, and landslides. Edwards et al. 2016.

II. Erosion and Sedimentation Can Have Significant, Adverse Impacts to Aquatic Species

Erosion and sedimentation can have significant adverse impacts to aquatic life. Sedimentation alters substrate conditions by filling in interstitial spaces between rocks which provide breeding, feeding, and sheltering habitat for many species.[10] Increased sedimentation from logging can suffocate aquatic snails and their eggs, preclude their ability to feed, and extirpate populations: "As most (freshwater snails) are obligate perilithon grazers and require stable substrate, siltation, such as that resulting from clear-cutting, generally means loss of habitat and at least local extirpation."[11] Increased sedimentation is also harmful for freshwater mussels.[12] Clearcutting and conversion of deciduous forest to pine plantations increases sedimentation and reduces the input of large woody debris and leaf litter into streams which are necessary to provide microhabitat and food for aquatic organisms.[13]

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[4] Croke, J., Mockler, S., Fogarty, P., and Takken, I. 2005. Sediment concentration changes in runoff pathways from a forest road network and the resultant spatial pattern of catchment connectivity. Geomorphology. 68:257-268.
[5] *Id.*
[6] Meghan and King, 2004.
[7] Dolloff, C. A., Leftwich, K.N., Hudy, M., Warren, M. L., Haag, W., Bishop, V., Walker, J., McDougal, L.A., Chalfant, G., Chen, G., Kershner, J. 2001. An assessment and strategy for conservation of aquatic resources on the Daniel Boone National Forest, Interim Report, Center for Aquatic Technology Transfer, Virginia Polytechnic Institute and State University. p. 42 (April 2001).
[8] *Id.*
[9] *Id.*
[10] Neves, R.J., A.E. Bogan, J.D.Williams, S.A. Ahlstedt, P.W. Hartfield. 1997. Status of aquatic mollusks in the southeastern United States: a downward spiral of diversity. P. 43-85 In: Benz, G.W. and D.E. Collins (editors). 1997. Aquatic Fauna in Peril: The Southeastern Perspective. Southeast Aquatic Research Institute Special Publication 1, Lenz Design and Communications, Decatur, GA. 553 pp.
[11] Frest, T.J., and E.J. Johannes. 1993. Mollusk species of special concern within the range of the Northern Spotted Owl with an addendum addressing new management options proposed in June 1993. Final report to Forest Ecosystem Management Working Group, USDA Forest Service. Deixis Consultants, 2517 NE 65th St. Seattle, WA 98115. 98 p.
[12] Neves, et. al. 1997.
[13] Morse, J.C., B.P. Stark, W.P. McCafferty, and K.J. Tennesen. 1997. Southern Appalachian and other Southeastern streams at risk: Implications for mayflies, dragonflies and damselflies, stoneflies, and caddisflies. P. 17-42 In: Benz , G.W. and D.E.

Clearcutting can lead to the disappearance of caddisflies and mayflies, with ramifications at higher levels of the food web.[14] Aquatic-breeding amphibians which depend on ephemeral ponds and/or which are dependent on forested habitats to complete their life cycle are particularly threatened by logging activities.[15] Herbicides used after timber harvests also negatively affect amphibians and other aquatic organisms.[16]

Sedimentation is one of the primary causes of habitat degradation in southeastern waterways.[17] Sedimentation and siltation result from a variety of activities including agriculture, forestry, development, and mining, with silt reaching waterways during both ground-disturbing activities and storm events.[18] Suspended sediment threatens the entire aquatic community, from fish to invertebrates to birds. Richter et al. (1997) identify sedimentation as the major stressor affecting the ability of aquatic animals to recover from declines.[19]

In the southeast, sedimentation is responsible for nearly 40 percent of fish imperilment problems.[20] Sedimentation has both direct and indirect negative effects on fish. Suspended sediments cut and clog gills and interfere with respiration. Sedimentation blocks light penetration, which interferes with feeding for species like minnows and darters which feed by sight.[21]

Benthic species require specific substrate conditions for spawning, feeding, and cover, all of which are degraded by sedimentation.[22] When sedimentation fills in the crevices between and beneath rocks, it decreases the availability of cover for resting and predator evasion.[23] Madtoms, darters, suckers, and some minnows deposit their eggs on or near the substrate, and sedimentation interferes with their reproduction both by decreasing habitat suitability and by directly smothering eggs. Benthic fishes are also negatively affected by toxins which are stored in sediments.[24] Ultimately, excessive sedimentation can eliminate fish species from an area by rendering their habitat unsuitable.[25]

Collins (editors). 1997. Aquatic Fauna in Peril: The Southeastern Perspective. Southeast Aquatic Research Institute Special Publication 1, Lenz Design and Communications, Decatur, GA. 553 pp.; Herrig, J. and P. Shute. 2002. Chapter 23: aquatic animals and their habitats: Southern Region, USDA Forest Service and Tennessee Valley Authority. 45 pp. In: Wear, David N.; Greis, John G., eds. 2002. Southern forest resource assessment. Gen. Tech. Rep. SRS-53. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station. 635 pp.

[14] Morese, et al. 1997.

[15] Dodd, C.K. Jr. 1997. Imperiled Amphibians: A Historical Perspective. p. 165-2000 In: Benz, G.W. and D.E. Collins (editors). 1997. Aquatic Fauna in Peril: The Southeastern Perspective. Southeast Aquatic Research Institute Special Publication 1, Lenz Design and Communications, Decatur, GA. 553 pp.

[16] *Id*.; Herrig and Shute. 2002.

[17] Neves et al. 1997

[18] U.S. Fish and Wildlife Service (FWS). 2000. Mobile River Basin Aquatic Ecosystem Recovery Plan. Atlanta, GA. 128 pp.

[19] Richter, B.D., D.P. Braum, M.A. Mendelson et al. 1997. Threats to imperiled freshwater fauna. Conservation Biology. 11: 1081–1093.

[20] Etnier, D.A 1997. Jeopardized southeastern freshwater fishes. p. 87-104 In: Benz, G.W. and D.E. Collins (editors). 1997. Aquatic Fauna in Peril: The Southeastern Perspective. Southeast Aquatic Research Institute Special Publication 1, Lenz Design and Communications, Decatur, GA. 553 pp.

[21] Etnier, D.A. and W.C. Starnes 1993. The Fishes of Tennessee. University of Tennessee Press, Knoxville, TN.

[22] *Id*.; Warren, Jr., M.L., P.L. Angermeier, B.M. Burr, and W.R. Haag. 1997. Patterns of fish imperilment in the Southeast. p. 105-164 *In:* Benz, G.W. and D.E. Collins (editors). 1997. Aquatic Fauna in Peril: The Southeastern Perspective. Southeast Aquatic Research Institute Special Publication 1, Lenz Design and Communications, Decatur, GA. 553 pp.

[23] Herrig and Shute 2002.

[24] Reice, S.R. and M. Wohlenberg. 1993. Monitoring freshwater benthic macroinvertebrates and benthic processes: Measures for assessment of ecosystem health. In Freshwater Biomonitoring and Benthic Macroinvertebrates. D.M. Rosenberg and V.H. Resh (eds.). Chapman and Hall, New York, NY, p. 287-305.

[25] FWS 2000.

Likewise, excessive sedimentation has strong, persistent negative effects on freshwater invertebrates.[26] Siltation is one of the primary factors implicated in the decline of freshwater mollusks.[27] Neves et al. (1997) state, "[P]eriodic additions of sediment have profound effects on the long-term sustainability of mollusk populations."[28] Suspended sediments have both direct and indirect negative effects on mollusks. Sedimentation clogs the gills of mussels and snails and can cause suffocation.[29] Sedimentation reduces feeding efficiency both by interfering with respiration for filter feeders and by coating the algae which snails scrape from rocks.[30] Decreased visibility due to sedimentation can interfere with mussel reproduction by making it difficult for host fishes to detect glochidia.[31] Sedimentation also reduces substrate suitability.[32]

As part of the conservation strategy for the protection and restoration of aquatic resources on the DBMF, Dolloff, et al. 2011 established the following goal:

> Restore and maintain the sediment regime under which the aquatic system evolved. Sediment regime elements including the timing, volume, rate, and character of sediment input, storage, and transport. Maintain sedimentation rates that are in equilibrium with the watershed and that stabilize or improve the biological condition of the stream. Riparian areas will contain a minimum amount of exposed mineral soil and effective mitigation will occur where surface disturbances or modifications concentrate runoff, accelerate soil erosion, or transport sediment to stream channels.[33]

III. The Kentucky Arrow Darter and Snuffbox Mussel are Threatened by the Impacts of Logging

A. Kentucky Arrow Darter

The Kentucky arrow darter (KAD) is a small fish that typically inhabits pools or transitional areas between riffles and pools in moderate-to high-gradient, first-to third-order streams with rocky substrates.[34] KADs typically occur in streams with watersheds of 10 square miles or less and many of these habitats can be intermittent in nature.[35] During drier periods, KADs retreat into shaded, isolated pools or disperse into larger tributaries.[36]

