KENTUCKY HEARTWOOD

Protecting the Beauty and Wellbeing of Kentucky's Native Forests

Jaime Hernandez
Land Between The Lakes NRA
100 Van Morgan Drive
Golden Pond, KY 42211

RE: Demumbers Creek Project

June 8, 2010

Dear Mr. Hernandez,

Thank you for the opportunity to submit comments on the Demumbers Creek Project. We hope that you take our comments into consideration and are willing to address our substantive concerns.

I. Please allow for public comment on the Environmental Assessment

As we understand it, the normal (though not mandatory) procedure at LBL is to release the EA concurrent, or nearly concurrent, with the Decision. Allowing comments during scoping and on the 30-day notice does not allow the public enough information to offer informed, detailed comments. Allowing comments on a Draft EA will allow for more substantive dialog and lessen the need for an administrative appeal.

II. Prescribed Fire

As we have begun to review the prescribed fire program at LBL it has become apparent that the Forest Service at LBL has gone to extremes with this program. Indeed, fire appears to be considered the prefect management tool for every actual and perceived ill in the forest. Unfortunately, there is still a great deal of uncertainty to back up such an aggressive, landscape scale use of fire. While these comments are in regards to the Demumbers Creek Project area, it stands that the proposed actions here are within the context of burning in adjacent areas and throughout the peninsula.

The historical role of fire in LBL is arguable, with virtually no historical or dendrochronological data to confirm an extensive presence of fire in the area. Fire in the central hardwood region is associated primarily with human presence, and the presence of regular indigenous habitation or use prior to the initial land grants that lead to Euro-American populations in LBL is doubtful. Without regular human use, there would be no regular human ignition, and, as such, little fire in this area. The Forest Service needs to make a clear argument based on archeological or other historical data that indicate regular human use throughout the peninsula to justify fire in this particular place.

It is clear that fire has had a role in the forests of our region for at least the last 3000 years, as evidenced by the paleoecological work of the Delcourts and others. However, issues of return interval, site specificity, and overall extent are little more than guesswork.

The idea that the shift in the understory from oak to maple dominance is a direct result of fire exclusion, as popularized by Abrams and others, has little demonstrable backing in the literature. Studies performed in the Red River Gorge and elsewhere have found contradicting results. In some studies fire has been observed as promoting oak over maple while in other cases promoting maple over oak. A currently unpublished paper that will soon be printed in an upcoming issue of Ecography (attached with permission) by Neil Pederson (EKU) and Ryan McEwan (University of Dayton) discusses at length how the apparent oak to maple shift is a result of multiple ecological drivers. Among their observations, the authors suggest that:

- The instrumental and tree-ring reconstructed Palmer Drought Severity Index for the eastern hardwood region reveals a slightly cooler/wetter period concurrent with the increased success of maple and decreased success of oak. The more mesic conditions favor maple. Further, another study by McEwan found that oak recruitment at Lilly Cornett was decreased on more mesic sites, but fine on more xeric sites.
- Increasing deer populations alongside the loss of Castanea dentata (a preferred food source) may have led to significant displaced herbivory, decreasing the available acorns for successful germination, and adding further pressure to oak seedlings
- For anthropogenic fire to be the primary driver behind historic (and prehistoric) oak regeneration, there must have been a remarkable homogeneity of native anthropogenic behavior across cultures and regions and covering nearly every acre of the eastern oak forests. This is highly unlikely
- Most remaining old-growth oak forests and trees (and presumably previously existing old-growth oak forests) initiated during the depopulated period, where native populations plummeted by as much as 90%. With such radical decreases in population and disruption to cultural practices, it does not logically follow that fire would have been so ubiquitously applied across the landscape during that period.

Additionally, ongoing research by Neil Pederson and Ryan McEwan is looking at the first long-term fire chronology in Kentucky, examining basal area cross-sections from downed trees at Lilly Cornett Woods, a true old growth forest in Letcher County. The samples go back to the mid-1600's. While the results have yet to be worked out statistically, initial scans of the samples indicate very little fire in this premier old-growth forest with an abundance of oak. I have been examining these samples first-hand in my work in Dr. Pederson's lab.