KADs occurred historically in at least 74 streams in the upper Kentucky River basin of eastern Kentucky.[37] But the species has declined significantly rangewide and has been eliminated from large portions of its range. Forty-four percent of the species' extirpations have occurred since the mid-1990s and the species has disappeared completely from several watersheds.[38] Its current range is now limited

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[26] Strayer, D.L. 2006. Challenges for freshwater invertebrate conservation. Journal of the North American Benthological Society 25(2):271–287.
[27] Williams, et al. 1993.
[28] Neves, et al. 1997 at 68.
[29] FWS 2000.
[30] *Id*.
[31] Neves, et al. 1997.
[32] Herrig and Shute 2002.
[33] Dolloff, et al. 2001. at 49.
[34] Department of the Interior, Fish and Wildlife Service, Endangered and Threatened Wildlife and Plants; Threatened Species Status for Kentucky Arrow Darter with 4(d) Rule, Proposed Rule, 80 Fed. Reg. 60962, 60964 (Oct. 5, 2015).
[35] *Id*. at 60964
[36] *Id.*
[37] *Id.* at 60965.
[38] *Id*. at 60968.

to 47 streams, scattered across 6 sub-basins.[39] Of these 47 streams, the Service considers half of these populations to be "vulnerable" and most remaining populations are isolated and restricted to short stream reaches.[40] About 38 percent of the species' remaining populations occurs within the DBNF and these streams contain some of the best remaining habitats.[41]

Today, the species is still known to occur in the Red Bird River, a tributary of the South Fork Kentucky River that flows northerly through portions of Bell, Clay, and Leslie Counties.[42] It once was known to inhabit 12 streams within the watershed but it has been extirpated from two streams (Big Creek and Hector Branch).[43] The Red Bird River watershed supports the largest concentration of occupied streams and some of the species' best remaining populations.[44]

The KAD's habitat and range has been destroyed, modified, and curtailed due to a variety of anthropogenic activities.[45] Resource extraction (including logging) has contributed to the degradation of streams within the species' range.[46] These and other activities have led to chemical and physical changes to stream habitats, which have adversely affected the species.[47] Specific stressors include increase dissolved solids and higher instream conductivity, excess sediments deposited in a stream, turbidity, nutrient pollution and organic enrichment, and elevation of stream temperatures.[48]

Sedimentation has been listed repeatedly by Kentucky Division of Water (KDOW) as the most common stressor of aquatic communities in the upper Kentucky River basin.[49] Logging is one of the primary sources of sediment and can result in canopy removal, channel disturbance, and increased siltation which in turn degrades KAD habitats.[50] The reduction or loss of riparian vegetation results in higher stream temperatures, destabilization of stream banks and siltation, and removal of submerged root systems that provide habitat for fish and macroinvertebrates.[51]

When the U.S. Fish and Wildlife Service proposed listing the KAD in 2015, it specifically discussed the adverse effects logging activities can have on KADs and other fishes through the removal of riparian vegetation, direct channel disturbance, and sedimentation of instream habitats. The agency explained:

> During logging activities, sedimentation occurs as soils are disturbed, the overlying leaf or litter layer is removed, and sediment is carried overland from logging roads, stream crossings, skid trails, and riparian zones during storm events. Logging impacts on sediment production can be considerable, but access and haul roads often produce more sediment than the land harvested for timber. Excess sediment can bury in-stream habitats used by the species for foraging, reproduction, and sheltering, and it can disrupt the dynamic equilibrium of channel width, depth, flow velocity, discharge, channel slope, roughness, sediment load, and sediment size that maintains stable channel morphology. The lack of stream-side vegetation also promotes bank

[39] *Id*. at 60966.
[40] *Id*. at 60968.
[41] *Id*. at 60980.
[42] *Id*. at 60972.
[43] *Id*.
[44] *Id*.
[45] *Id*. at 60974.
[46] Id.
[47] *Id.*
[48] *Id.*
[49] *Id*. at 60978.
[50] *Id.*
[51] *Id.*

> erosion that alters stream courses and introduces large quantities of sediment into the channel. This can lead to channel instability and further degradation of in-stream habitats. Reductions in riparian vegetation can adversely affect the species through increased solar radiation, elevated stream temperatures, loss of allochthonous (organic material originating from outside the channel) food material, and bank instability/erosion. Direct channel disturbance occurs primarily at stream crossings during culvert, log, or rock placement. Severe impacts can occur when loggers use stream channels illegally as skid trails.[52]

In sum, logging and the resulting impacts of sedimentation, have had a significant negative impact on the species.

The species is further threatened by climate change according to the United States Fish and Wildlife Service (USFWS).[53] Climate change has the potential to increase the vulnerability of the KAD to random catastrophic events such as extreme floods, strong storms, and droughts.[54] The frequency, duration, and intensity of droughts are likely to increase in the Southeastern United States as a result of climate change.[55] Scientists predict that climate change and rising temperatures will have several significant impacts on fishes including the disruption to their physiology, life history, and distribution.[56] Models forecast average annual temperatures for Kentucky and the upper Kentucky River drainage to increase by 4.5 to 9 degrees Fahrenheit by the 2080s.[57] USFWS states that climate change is almost certain to affect aquatic habitats in the upper Kentucky River drainage through increased water temperatures and more frequent droughts, and species like the KAD with limited ranges, fragmented distributions and small population sizes will be particularly vulnerable to the effects of climate change.[58]

These impacts, in addition to the impacts caused by other activities, led the USFWS to list the species[59] and designate critical habitat under the Endangered Species Act (ESA) in 2016.[60] Critical habitat are "the specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the Act, on which are found those physical or biological features essential to the conservation of the species, and which may require special management considerations or protection; and specific areas outside the geographical area occupied by the species at the time it is listed, upon a determination that such areas are essential for the conservation of the species."[61] KAD critical habitat is designated throughout the project site.[62]

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[52] *Id.*
[53] *Id*. at 60982.
[54] *Id.*
[55] *Id*.
[56] *Id.*
[57] *Id.*
[58] *Id*.
[59] Department of the Interior, Fish and Wildlife Service, Endangered and Threatened Wildlife and Plants; Threatened Species Status for the Kentucky Arrow Darter with 4(d) Rule, Final Rule, 81 Fed. Reg. 68963 (Oct. 5, 2016).
[60] Department of the Interior, Fish and Wildlife Service, Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for Kentucky Arrow Darter, Final Rule, 81 Fed. Reg. 69312 (Oct. 5, 2016).
[61] 16 U.S.C. § 1532.
[62] *See id*.; BAE at 13-15.

B. Snuffbox mussel

The snuffbox is found in small-to medium sized creeks, larger rivers, and lakes.[63] It occurs in swift currents of riffles and shoals and wave-washed shores of lakes over gravel and sand with occasional cobble and boulders.[64] They generally burrow deep into the substrate, except when spawning or attempting to attract a host.[65] In streams they occur primarily in "flow refuges," which are stable areas that display little movement of particles during flood events.[66]

The snuffbox historically occurred in 210 streams and lakes in 18 states and 1 Canadian providence.[67] Today, snuffbox populations are known from 79 streams in 14 states, including the Red Bird River in Kentucky.[68] This marks a 62 percent decline in occupied streams.[69] Because multiple streams may comprise a single snuffbox population, the actual number of extant populations is fewer than 79.[70] And these extant populations, with few exceptions, are highly fragmented and restricted to short reaches.[71] The population in the Red Bird River is considered "marginal."[72] Marginal populations are very small and highly restricted, with no evidence of recent recruitment, of questionable viability, and that may be on the verge of extirpation in the immediate future.[73] The small population in the Red Bird occurs sporadically in the lower 20 river miles and viability is unknown.[74]

The snuffbox faces many threats including siltation and pesticides. Excessive sedimentation affects the majority of streams with snuffbox populations.[75] Sedimentation has been linked to the decline of mussel populations nationwide and is a threat to the snuffbox.[76] The impacts include reduced feeding and respiratory efficiency due to clogged gills, disrupted metabolic processes, reduced growth rates, limited burrowing activity, and physical smothering.[77] Excessive sedimentation can have detrimental effects that are not immediately apparent. As the USFWS explained in its decision to list the species in 2012:

> Physical habitat effects include altered suspended and bed material loads, and bed sediment composition associated with increased sediment production and run-off; clogged interstitial habitats and reduced interstitial flow rates and dissolved oxygen levels; changed channels in form, position, and degree of stability; altered depth or wide-depth ratio that affects light penetration and flow regime; aggraded (filling) or degraded (scouring) channels; and changed channel positions that dewater mussel beds…Interstitial spaces in the substrate provide essential habitat for juvenile mussels. When they are clogged, interstitial flow rates and spaces may become reduced, thus reducing juvenile habitat availability…Sediment may act as a vector for delivering contaminants, such as nutrients and pesticides, to streams. Juveniles can readily ingest

[63] Department of the Interior, Fish and Wildlife Service, Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for the Rayed Bean and Snuffbox Mussels Throughout Their Ranges, Final Rule, 77 Fed. Reg. 8632, 8632 (Feb. 14, 2012).
[64] *Id*. at 8633.
[65] *Id.*
[66] *Id.*
[67] *Id*. at 8639.
[68] *Id*.
[69] *Id.*
[70] *Id*.
[71] *Id.*
[72] *Id*. at 8639-8641.
[73] *Id*. at 8641.
[74] *Id*. at 8646.
[75] *Id*. at 8656.
[76] *Id*.
[77] *Id*.

> contaminants adsorbed to silt particles during normal feeding activities. These factors may explain, in part, why so many mussel populations, including those of the rayed bean and snuffbox, appear to be experiencing recruitment failures.[78]

The species is further threatened by pesticides. Elevated concentrations of pesticides frequently occur in streams due to pesticide runoff, overspraying, and lack of adequate riparian buffers.[79] Herbicides such as glyphosate and chlorpyrifos are potentially toxic to these mussels.[80]

According to the USFWS's last Five-year review of the species, "The overall snuffbox status has not improved since listing and threats have not been ameliorated. Threats persist for the remaining snuffbox populations, including habitat degradation and climate change. Only six percent of the extant populations are large and stable or improving. Although there are ongoing attempts to alleviate some threats, there appear to be no populations without current significant threats and many threats are without obvious or readily available solutions."[81]

IV. The Draft EA Fails to Meaningfully Consider the Impacts of Logging on the KAD and Snuffbox Mussel

NEPA requires federal agencies to take a "hard look" at the environmental consequences of their actions and provide for broad dissemination of relevant environmental information.[82] This "hard look" must include "some quantified or detailed information" supporting the conclusions of an EA.[83] An "agency has satisfied this 'hard look' requirement if it has examine[d] the relevant data and articulate[d] a satisfactory explanation for its action including a rational connection between the facts found and the choice made."[84] The "hard look" requirement is violated when the "agency failed entirely to consider an important aspect of the problem."[85]

The EA's analysis of the project's impacts to the KAD and snuffbox mussel is woefully inadequate and the Forest Service has failed to take the necessary "hard look" under NEPA. The EA provides almost no analysis, only conclusory statements, and where it does acknowledge impacts, it provides no specific details, no site-specific information, and makes no attempt to weigh the disadvantages of the action alternative in which those impacts occur against the advantages of taking no action.

The Forest Service acknowledges that the "primary soil concern for this project is erosion, driven by the fine-loamy textures, rock content, and slopes of the area."[86] Further, the Natural Resources Conservation Service (NRCS) erosion ratings for the project area range from "moderate to severe."[87] There will also be extensive use of heaving equipment, skidding, decking and transportation of logs.[88] The EA finds that "erosion could occur with these activities until the ground cover is reestablished, within 3 months to

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[78] *Id.* (internal citations omitted).
[79] *Id.* at 8654.
[80] *Id.*
[81] U.S. Fish and Wildlife Service, Midwest Region Ecological Services Field Office, Columbus, Ohio, Snuffbox (Epioblasma triquetra) 5-Year Review: Summary and Evaluation, at 40, August 2018.
[82] *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 350 (1989).
[83] *Klamath-Siskiyou Wildlands Ctr. v. Bureau of Land Mgmt*., 387 F.3d 989, 993 (9th Cir. 2004).
[84] *Black Warrior Riverkeeper, Inc. v. U.S. Army Corps of Eng'rs*, 833 F.3d 1274, 1285 (11th Cir. 2016)(citation omitted).
[85] *Sierra Club v. U.S. Army Corps of Eng'rs*, 295 F.3d 1209, 1216 (11th Cir. 2002).
[86] EA at 28.
[87] *Id.*
[88] EA at 29.

approximately 3 years."[89] In addition, roads may take longer to revegetate depending on the length of use, compaction, and post-use disturbance.[90]

Despite these activities, the EA summarily concludes that there would only be "short term negligible indirect effects" from sedimentation,[91] "negligible: herbicide impacts,[92] and no discussion at all of the threats climate change will have on these species. The EA provides no information about the well-documented effects sedimentation can have on these species, how water quality degradation has contributed to the decline of these species and resulted in their listing under the ESA, and how these activities could further impact these species in the DBNF. The EA fails to identify the erosion ratings of the respective units or slope in each stand, the method of logging in each stand, the proximity of logging operations and roads, including oil and gas roads, to nearby streams (including KAD critical habitat), and other factors that could influence the potential for soils to erode and sediments to enter areas where KAD and snuffbox mussel are known to occur. The EA does not identify the location of temporary and permanent roads in relation to these areas and the potential impacts of construction and operation. These roads, including skid trails, have the potential of creating entirely new stream channels resulting in increased surface flows out of the watershed and an even greater potential for erosion and sedimentation. There is no discussion of these potential impacts or what other impacts could occur before the temporary roads are revegetated several years from now or what the resulting impacts could be if the mitigation measures fail.

In several instances the EA refers to the Biological Assessment and Evaluation (BAE) but the BAE provides hardly any more insight into the project's effects on these species. It appears to rely mostly on a single source to support its position that there would be "slight, temporary increases in erosion" but Best Management Practices (BMPs) would make it unlikely that sediments would reach streams. But the source the Forest Service relies on (Cotton 2019) is not included with the EA and appears to be for an entirely different project.[93] The EA further dismisses the potential spread of herbicides despite the threats these chemicals pose to aquatic species. There is also no consideration of the cumulative effects of past, present, and reasonably foreseeable future logging projects on these species.

Instead, the EA largely relies on Kentucky state BMPs and other mitigation measures to determine that the project would not impact these species. There is no site-specific information about the use of these BMPs, the expected rate of effectiveness,[94] or the environmental consequences if these BMPs are insufficient, are not properly implemented and/or maintained, or cannot achieve the desired outcome due to the severity of the slopes and erosion ratings in a particular unit. Measures such as the use of water bars may also have limited effectiveness. Improper placement and installation, vehicle traffic, and the inherently high risk of failure greatly reduce the effectiveness of BMPs. In fact, the Forest Service has previously found that these measures could do more harm than good by directing more water into aquatic habitats.[95]

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[89] *Id.*
[90] *Id*.
[91] *Id*. at 48-49.
[92] *Id*.
[93] *See* EA at 31, 42.
[94] Courts have also been critical of an overly high efficiency rate of erosion control devices. *See Cowpasture River Pres. Ass'n v. Forest Serv*., 911 F.3d 150, 177 (4th Cir. 2018).
[95] *See id*. (Forest Service violated NEPA by failing to take a hard look at erosion and sedimentation).

"The discussion of steps that can be taken to mitigate adverse environmental consequences plays an important role in the environmental analysis under the National Environmental Policy Act (NEPA)."[96] There must be a "reasonably complete discussion of possible mitigation measures."[97] Courts have required mitigation measures to be supported by substantial evidence in order "to avoid creating a temptation for federal agencies to rely on mitigation proposals as a way to avoid preparation of an EIS."[98] Mitigation measures are deemed insufficient when the agency fails to study the efficacy of the proposed mitigation, fails to take certain steps to ensure the efficacy of the proposed mitigation, or fails to consider alternatives in the event that the mitigation measures fail.[99]

Moreover, the Forest Service must identify where it will log and how, analyze the impacts of that, and allow the public to comment with that information. Site-specific decisions require site-specific analysis before the decision is made.[100]

NEPA demands more than just conclusory statements that the project will have "negligible" sedimentation impacts. Furthermore, the Forest Service has an obligation to avoid adverse modification of critical habitat. The Forest Service must closely examine the site-specific impacts of the proposed project, the impacts logging activities can have on the snuffbox mussel and the KAD and its critical habitat, and provide a reasoned explanation for its decision.[101]

V. Implementation of Group One Project Demonstrates Inadequacy of BMPs and Forest Plan Standards

The Soil and Water Report for the South Redbird project bases the determination that impacts from sedimentation will be minimal and temporary on prior, successful implementation of BMPs and Forest Plan Standards. Table 6 of the Soil and Water Report provides a "Summary of BMP Monitoring results for random and various ground-disturbing activities on the Daniel Boone National Forest, South Red Bird Project, Redbird Ranger District, Daniel Boone National Forest."[102] However, none of the projects in Table 6 are located in or near the Redbird Ranger District. Each of the logging projects listed as being "Effective" with respect to BMP implementation and monitoring occurred in a different ranger district, and on sites that are significantly less steep with soils that are less erodible than those in the South Redbird project area. The examples provided have little bearing on the adequacy of BMPs and Forest Plan Standards with respect to the Redbird District and the South Redbird project.