The point here is not to say that fire has no bearing on oak regeneration. However, despite the current popularity of this hypothesis and its broad application across the landscape, we simply do not know the historical extent and severity of fire and all that we do not is experimentation. At LBL the astounding extent of fire as proposed goes far beyond what we know from the literature. Further, the over-use of fire in the wrong areas could be causing damage to forests and their ability to rebuild lost soil resources. We simply don't know.

What we do know about the role of fire indicates that, in hardwood forests, fire return intervals of 12-20 years may be normal – not the aggressive 2-5 year intervals proposed at Demumbers Creek. These shorter fire intervals are more appropriate for grasslands and other true openlands, but not forests.

In regards to the relationship between fire and shortleaf pine, a study in the Missouri Ozarks – a similarly oak and oak-shortleaf pine dominated forest - indicates an interesting correlation between fire interval and pine establishment. In the study by Stambaugh et. al., *What Fire Frequency is Appropriate for Shortleaf Pine Regeneration and Survival?*, the authors found that frequent fire intervals (1-4 years) were associated with abundant pine recruitment, but long-term survivorship was associated with intervals from 8-15 years. Seedling establishment was found to be highest in the first 4 years after fire.

This scenario is consistent with the erratic temporal and spatial scales that should be expected from indigenous burning of the landscape. Specifically, some areas along regular travel routes or hunting lands would have be set ablaze periodically (as opposed to regular, prescribed intervals), and the spatial extent would have been tremendously variable based weather, vegetation, and other conditions. In the "margins" would be areas that might burn regularly every couple of years, and then not burned for much longer. This appears to be a prescription for long-term success of shortleaf pine. However, the prescription in the Demumbers Creek Project maintains only the rapid return interval and does not look toward long-term maintenance based on what little we can glean from the literature.

To be clear, Kentucky Heartwood is not against prescribed fire. Fire admittedly has a role in the landscape. But the issue at hand is what spatial and temporal scales are appropriate based on what we do know from published data. The "one size fits all" prescription proposed for the Demumbers Creek Project is extreme and should be modified appropriately.

III. Canopy Cover and Gap Dynamics

The primary natural means by which forest canopies turn over in our region is through gap dynamics. Individual and small tree mortality along with canopy breakage creates openings, increases light to the midstory and forest floor, and creates a more structurally diverse forest architecture. These gaps create small-scale early successional habitat, and are the chief means by which this early successional habitat has been created historically in our region. There is an abundance of literature discussing average rates of canopy disturbance, gap closure, recruitment within gaps, and so on. Please let us know if you are not familiar with this body of literature.

Even without the canopy damage caused by the ice storm of 2009, it would be expected that individual mortality, microbursts, etc., would have created gaps. The ice storm likely increased the infiltration of light substantially.

Rather than damaging the forest, these disturbance events are critical to the diversity and functioning of the forests, and are likely shifting the artificially imposed even-aged forest architecture back toward a more native multi-age structure.

We would like to know what the percent cover in the various prescription areas actually is at this time. The project discusses how the canopy is too dense and needs to be thinned, yet also states that substantial canopy damage added substantial debris to the forest floor creating a greater fuel load. Which is it?

IV. Forest Regeneration

The Demumbers Creek Project proposes to clearcut 100 acres of pine plantation and 250 acres of hardwood forest. While at this time we have little concern over restoring native pine in old plantations (though field visits may change this assessment), we have great concerns over regeneration harvests of 250 acres of hardwood forest.