The Soil and Water Report does remark on one failure in the Redbird District. The Report states:

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[96] *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 351 (1989); *see also* 1502.16(h) (stating that an EIS must contain "means to mitigate adverse environmental impacts").
[97] *Id*. at 352.
[98] *National Audubon Soc'y v. Hoffman*, 132 F.3d 7, 17 (2d Cir. 1997)(emphasis added).
[99] *Id.*; *see also National Parks & Conservation Ass'n v. Babbitt*, 241 F.3d 722, 734-35 (9th Cir. 2001) (holding that the agency could not issue a FONSI based upon mitigation measures because it "did not conduct a study of the anticipated effects of the mitigation measures, nor did it provide criteria for an ongoing examination of them or for taking any needed corrective action"); *Sierra Club v. Norton*, 207 F. Supp. 2d 1310 (S.D. Ala. 2002).
[100] *See, e.g., "Ilio'ulaokalani Coalition v. Rumsfeld*, 464 F.3d 1083 (9th Cir. 2006).
[101] *Seattle Audubon Soc'y v. Mosely*, 798 F.Supp. 1473, 1482 (W.D. Wash. 1992) ("[t]he agency may not rely on conclusory statements unsupported by data, authorities, or explanatory information."); *Earth Island Inst. v. U.S. Forest Service*, 442 F.3d 1147, 1160 (9th Cir. 2006) (An agency has acted arbitrarily and capriciously when it fails to make a reasoned decision based on an evaluation of evidence).
[102] *See* South Red Bird Project Soil & Water Report at 13

> One large exception occurred in a nearby sub watershed within the last 2 years: Granny's Branch. A full-bench skid road was constructed on slopes that exceeded 35%. The soil scientist was not informed until after the sale was finished. Repairs were made using soil and water funding. Erosion occurred in this location but it was arrested once the area was seeded and mulched. Communication could have kept this from happening, and the leadership, staff, and district all understand that Granny's Branch was an unacceptable situation. That is not expected to happen again.[103]

The Granny's Branch site is a shelterwood harvest approved as part of the Group One Proposal Redbird River Project (hereafter "Group One project"), which is adjacent to the South Redbird analysis area. The Granny's Branch site, however, is not an "exception." Commenters have documented similar impacts across several other shelterwood harvest sites from the Group One project. It is important to note that the Group One harvests we describe below were implementing the same prescriptions and for the same purposes as those described in the South Redbird project. The sites largely exhibit the same soil types and slopes as those in the South Redbird project, and would rely on the same BMPs and Forest Plan Standards as the South Redbird project.

- At the Granny's Branch site noted in the Soil and Water Report (Shelterwood unit 13 in the Group One EA), in addition to the required remediation, we observed skid roads and logging up the edge of an extensive rock face (presumably from historic coal mining activities). Soil, brush, and whole trees were pushed to the edge and over the rock face. Logging went straight through intermittent stream channels, which we found to be flowing through piles of logging slash.

- In Shelterwood unit 18 on Lower Jack's Branch we observed severe erosion, downcutting in water channels flowing out of the harvest area, and a significant landslide. The landslide we documented began at a full-bench skid road and dumped sediment and rubble into a flowing stream channel (a side tributary of Lower Jack's Branch). Using recently available satellite imagery, we performed an analysis of the area of mineral soil exposed by skid roads and landings, and estimated that approximately 30% of the area was exposed soil. This is three times what is allowed under Forestwide Standard DB-VEG-26, and is directly contributing to erosion and likely non-native plant invasion. Based on our visual and satellite inspection of other Group One harvest sites, this does not appear to be an exception. It also appears that the Forest Service violated Kentucky State BMPs, and therefore the Forest Plan, with regard to Streamside Management Zone (SMZ) protections. Specifically, the Kentucky State BMPs require that roads, trails, and landings be at least 100 ft. from intermittent steams when slopes exceed 16%.[104]

- In Shelterwood unit 14 on Ulysses Creek, we observed massive bulldozed skid trails, creating embankments up to 10 feet tall. We observed a landslide at that site that cut across three large road contours that were bulldozed for skid trails. The landslide was covered with invasive Japanese stiltgrass.

- Shelterwood unit 20 on Ulysses Creek was logged in 2012, prior to the aforementioned sites. On November 18th, 2018 Kentucky Heartwood submitted a letter to Redbird Ranger District Ranger Robert Claybrook regarding concerns over this site. As described in our letter, we observed expansive infestations of multiple invasive species, including Japanese honeysuckle, Japanese stiltgrass, multiflora rose, kudzu, Sericea lespedeza, and autumn olive. These species were not

[103] *Id.*

[104] *See:* Kentucky Logging BMP Field Guide, A field guide to the minimum requirements for logging Best Management Practices in Kentucky

only observed established on skid roads, but on the ground between the skid roads. These infestations were considerable and beyond what is described or anticipated in the effects analysis for the Group One or South Redbird project. The extent of invasion is likely a direct result of the excessive amount of soil disturbance allowed by the Forest Service. In the response letter dated December 11, 2018, District Ranger Claybrook stated that the sale contract "includes provisions for equipment cleaning prior to stand entry," and that "this contract provision was followed during the sale operation. All skid trails and landings were seeded with a specified mix of annual rye, wheat and oats which is designed to manage erosion." Clearly existing protocols are insufficient.

These observations represent only a small sampling of areas logged as part of the Group One project. While the prescriptions are identical to those in the South Redbird project, there is one notable difference: While the harvest areas in the Group One project range from 16 to 40 acres, some of harvest areas in the South Redbird project would be from about 200 to over 350 acres each. The Soil and Water Report notes that as many as 91 miles of skid roads may be developed to remove timber from harvest sites. The Soil and Water Report also assumes that skid trails will average 14 feet in width. Our field measurements indicated that these skid roads are often much larger when accounting for the upslope "cut" grade and the downslope fill dumped to create these road benches.

The terrain, slopes, soil types, geology, and vegetation are essentially identical between the Group One and South Redbird project areas, and have little relationship to the sites chosen for analysis in the Soil and Water Report. The actual effects of the Group One project, as implemented, clearly demonstrate that existing Forest Plan Standards and BMPs, as well as Forest Service operations and oversight, will be insufficient with regards to limiting erosion and protecting soil, water, and aquatic federally-listed species in the South Redbird project area.

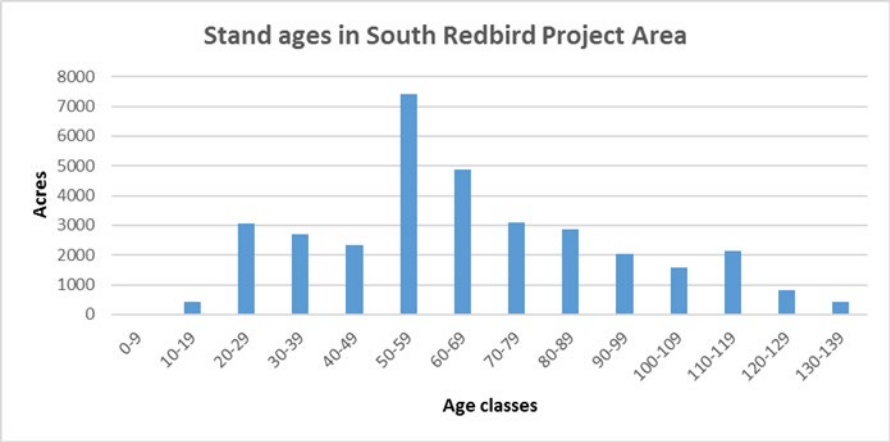
Section 2: Interior and Old-Growth Forests

VI. Forest Age Classes

The Draft EA and Vegetation Report are substantially misleading on the matter of age classes in the project area. For example, Table 2 in the Vegetation Report[105] and Figure 14 in the EA[106] unevenly cluster various age classes to provide a misleading presentation of forest conditions in the project area. Disconcertingly, all forests over 70 years of age are lumped together as "late" (we presume this is meant to mean "late seral," despite this being an outdated term and concept with respect to forest development). A broad range of scientific publications clearly discern between differing structural associations and developmental classes past the 70-year mark.[107,108] We already addressed these issues in some detail in our scoping comments. We don't understand why this information was not incorporated into the Draft EA.

[105] See, Vegetation Report at 6
[106] See, EA at 41
[107] Scheff, Robert (2012). The Development of Old-Growth Structural Characteristics in Second Growth Forests of the Cumberland Plateau, Kentucky, USA. Master's Thesis, Eastern Kentucky University.
[108] USDA FS. 1997. Guidance for conserving and restoring old-growth forest communities on national forests in the southern region. Report of the Region 8 old-Growth Team. United States Department of Agriculture Forestry Report R8-FR, 56.

Compare, for example, Figure 14 in the EA with a more accurate portrayal age class distributions that we provided in our scoping comments based on DBNF GIS data.



Clearly, the dominant age classes in the project area are 50-59 and 60-69 years old. But the EA and Vegetation Report would mislead the public and decision makers in to believing that "old" or "late" forests are abundant in the project area. They are not. This is not merely academic – it goes to the heart of the project. In the document "Landscape Inventory and Assessment for: South Red Bird #33, Prescription Area: 1.K Habitat Diversity Emphasis," dated May, 2017[109], the Forest Service states that to meet Forest Plan Objective 1.K-1.A to "Maintain 5 to 6 percent within each 5th level watershed in the 0-10 age class," that the Forest Service should "where possible, regenerate the largest 'hump' of age class."[110] The largest "hump" is not the arbitrary aggregate of at least seven 10-year age classes from 71 years upward. Following the recommendation in the project record, the Forest Service should be focusing regeneration activities on the overabundant 50-59 and 60-69 age classes. Instead, regeneration harvests are focused on less-abundant older aged forests.

In fact, while Vegetation Report and EA state that 28% of the forests in the project area are over 70 years in age, only 15% is over 100 years, and 2% over 130 years. About half of the logging proposed in the South Redbird project is targeted at forest over 100 years in age. In total, the project would log 23% of forests over 100 years old, adding to an already substantial deficit in older forest types in the project area. We don't argue that there isn't a deficit of early seral habitat. There clearly is. However, while the two least-abundant age classes are 0-9 and 10-19 years, the third, fourth, fifth, and sixth least abundant 10-year age classes are 90 years and older.

VII. Interior Forests

The Draft EA is woefully inadequate with regard to consideration of interior forests. The Purpose and Need for the project states that:

[109] This document was obtained through a previous Freedom of Information Act request for documents in the project record

[110] *See* "Landscape Inventory and Assessment for: South Red Bird #33, Prescription Area: 1.K Habitat Diversity Emphasis" at 1

> "This project is needed to make progress towards the Desired Future Conditions (DFCs) of the *Land and Resource Management Plan for the Daniel Boone National Forest*." (USDA 2004, hereafter "Forest Plan"). Information gathered in the project area identified several areas in the watershed that do not currently meet desired resource conditions defined in the Forest Plan… Data gathered through the IRMS process was conducted between 2006 and 2017 to determine the current condition of the IRMA (refer to the Affected Environment document in the project record). The existing conditions were then compared to the Forest Plan's goals, objectives, and for each resource. Where gaps between the existing condition and DFC exist, recommendations were developed to move the resource closer to DFC."[111]

Most of the vegetation management in the South Redbird project is predicated on meeting the Goals and Objectives of Forest Plan Prescription Area 1.K Habitat Diversity Emphasis. I.K-Objective 1.C. states:

> "Maintain 30 percent within each 5th level watershed in a relatively closed canopy forest at least 70 years old with midstory and shrub/sapling layers. One-fourth of the 30 percent should be maintained in blocks of at least 620 acres for interior habitat. Each block can include up to 200 acres from adjacent cliff and riparian areas; up to one-third of each block may be thinned to no less than 60 basal area."[112]

The EA and Vegetation Report repeatedly and incorrectly assert that there is an overabundance of "older age classes" in the project area.[113] The data belie this assertion. With respect to maintaining "One-fourth of the 30 percent (of stands at least 70 years)… in blocks of at least 620 acres for interior habitat," our analysis of GIS data shows that no such areas exist in the project area. The areas that most closely meet the Forest Plan's Objectives for interior forest management are within the Elisha Creek watershed, and are proposed for some of the most intensive timber harvesting in the project area. Such action precludes the development of interior forest and meeting Forest Plan Goal 1.K-Objective 1.C. in the near or distant future. This does not appear to be mentioned at all in the EA or supporting documents.

We turn again to the document "Landscape Inventory and Assessment for: South Red Bird #33, Prescription Area: 1.K Habitat Diversity Emphasis" dated May, 2017. The 5th Level Watershed analyzed in this document includes both South Red Bird and North Red Bird IRMA areas (including the Group One project area). The document states:

> "Within the analysis area, there are 3 blocks that either meet or fall just shy of the 620 acre block for interior habitat. This equates to achieving the DFC for this objective, when pro-rated to the South Red Bird IRM analysis area."[114]

Notwithstanding the fact that areas that "fall just shy of…" do not "achieve the DFC for this objective," none of these areas appear to be within the South Redbird project area. That some areas might exist outside of the project area in the North Redbird IRMA (Group One project area) is not relevant, by the Forest Service's own assertions.[115] The Landscape Inventory and Assessment further states that "Such

[111] *See* EA at 5
[112] Forest Plan 3-5
[113] See, for example, Vegetation Report at 4 and 5 and EA at 41
[114] *See*, Landscape Inventory and Assessment for: South Red Bird #33, Prescription Area: 1.K Habitat Diversity Emphasis at 2
[115] *See*, for example, EA at 40 "The South Red Bird Project area is lacking entirely of forests in the 0-10 age class."

management is a constraint to where regeneration unit may be located" and that "Time is the only way to achieve this objective."[116]

VIII. Old-Growth

The Forest Service has inappropriately excluded and inappropriately considered old-growth in the project and analysis. A "Briefing Paper" from District Ranger Claybrook dated February 20, 2018 states:

> "The Redbird Ranger District is proposing a 32,300-acre wildlife habitat enhancement project in National Forest System lands across the South Red Bird Watershed. The project would focus on creation of young forest habitat and forage availability, oak regeneration, and addressing declining forest conditions for improved vegetation composition and structure. **Some of the projects would include creating and maintaining a wide variety of habitats for wildlife, such as** young forests, edge habitat, **old-growth,** grasslands, and ephemeral ponds; reducing non-native invasive plant species to increase native plant diversity and resilience; reintroducing fire to the landscape; salvaging timber stands damaged by insects, disease and wildfire; and providing timber products to the local economy." [117] (emphasis added)

Notably, this "Briefing Paper" was published only 9 days before the scoping letter was published, and after a several years' long "collaborative" process. And it includes "creating and maintaining… old-growth" as part of the project. Kentucky Heartwood raised old-growth issues throughout the collaborative process, and was invited to speak on old-growth management at the May 2, 2017 South Redbird collaborative field trip hosted by the Forest Service. But active old-growth management is then explicitly excluded from the project in the Draft EA. The Draft EA states:

> No active old-growth management is being considered at this time in the South Red Bird IRMA because a) there is more than 1,800 acres of Designated Old-Growth already in the Red Bird River watershed within the North Redbird IRMA; b) 160 acres in the Right Fork of Elisha Creek Proposed Research Natural Area (pRNA) is to be managed as old growth in perpetuity, and c) thousands of acres throughout the IRMA will continue to mature naturally and will eventually take on the characteristics of old-growth. Nevertheless, in response to public comment, we removed 46 acres from Action 1.A to allow that stand to grow older.[118]

Each of the three reasons given for excluding active old-growth management is flawed. The first reason provided is that "there is more than 1,800 acres of Designated Old-Growth already in the Red Bird River watershed within the North Redbird IRMA." The existence of an 1,800 acre old-growth management area in a different area does not negate the need for old-growth management in the South Redbird project area. If it does, then much of the Purpose and Need for the South Redbird project has been met already. As part of the Group One project, the Forest Service amended the Forest Plan to create a 11,260 acre Ruffed Grouse emphasis area in the North Redbird IRMA. Management for grouse habitat is explicitly one of the primary reasons provided for managing for early seral habitat in the South Redbird project. If management for old-growth in the South Redbird IRMA is met by having a 1,800 acre old-growth management areas in the North Redbird IRMA, then management for ruffed grouse in the South

[116] *See*, Landscape Inventory and Assessment for: South Red Bird #33, Prescription Area: 1.K Habitat Diversity Emphasis at 2
[117] *See*, "Daniel Boone National Forest Redbird Ranger District South Red Bird Wildlife Habitat Enhancement Project Robert Claybrook, District Ranger, Briefing Paper" dated 2/20/2018.
[118] EA at 41

Redbird IRMA is met by having a 11,260 acre Ruffed Grouse emphasis area in the North Redbird IRMA.

With regard to the presence of the 160 acre Right Fork of Elisha Creek pRNA, that area only accounts for 0.5% of the project area – about as much early seral habitat. If that's enough old-growth in the project area, then perhaps we also have enough early seral habitat. And the statement that the "thousands of acres throughout the IRMA (that) will… eventually take on the characteristics of old-growth," is not adequate. For most forest types in the project area, old-growth conditions do not begin to emerge until 130 to 150 years, and even then, forests are just on the superficial cusp of "old-growth." Currently 2% of the project area (700 acres) is over 130 years old, and 15% (4,965 acres) is over 100 years old. The proposal would drop the >100 year age grouping to 3,808 acres, or 12%. Presuming no more logging projects over the next 30 years occur in the project area, that means there might be about 12% of the area in something akin to old-growth by 2050. But the rationale given in the Draft EA rests simply on "we're not going to cut it all now, and forests grow, so we're managing for old-growth." This simply is not an adequate level of analysis for a significant issue.

The rejection of active old-growth management also states that "Nevertheless, in response to public comment, we removed 46 acres from Action 1.A to allow that stand to grow older." This requires going into in some detail. On November 11, 2018, Kentucky Heartwood submitted a letter to District Ranger Claybrook regarding the stand near the confluence of Little Flat Creek and the Redbird River. This stand had been proposed for a shelterwood harvest. Our version of the DBNF GIS database indicated that the stand had an origination date of 1884, making it 134 years old at the time. Our initial survey of the area indicated that the forest had good old-growth structure. We communicated to the Forest Service that the stand needed to be surveyed as potential old-growth per the Region 8 Old-Growth Guidance[119] and Daniel Boone Forest Plan. District Ranger Claybrook responded in a December 11, 2018 letter stating:

> "In regard to your concern for possible old growth in Stand 08311727010024 in the Little Flat Creek drainage, this stand has been inventoried for old-growth criteria and their status has been determined… Based on inventory data it has been determined that this stand does not meet the necessary criteria to be considered potential old-growth."