As stated in the above section on gap dynamics, small scale disturbance is the primary means of natural forest turnover in this region. Stand-replacing events are nearly unheard of in the repertoire of natural phenomena affecting our forests. Clearcutting and other regeneration harvests perpetuate the same dynamics that have cause so much trouble – and indeed that the Forest Service routinely touts as reason to log. Specifically, regeneration harvest result in overstocked, even-aged cohorts the require multiple entries (at taxpayer expense) to thin and coax into a more healthy stand. While this type of management may be expedient or appropriate on industrial forestlands, it is completely inappropriate in a national recreation area. In other terms, it has a basis in silviculture, but not ecology.

V. Understory Vegetation

Much emphasis is given to early successional habitat and an open overstory, as well as fire adapted and fire dependant species. However, the Forest Service needs to consider the impacts of logging on understory forbs. Much research has been published on how understory, herbaceous diversity decreases with logging and does not appear to rebound within a historical context. If you are not aware of this body of literature please let us know and we will provide you with a list of citations or papers. A good starting point would be Meier et. al 1995, Possible Ecological Mechanisms for Loss of Vernal-Herb Diversity in Logged Eastern Deciduous Forests, *Ecological Applications*, 5(4), 1995, pp. 935-946.

Many of these species are in decline or underrepresented in the landscape and have life history traits and dispersal strategies that make recovery from major disturbance (and logging in particular) exceedingly difficult. Further, recovery is impeded by the predictable success of and foothold gained by more common r-selected species.

We would like to see botanical surveys offering inventories of herbaceous populations and discussions of the short- and long-term impacts to these populations from implementation of the proposed action and alternatives based on the published literature and best available science.

VI. Cumulative Effects

It is clear that LBL is choosing to burn much, if not most, of the peninsula. The cumulative effects of the Demumbers Creek Project in this context must be thoroughly evaluated. In particular, with so few acres left *unburned,* what is the relative value and importance of burning or not burning this particular area? Are there species negatively affected by repeated, short-interval fire regimes that are being affected across LBL that may need refuge in the Demubers Creek Project area.

VII. Biomass, Carbon, and Nutrient Cycling

The Forest Service needs to consider the total carbon and nutrient cycling impacts of biomass harvesting. The longstanding practice of retaining slash has been a key component of retaining forest productivity and aiding in forest recovery. There is an abundance of literature on how whole tree removal impacts the short- and long-term productivity of forest sites. Through harvesting, forest stands lose large amounts of limiting nutrients including nitrogen, potassium, calcium, and phosphorus. Biomass harvesting necessarily exacerbates these impacts and denudes the forest resource. The Forest Service must address these well documented impacts before allowing for the removal of slash and small-diameter woody material from public lands for biomass derived energy.

Further, the carbon outputs from biomass harvesting and the project in general need to be addressed. It is now well documented that carbon sequestered through regeneration does not equal or exceed that lost to the atmosphere through harvesting as material is burned or decomposes, and as soil respiration increases releasing significant amounts of carbon.

We assert that a forestry practice that necessarily increases carbon released into the atmosphere while decreasing forest productivity is inappropriate for America's public lands.

The following section is reprinted from a piece we wrote for the Kentucky Conservation Committee report on Biomass that addresses some of these issues. We have retained the citations for your benefit.