On February 25, 2019, Kentucky Heartwood Director, Jim Scheff, sent an email to Ranger Claybrook asking for clarification on which of the criteria were not met. On February 26, 2019, Ranger Claybrook responded with the following:

> "In May of 2017 a stand exam was conducted for Compartment 2701, Stand 24. A black oak, representative of the stand was chosen to be cored, and the age was approximately 65 years old. The Region 8 Old Growth Guidance requires the stand to be a minimum of 130 years old to qualify as existing old growth for Dry-mesic oak Forest Communities. While the stands layer reports a year of origin of 1884, this age was previously reported in error and will soon be updated within the Forest Sampled Vegetation (FSVeg) Spatial Database."

To begin with, coring one tree is not the correct protocol for assessing old-growth per the methodology described in the Region 8 Guidance or the Forest Plan, into which the Guidance is incorporated. A visual inspection of the stand made it clear that the Forest Service's revision of the age data for the stand

[119] Region 8 Guidance for Conserving and Restoring Old-Growth Forest Communities on National Forests in the Southern Region (1997)

was completely incorrect. Therefore, Kentucky Heartwood performed an extensive structural and age analysis of the forest. We first measure and mapped nearly 500 trees, determining that the stand had an overall density of 11 trees per acre at least 20" dbh. The Region 8 criteria for this forest type, Dry-Mesic Oak Forest require that there to be at least 6 to 10 trees 20" dbh or greater. This criterion was certainly met. The criteria also include a minimum basal area of 40 ft^2/acre, which is easily met. As for age, the Forest Service's determination that the stand was 65 years old was clearly preposterous. Therefore, we core sampled 16 trees from 8 species distributed across the stand. Fourteen of the 16 trees ranged from 150 to roughly 370 years old.

The final criterion for determining old-growth status is an assessment of human disturbance. The R8 Guidance states that "For a stand to be considered as existing old growth, no obvious evidence of past human disturbance which conflicts with the old-growth characteristics of the area should be present."[120] It's important to note that the Guidance does not disqualify stands with "any" human disturbance. During our assessment, we found several uncut American chestnut remnants as well as some cut chestnut stumps near the top of the ridge. Chestnut blight killed American chestnuts in southeastern Kentucky mostly in the mid-1930's, though extending into the 1940's in some locations. Most of the tree core samples that we gathered show an increase in growth rate (a "release" event) around 1946, suggesting that some type of disturbance took place at that time. Given the lack of logging roads or other infrastructure, we suspect that chestnut decline was followed by limited salvage harvesting of dead American chestnuts along with the possible selective removal of a small number of other trees at that time. The timing also appears to correspond to the Forest Service's 65 year-old black oak. We suspect that a pulse of young trees followed the 1946 event, and that the Forest Service undercounted their core sample (typical of field counting instead of proper core preparation and examination with a microscope).

Based on our surveys, the Little Flat Creek stand clearly meets the operational thresholds for old-growth designation under the Forest Plan and R8 Guidance. The stand exhibits classic old-growth characteristics for Appalachian forests, including a multi-aged structure dominated by very old trees, large down woody debris and snags, and a history of moderate- to low-severity disturbance events. The Forest Plan recognizes that the Dry-Mesic Oak old-growth forest type is underrepresented.[121] It is vitally important that this stand be properly categorized in the DBNF inventories for what it is – and not as 65 year-old "future old-growth." While relatively small, the Forest Service should reallocate this stand as Designated Old-Growth under the Forest Plan to ensure conservation of its unique value.

It is frankly distressing that the Forest Service could so radically misconstrue the status of an existing multi-aged, old-growth forest – particularly after its potential status has been raised by an entity with expertise on the issue. We question what other stands may exist that have been similarly mischaracterized. We would like to offer training to District and Forest staff in how to consider and assess old-growth forests.

IX. Silvicultural Approaches to Support Old-Growth Characteristics

Kentucky Heartwood Director, Jim Scheff, submitted multiple peer-reviewed studies, reports, and examples of silvicultural approaches for enhancing old-growth structure in forests to the Forest Service

[120] *Id.*
[121] *See* Forest Plan 3-26

early in the collaborative process (e.g., structural complexity enhancement). Several documents[122, 123, 124, 125, 126] were sent to then-project Team Leader Jared Calvert on April 24, 2017, following discussion on this issue at the "collaborative" meeting in Manchester on February 22, 2017. We also raised each of these studies and examples in our scoping comments. We explicitly brought these to the Forest Service to consider as a possible management approach in the relatively young, codominant stands that typify the South Redbird project area. In general, these approaches aim to shift the codominant structure of young mature stands (roughly 60 to 90 years old in our region) by creating gaps, snags, and dominant trees through careful silvicultural intervention. The forest canopy structures created by these approaches, in our region, can be beneficial for rare and declining species, like Cerulean warbler and Indiana and northern long-eared bats.

However, we can find no consideration of these approaches in the record. The only mention we find of these submissions is an April 27, 2017 email[127] from Jared Calvert to Callie Schweitzer stating:

> "Here are the documents that Jim Scheff from Kentucky Heartwood had sent. I haven't had a chance to read them in detail. Just wanted to share so you would know what different people are thinking about."[128]

Callie Schweitzer responded:

> "Thanks Jared. Sort of what I expected, unevenaged management for these systems. But as we talked about, care must be taken to apply something that works 'up north' to sites that are not northern; we don't necessarily want to regeneration shade tolerant species; and our decomposition rates are such that maintaining any downed woody debris is almost impossible without a drought year! Certainly may be an interesting discussion . . . C"[129]

It's worth noting that among the studies submitted was a SRS General Technical Report about the management of Pioneer Forest in the Missouri Ozarks, which is not "up north." But, more to the point, there are many valid reasons why the silvicultural approaches we suggested and submitted are viable and useful in forests in the project area. For example, the document "Landscape Inventory and Assessment for: South Red Bird #33, Prescription Area: 1.K Habitat Diversity Emphasis" in the project record states that the Forest Service could help meet Forest Plan Objective 1.K-1.M.[130] in the following way:

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[122] Accelerating the Development of Old-growth Characteristics in Second-growth Northern Hardwoods, USDA Forest Service, Northern Research Station, General Technical Report NRS-144. Authors: Karin S. Fassnacht, Dustin R. Bronson, Brian J. Palik, Anthony W. D'Amato, Craig G. Lorimer, Karl J. Martin (February 2015).

[123] Managing for late-successional/old-growth characteristics in northern hardwood-conifer forests, Forest Ecology and Management 235 (2006) 129–142. Author: William Keeton (2006).

[124] Pioneer Forest - A Half Century of Sustainable Uneven-aged Forest Management in the Missouri Ozarks, USDA Forest Service, Southern Research Station, General Technical Report SRS-108. 2008.

[125] Restoring Old-Growth Characteristics, University of Massachusetts-Amherst Extension. Authors: Anthony D'Amato and Paul Catanzaro

[126] The Vermont Forest Ecosystem Management Demonstration Project, University of Vermont, Rubenstein School of Environment and Natural Resources. Presentation and summary of findings. Austin R. Troy, Allan M. Strong, Donald R. Tobi, Margaret Skinner, William Keeton. 2008.

[127] Located through a Freedom of Information Act request for the project record

[128] *Id.*

[129] *Id.*

[130] *See,* Forest Plan 3-36: "Provide a minimum of two pieces of downed woody per acre, at least 12 inches in diameter and 10 feet long, across the Prescription Area"

> "Create additional downed woody in stands identified for treatment. Consider this as a method to increase stand structure specifically related encouraging the development of the complex old-growth successional stage."

The Forest Servcie explicity refers to manageing for "encouraging the development of the complex old-growth successional stage" deep in the project record, but in the Draft EA and Vegetation Report such management is ignored or dismissed.

The statement in the record that "maintaining any downed woody debris is almost impossible without a drought year" actually illustrates why old-growth is important. Small diameter coarse woody debris from logging slash or the stem exclusion phase in younger stands will decompose quickly. What makes old-growth different from younger "mature" forests is that most old-growth and complex, older second-growth communities are typically associated with inputs of large-diameter coarse woody debris.[131] It is the large diameter material that is more persistent, and important in providing habitat and resources for a wide variety of species. That's why, notably, some of the best research on coarse woody debris in old-growth forests is from Lilley Cornett Woods, just a few miles from the project area.[132]

The Forest Service cannot arbitrarily erase viable alternatives and suggestsion in the record because they are inconvenient or don't fit with the Forest Service's predetermined silvicultural model for the project area.

Section 3: Invasive Species

X. Project Will Increase Non-Native Plant Invasions, Impact Forest Health

The Purpose and Need for Action in the scoping document lists "reducing non-native invasive plant species to increase native plant diversity and resilience," as one of the purposes for the project. The Botanical Resources report describes how soil disturbance tends to increase opportunities of non-native plant invasion.[133] However, neither the Botanical Resources Report or Draft EA assess the efficacy of the mitigation measures described in the project record (e.g., pre-treatment, erosion control seeding).[134]

As discussed above in these comments in section *V. Implementation of Group One Project Demonstrates Inadequacy of BMPs and Forest Plan Standards,* the excessive amount of earth moving incorporated into commercial timber harvests in the Group One project has induced out-of-control non-native plant invasions. The observed invasions far exceed the descriptions and expectations in both the Group One and South Redbird EAs, and come despite the Forest Service's control and mitigation

[131] Scheff, Robert (2012). The Development of Old-Growth Structural Characteristics in Second Growth Forests of the Cumberland Plateau, Kentucky, USA. Master's Thesis, Eastern Kentucky University.
[132] *See,* Muller, Robert (2003) Landscape patterns of change in coarse woody debris accumulation in an old-growth deciduous forest on the Cumberland Plateau, southeastern Kentucky. Can. J. For. Res. 33: 763-769
[133] Botanical Resources Report at 30
[134] *Id.*

measures (which are essentially identical between the two projects).[135] This is a significant environmental effect bearing on the purpose and need for the project.

Furthermore, the Draft EA states that "restor(ing) forest health"[136] is a key part of the purpose and need for the project. The U.S. Forest Service has recognized non-native invasive plants as one of the key factors impacting forest health on the Daniel Boone National Forest.

> "The Chief of the United States Department of Agriculture (USDA), Forest Service identified non-native invasive species, including plants, as one of the four critical threats to ecosystems. Invasive species, including plants, are reported to be the second-most critical threat to conservation of biodiversity."[137]

This concern is echoed in the Vegetation Report for the project.

> "Exotic invasive plants are the greatest threat to endangered species in the United States, excluding habitat loss, and are a consistent threat to ecosystems worldwide (Flather et al. 1994; Wilcove et al. 1998). Infestations can cause undesirable changes in ecosystems via displacement of native plant and animal species, the alteration of nutrient cycling and successional recovery of a community following disturbance (Walker and Smith 1997). The lack of natural control mechanisms such as insects, predators, plant fungi, competing vegetation, and herbivory allow many of these exotics to thrive in North America. Non-native invasive plant species (NNIPS) currently exist in the project area and can impact forest health by disturbing biodiversity (Walker and Smith 1997; Loewenstein and Loewenstein 2005). The majority are located in previously disturbed areas, primarily roadways and old strip mines."[138]

Objectively, the scale of NNIS invasions observed in Group One project, and the failure of control and mitigation measures, demonstrates that implementation of commercial timber harvests in the South Redbird project may lead to significant negative impacts to forest health and run counter to the purpose and need for the project.

Section 4: Oak Recruitment, Early Seral Habitat, and Range of Alternatives

XI. Oak Recruitment

The Draft EA lists "enhance oak recruitment" as part of the Purpose and Need for the project,[139] and further states that:

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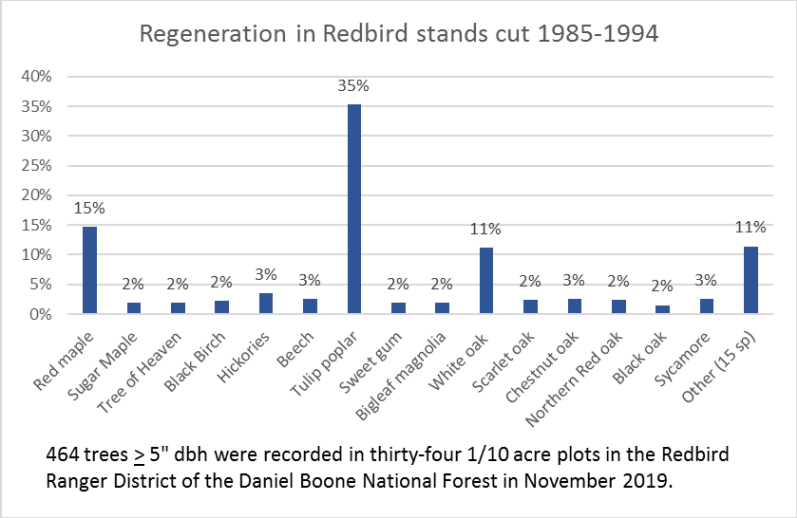
[135] *See,* Affected Environment at 10
[136] EA at 2
[137] *See,* Invasive Plant Species Treatment Environmental Assessment, Daniel Boone National Forest, April 2016
[138] Vegetation Report at 8
[139] EA at 2

> "Oak recruitment is declining, which threatens sustaining oak species as a major component of future forests and could limit hard mast forage for wildlife that eat acorns."[140]

Shelterwood regeneration harvests have been prescribed to meet this objective. However, we have collected data from thirty-four 1/10th acre plots across the Redbird District in stands harvested between 1985 and 1994. The data show that the results of the Forest Service's logging practices has been to reduce to abundance of oak species, while increasing dominance of tulip poplar and, secondarily, red maple.



While these data run contrary to the prevailing silvicultural assumptions guiding the Forest Service's proposal here, they are nevertheless real. It is probable that the Forest Service's chosen management emphasis for the South Redbird project (shelterwood regeneration harvests) will serve to reduce the presence and dominance of oak on the landscape. This runs contrary to the purpose and need for the project.

While even-aged systems have been the "go-to" tool for upland oak management, research from the University of Kentucky suggests that intermediate-sized group selection with adjacent thinning (i.e., femelschlag or expanding gap silviculture), along with midstory thinning, may be optimal for supporting oak recruitment. While the Forest Service has incorporated some non-commercial group selections into the project design, this does not negate the fact that much of the even-aged logging proposed in the South Redbird project will negatively impact oak abundance in the forest.

We provide here information from a presentation by Dr. John Lhotka of the University of Kentucky[141]. He presents data from Robinson Forest showing that group selection harvests of about 0.4 acres (150 foot gap) result in substantially better oak development after 48 years than larger group harvests of about 1.1 acres (250 foot gap), with the latter resulting in a greater abundance of tulip poplar. This overabundance of tulip poplar is what has been observed in larger regeneration sites across the Redbird District (and Daniel Boone National Forest more broadly). Dr. Lhotka states, "Dominant and codominant oak density was maximized in 150 ft opening." He also states that "An expanding-gap

[140] EA at 6

[141] Formulating an Expanding-Gap Regeneration System for Quercus Dominated Stands, John M. Lhotka, Department of Forestry, University of Kentucky

irregular shelterwood that uses intermediate gap sizes and midstory removal as a preparatory treatment around gaps may represent a novel silvicultural practice for increasing oak regeneration potential within the CHFR (Central Hardwood Forest Region)."

Robinson Forest Gap Size Study - Results

Overstory Trees ha^{-1} by Treatment following 48 Years

Species Group	Opening Size		
	50 ft	150 ft	250 ft
Oak	27.4^{a*}	89.3^{b}	49.5^{b}
Maple	82.2^{a}	51.4^{a}	52.4^{a}
Yellow-poplar	0^{a}	39.3^{b}	50.4^{b}
Hickory	12.1^{a}	4.7^{a}	2.9^{a}
Other Commercial	6.1^{a}	2.7^{a}	4.9^{a}
Other	9.1^{a}	5.4^{a}	3.4^{a}

*Means within a species group that have similar letters are not statistically different ($\alpha = 0.05$)

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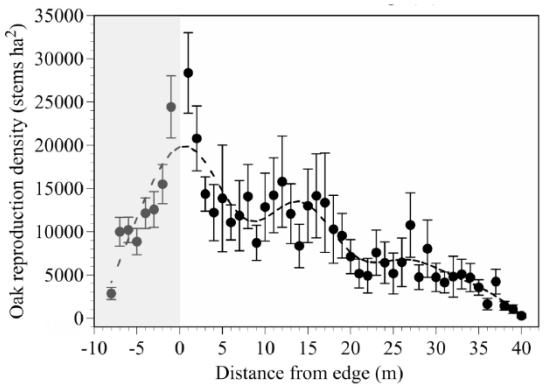
This same presentation by Dr. Lhotka presents research conducted in Berea College Forest by Drs. Lhotka and Stringer showing that optimal oak regeneration and development occurs in the edge environment just outside of harvest areas. They show less successful oak recruitment occurs *within* the harvest area than in the 20 m *outside* of the harvest area (in uncut forest). This suggests that intermediate levels of harvest, or smaller harvests with greater spatial distribution (more edge effects), would better assist in recruiting oaks than 20 to 40 acre shelterwood harvests.

Berea Forest Edge Effects Study – Seedling Density



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We recognize that the Forest Service proposes crop-tree release on 1,900 acres of young forests to encourage oaks, hickories, and other hard-mast producing species. However, nearly 6,000 acres of the project area have been harvested since 1980, and likely exhibit dominance by tulip poplar and red maple. The Forest Service does not have the resources to mitigate the species shifts induced by prior management decisions in most of these young forests, and there is no apparent mechanism or guarantee that long-term stewardship funds to mitigate similar shifts in the proposed South Redbird shelterwood cuts will be available. Without such assurances, it is likely that a decision to approve the current proposed action will actually run counter the purpose and need by decreasing the abundance of oak species on the landscape through harvesting mature trees (at about 1/3 of their life expectancy) while inducing a competitive advantage to tulip poplar and red maple.