> In a native forest there is no such thing as waste. Through the process of photosynthesis vast amounts of atmospheric CO_2 are incorporated into trees and other plants as living biomass. As it works its way through the ecosystem, this biomass is eventually transformed into food for insects, fungi, animals, and hosts of microorganisms. Some carbon is released back in to the atmosphere as the biomass is broken down, but large amounts of it stay in the system as above-ground biomass and soil carbon – the latter of which can stay in the soil for thousands of years if left undisturbed.[1]
>
> In addition to carbon, vital nutrients like nitrogen, calcium, and phosphorus slowly accumulate and are cycled through the forest. As plant material decomposes, living roots quickly take up the newly available nutrients before they can be washed out of the system.[2]
>
> Until recently, it was assumed that old-growth and mature forests stopped sequestering carbon.[3] These forests have often been called "decadent" or "overmature" by foresters and other land managers. It was assumed that the amount of respiration – the CO_2 released by organisms when breaking down carbon chains for energy – equaled or exceeded the CO_2 brought in through photosynthesis. In recent years this assumption has been shown to be wrong, and the value of mature and old-growth forests in sequestering carbon has become apparent.[4, 5]
>
> Logging removes large amounts of biomass and vital nutrients as trees are taken from the forest.[2] It also causes carbon to be released as soils are turned over and exposed. It had been assumed that decreased competition for resources among remaining trees would allow for increased growth that would more than compensate for the amount of carbon released. However, recent studies indicate this assumption to be wrong as well. When taking into consideration the life-cycles of wood products and the decomposition or burning of byproducts from logging and milling, these studies have shown that more carbon may be stored by leaving the forest alone.[6,7]
>
> Removing most, or all, of the timber from a forest presents even more extreme impacts. Losing the forest canopy causes soil to warm, leading microorganisms to quickly decompose soil organic matter and release more CO_2 - so much so that the soil level can noticeably drop.

Without the living root systems of overstory trees to quickly recapture nutrients released from decomposition and microbial processes, vital elements like nitrogen quickly wash out of the forest and in to streams. Erosion increases as well, carrying more of the soil resource with it.[2] Forests repeatedly cleared may never return to their initial productivity.[8]

When land is converted to agricultural or other uses, disturbance to the top few feet of soil – where a majority of forest biomass is sequestered - leads to the discharge of large amounts of carbon that otherwise would have been stored safely away for hundreds, even thousands of years.

As landowners and a society we rely on wood products for our everyday lives. However, forests are not a wholly renewable resource like wind or solar, and should not be considered as such. Removing timber necessarily impacts forest ecosystems. When removing wood from the forest, the utmost care should be taken to leave as much biomass as possible and to protect the soil resource. Regrettably, industrial forestry practices ignore the basic ecology of our forests, excuse well documented impacts, and pave the way for industries like wood-fired biomass plants that encourage the removal of every last chip of wood.

For our forests to provide wood products, clean water, rich habitat, and the critical sequestering of carbon now and into the future, Kentucky forests need to be guarded from excessive harvesting and other practices that degrade rather than enhance our forest resources.

1. Fontaine, S., Barot, St., Barre, P., Bdioui, N., Bruno, M. & Rumpel, C. Stability of organic carbon in dep soil layers controlled by fresh carbon supply. Nature. Vol 459|8 November 2007.
2. Bormann, F.H. & Likens, G.E. Pattern and Process in a Forested Ecosystem. Springer-Verlag, 1979.
3. Odum, E.P. The strategy of ecosystem development. Science 164, 262-270 (1969).
4. Luyssaert, S., Detlef Schulze, E. Borner, A., Knohl, A., Hessenmoller, D., Law, B.E., Ciais, P., & Grace, J. Old-growth forests as global carbon sinks. Nature Vol 455|11 September 2008.
5. Zhou, G., Liu, S., Li, Z., Zhnag, D., Tang, Z, Zhou, C., Yan, J., Mo, J. Old-Growth Forests Can Accumulate Carbon in Soils. Science Vol 314, 1 December 2006.
6. Depro, B.M., Murray, B.C., Alig, R.J., Shanks, A. Public land, timber harvests, and climate mitigation: Quantifying carbon sequestration potential on U.S. public timberlands. Forest Ecology & Management 255(2008) 1122-1134.
7. Nunery, J.S. & Keeton, W.S. Forest carbon storage in the northeastern United States: Net effects of harvesting frequency, post-harvest retention, and wood products. Forest Ecology & Management (2010) In Press.
8. Davis, S. C., Hessl, A., Scott, C.J., Adams, M.B., Thomas, R.B. Forest carbon sequestration changes in response to timber harvest. Forest Ecology & Management 258 (2009) 2101-2109.