XII. Secret Meetings

The Draft EA states that "elk, turkey and ruffed grouse foundations are concerned about the lack of early seral habitat (vegetation 10 years old and younger) across the forest."[142] Of course, our organizations are concerned about old-growth and interior forest habitats, but our concerns have not been taken seriously. Perhaps this differential in concern on the part of the Forest Service is related to the fact that, as stated in comments submitted by the Rocky Mountain Elk Foundation, "RMEF has a strong partnership with the Daniel Boone National Forest and has contributed financial and technical assistance to various projects within the proposed area."[143] Perhaps financial contributions help raise an organizations' concerns in terms of importance.

On February 8, 2019, Kentucky Heartwood submitted a FOIA request to the DBNF requesting documents "pertaining to the South Red Bird Wildlife Enhancement Project." Included in that request was "Any and all communications, including records of meetings, with non-governmental organizations including, but not limited to, the Rocky Mountain Elk Foundation, in connection with the South Redbird project."

In the response to the February 8, 2019 FOIA request, the Forest Service provided no records of communications or meetings with RMEF or other "elk, turkey and ruffed grouse foundations," other than an invitation to speak at the May 2, 2017 South Redbird field trip. We are not aware of RMEF or National Wild Turkey Federation participating in any of the other collaborative meetings held for the South Redbird project. Nor did we find in the project record any comments submitted by these organizations in response to the scoping letter, per the DBNF's FOIA response. This raises the questions of whether or not secret meetings and communications with these organizations have occurred, whether or not documents were illegally withheld from the FOIA request, or whether or not the Forest Service has manufactured this support to move forward with a historically large logging project. These are questions that need to be answered.

The emphasis on creating ESH for elk is also curious. Rocky Mountain Elk were introduced in Kentucky as a "beneficial" post-mining use on retired surface mines. There is no deficit of retired surface mines in and around the project area. Resource specialists noted in the field on the May 2, 2017 field trip that elk have been observed using an increasing amount of forest habitat, choosing to leave the

[142] EA at 4

[143] *See,* Rocky Mountain Elk Foundation comments on the South Red Bird Project Draft Environmental Assessment

grassy, brushy ESH of reclaimed strip mines for the mature forests around them. We've noted abundant elk sign in the old-growth on Little Flat Creek. Other than abstract assertions that elk need more ESH, there appears to be no compelling reason to log the Daniel Boone National Forest to create elk habitat.

XIII. Alternative Management for Early Seral Habitat

Early seral habitat (ESH) is clearly important to a wide range of species, and is objectively at very low levels in the project area. Commenters do not object to active management for the development and maintenance of ESH, per se. The Forest Plan calls for "5 to 6 percent within each 5th level watershed (to be) in the 0-10 age class" in the 1.K Habitat Diversity Emphasis prescription.[144] The South Redbird project relies almost completely on even-aged commercial timber harvests for meeting this objective. However, there is no directive that we are aware of that ESH be created though commercial timber harvest. While the Forest Service is obligated to produce some timber, there is no apparent specified timber target that the DBNF or Redbird District must meet. In the aforementioned February 8, 2019 FOIA request, Kentucky Heartwood requested:

> "Any communications from Forest Service or USDA staff or officials (other than District staff) relating to expectations for acreage, volume, or receipts from the Redbird project specifically or any more general category of projects that includes the Redbird project."

No documents meeting this description were returned in response.

Kentucky Heartwood also submitted a FOIA request to the DBNF on December 14, 2018 requesting "copies of all documents, emails, phone records, and other communications issued by or on behalf of the Southern Region (R8) office, Regional Forester, Chief of the Forest Service, Secretary of Agriculture, Washington Office staff officers, or other regional or national line officers and political appointees ranked above the Daniel Boone Forest Supervisor, to the Daniel Boone National Forest (and staff) relating to the planning of vegetation management projects, and the scale and pace of vegetation management more broadly, on the Daniel Boone National Forest." The only document returned in response was a Fiscal Year (FY) 2019 Integrated Program of Work - Natural Resources letter from the Region 8 Forester to all Region 8 National Forests describing how to put together budget requests.

Therefore, we can only conclude that either there are no directives or communications to the Daniel Boone National Forest or Redbird Ranger District with regards to meeting any particular timber harvest acreages or volumes, or that the Daniel Boone National Forest illegally withheld documents from this FOIA request.

The Forest Service can, and has, managed successfully for ESH using non-commercial methods in the Redbird Ranger District. On May 2, 2017, the DBNF hosted a field trip for the South Red Bird collaborative. The Forest Service invited several presenters, including Steven Dobey of RMEF and Zak Danks, Program Coordinator for Ruffed Grouse and Wild Turkey at the Kentucky Department of Fish and Widlife Resources to speak on the importance of ESH for wildlife. The site that the Forest Service

[144] Forest Plan 3-35

chose to visit as an example of successful management for ESH was a *non-commercial* unit in the Group One project, where no skid roads or landings were constructed to remove the timber.

Many of the environmental concerns and impacts discussed in these comments (e.g., erosion, invasive species infestations, impacts to aquatic species) are a direct result of the infrastructure needed to commercially remove timber, and not inherent to the creation of ESH and young forest habitat. The Forest Service has wrongfully ignored available alternatives for creating ESH that would allow the agency to meet the purpose and need for the project, while avoiding some of the most serious environmental impacts, in addition to conserving larger blocks of mature interior forest habitat. We provide here several management alternatives that would achieve these goals.

1. According to DBNF GIS data, the project area includes 2,924 acres that were regenerated since 1990, and 5,837 acres regenerated since 1980. As described above, most of these stands are dominated by tulip poplar and red maple, with oaks, hickories, and other hard mast species representing a minority of stand composition. Action 5. Crop tree release would prescribe a small amount of non-commercial cutting to provide a competitive advantage to preferred tree species, especially oaks. On June 12, 2018, Kentucky Heartwood submitted a letter to District Ranger Claybrook with additional site specific comments on this project. In that letter we asked the Forest Service to consider creating ESH in sites harvested since 1980 by cutting most of the tulip poplar and red maple, thereby releasing oaks and hickories from competition (as prescribed) while *also* creating high quality ESH. This approach is backed up by the Kentucky Ruffed Grouse and Young Forest Strategic Plan 2017-2027, which states for Objective 1, Strategy 2 for "apply(ing) grouse management prescriptions to large tracts of forestland in eastern Kentucky" states, than one management approach is to "Use noncommercial practices to perpetuate high-stem-density cover."[145] Cutting or hinge-felling overabundant or less- desirable tree species (i.e., tulip poplar and red maple) would create excellent ESH and high stem density grouse habitat. We have had conversations with members of the Kentucky Chapter of the Ruffed Grouse Society who believe that management of stands harvested in the 1980s and 1990s as described here is a viable approach for supporting ruffed grouse. There is enough land in the project area in this 20-40 year age classes to meet the ESH objectives in Forest Plan 1.K-Objective 1.A.

2. The Forest Service can use non-commercial felling in mature forests, negating the need for excessive soil disturbance (e.g., skid trails, landings) to remove and sell timber. Proposed Action 3.B: Modification-Added: Group Selection would noncommercially cut an undisclosed number of groups ranging from 0.5 to 1.5 acres in size in relatively mature stands. And, as we describe previously in this section, the Forest Servcie chose to highlight a larger non-commercial unit in the Group One project to illustrate the benefits and need for management for ESH in the South Redbird project area.

3. Action 11.C would create 725 acres of ESH through variable density thinning along 45 miles of roadways. Timber would be harvested within 100 feet of existing roads, obviating the need to construct skid roads. This is a reasonable approach to creating ESH while meeting the Forest Service's multiple-use mandate to sell timber, while avoiding serious environmental impacts.

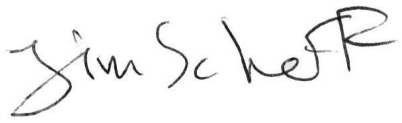
[145] Kentucky Ruffed Grouse and Young Forest Strategic Plan 2017-2027at 6

A combination of the above methods could meet the primary habitat objectives of the South Redbird project. A combination of the three management approaches above would support substantial creation and maintenance of ESH while supporting oak recruitment across the landscape. The primary obstacle to non-commercial management is of course paying for it. As the Forest Service has noted, habitat improvement work, including road and trail work, is typically paid for with timber receipts. Fortunately, the Forest Service has active partnerships with the RMEF and NWTF. According to public records, these two organizations together have around $110,000,000 in assets. They could certainly put resources toward implementing habitat management on the DBNF to benefit of their respective constituencies. Local partners like the Ruffed Grouse Society and Kentucky Division of Fish and Wildlife Resources could also help. If the Forest Service is willing to take a serious look at achieving the goals in this project through non-commercial methods with fewer environmental impacts, then we're willing to do what we can to help leverage support and funding to see this work happen.

The Forest Service needs to take a second look at this project with fresh eyes. There are too many biases and predetermined courses of action baked into to the proposal for a reasonable and informed decision to be made. Viable alternatives to the proposed action that can meet the purpose and need of the project exist, and need to be explored in detail in a revised EA.

Thank you for considering these comments.

Sincerely,



Jim Scheff, Director
Kentucky Heartwood
P.O. Box 1482
Berea, KY 40403