VIII. Best Available Science

Under NEPA, the Forest Service has an obligation to use the best available science. We have presented some literature citations in these comments to illustrate the points made, but all issues of science and ecology presented in these comments have a firm basis in the literature. Therefore, each of these issues must be addressed. If the Forest Service chooses to ignore the science, then a response must be made why the ecological principles and peer-reviewed studies presented in our comments are not relevant and can be ignored for the purposes of this project.

Again, if you need more literature citations or other sources for the information provided please let us know and we do our best to provide them. However, you should have access to much of the same literature base as we do.

Fundamentally, at least with regards to timber stand models and logging, what we have found is that the Forest Service relies heavily on the science of silviculture and ignores the ecological literature. While there is certainly intertwining among the two bodies of science, there are important differences. Namely, the former is aimed long-term timber production while the latter is aimed at broader community form and function. While good silviculture may be appropriate on timber lands, the Forest Service at LBL, a National Recreation Area, should be working with the ecological processes that shaped the landscape and not root decisions in the models of timber production. While the removal of some timber may on occasion be consistent with ecological processes, the assumptions and narrow scope of the science of silviculture have a strong tendency to bias project design and implementation away from a holistic approach to ecosystem management with potentially significant, albeit often ignored, consequences.

IX. Historical Artifacts and Cultural Heritage

It is unfortunate that there has been such a history of disrespect and antagonism toward the valid cultural history of the former members and descendants of the Between the Rivers community. Much of this legacy of antagonism has its roots prior to Forest Service management, though the Forest Service has inherited this complicated, and rich, history and must address it. Fortunately, it is never too late to engage a genuine and respectful working relationship.

The Forest Service should work cooperatively with the Between the Rivers community to survey and identify areas and artifacts that are of cultural significance to the people that were forced to give up their homeland for the good of the American public. Whether or not these artifacts or places are deemed significant to Forest Service personnel should not be the threshold of significance. This would be as insensitive as having a total stranger determine what items your late grandmother left are of significance to you.

In analyzing the proposed action and alternatives, the Forest Service must address the fact that prescribed fire does not always go as planned. There is ample evidence of this at LBL, with documentation of cemeteries and cemetery markers being burned, fire reaching the lakeshore, and various other debris, including creosote soaked timbers, being burned. The Forest Service must disclose that it is entirely possible – and indeed likely - for the burning as proposed to have such impacts, and to defend why such impacts are not to be considered significant. An alternative, of course, is to not burn where cultural artifacts are present and accept that not all of LBL needs to be burned.

X. Coarse Woody Debris and Snags

Lacking from most second growth and other managed forests is the presence of coarse woody debris (CWD) and snags across a diversity of size and decay classes. These “messy” forest attributes are in fact vital ecosystem components and associated with the success of numerous avian, herp, fungal, insect, and mammal species. Again, if you need a list please let us know. We are more than happy to provide this information. A nice starting place is Harmon et. al, 1986. Ecology of Coarse Woody Debris in Temperate Ecosystems. Adv. Ecol. Res. 15: 133-302.

Logging removes the large stems that would otherwise become snags or CWD, while repeated harvests ensure that no woody material reaches the large diameter classes required by many species (including swifts, Pileated woodpeckers, coyote, rodents, black bear, etc.) and that may require several centuries to develop. The Forest Service, in preparing the EA for the Demumbers Creek Project, needs to evaluate the volume and decay classes of CWD and snags, the populations of species associated with these aspects of natural, healthy forests, and determine the impacts on these species if the forest is not allowed to develop these structural and functional components. The Forest Service needs to consider this within the context of the long-term cumulative impacts of full implementation of the LBL Plan.

Again, we would be happy to discuss any of these issue at length, and are happy to provide whatever source literature that we are able should you be unable to find it. We look forward to reviewing this project further as it develops.

Sincerely,

Jim Scheff

Jim Scheff, Forest Watch Director
Kentucky Heartwood
P.O. Box 1486
Berea, KY 40403
(314) 971-4023
quercusstellata@gmail.com