

Cumberland River Fire Learning Network Project

A Collaborative Forest Landscape Restoration Act Proposal



USDA Forest Service
Daniel Boone National Forest
February 9, 2011



Executive Summary:

Dominant forest type(s): Oak – hickory; Pine (Virginia, shortleaf, pitch) – oak; Mesic encroached

Total acreage of the landscape: 278,266 Total acreage to receive treatment: 148,402

Total number of NEPA ready acres: 36,446 Total number of acres in NEPA process: 3,750

Description of the most significant restoration needs and actions on the landscape: The historically fire-adapted landscape of the southern Daniel Boone NF project area is generally overstocked, mesic-encroached, and vulnerable to disease, pests, and other disturbances. Using a combination of prescribed fire and mechanical treatments, forest composition and structure should be restored to a mosaic of oak – hickory forest and pine – oak forest, woodland, and prairie (CFLRP target forest types), as well as mesic coves and alluvial forest (non-target forest types).

Description of the highest priority desired outcomes of the project at the end of the 10 year period: Reduce basal area, reintroduce fire as regular disturbance, and improve oak and pine regeneration across 37,000 priority acres. Areas that have received initial treatments prior to project will serve as initial focus, with a goal of converting them into maintenance condition within the project period. Other areas will see initial treatments that will move them towards longer term desired future conditions.

Description of the most significant utilization opportunities linked to this project: East Kentucky Power Cooperative (EKPC) is conducting a feasibility study of both a 100% biomass facility and/or co-firing wood biomass with coal at their Cooper Power Station within the CFLRP area. EKPC is interested in partnering with DBNF as a biomass source if these projects move forward.

Name of the National Forest, collaborative groups, and other partner involved in project development: Project was developed out of work being done by the Cumberland River Fire Learning Network (established 2007). Members include: Daniel Boone National Forest, The Nature Conservancy, National Wild Turkey Federation, KY Division of Forestry, KY Department of Fish and Wildlife Resources, KY State Nature Preserve Commission, University of Kentucky, and University of Tennessee.

Describe the community benefit including number and types of jobs created: An estimated 56 jobs per year will be created as a result of treatments implemented, totaling over \$2.6 million benefiting local communities

Total dollar amount requested in FY11: \$481,275

Total dollar amount requested for life of project: \$13,940,434

Total dollar amount FS match in FY11: \$892,870

Total dollar amount FS match for life of project: \$14,629,328

Total dollar amount Partnership in FY11: \$0.00

Total dollar amount Partnership for life of project: \$0.00

Total in-kind amount Partnership in FY11: \$20,133

Total in-kind amount Partnership for life of project: \$260,133

Time frame for the project (from start to finish): 2011 – 2019

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Ecological, Social, Economic Context

Introduction

The collaborative effort described in this proposal is based on a foundation of work conducted by the Cumberland River Fire Learning Network (CRFLN) over the past four years. Fire Learning Networks are collaborative, multi-agency, community-based projects that use a model developed by The Nature Conservancy, USFS, and the Dept. of Interior to guide the process of restoration of fire-adapted/dependant environments.

The Cumberland River Fire Learning Network (CRFLN) covers 252,000 acres, of which 154,000 acres are managed by the Daniel Boone National Forest (DBNF) and 1,660 acres are managed as the Cumberland Falls State Resort Park by the Commonwealth of Kentucky. DBNF lands include the Beaver Creek Wildlife Management Area (17,347 acres) managed cooperatively with the Kentucky Department of Fish and Wildlife Resources since 1940. Cooperative efforts within these areas provide a higher level of wildlife productivity for certain species than may be found in surrounding areas, improving the opportunities for public hunting, fishing, and other wildlife-oriented recreation. The remaining area is privately owned in relatively small tracts scattered around and throughout the CRFLN.

As agreed upon by the members of the CRFLN, the goal for the landscape is to work with partners and the community to improve forests and watersheds through the restoration and maintenance of fire-adapted ecosystems and the re-establishment of historic distributions of forest types. Fire will be integrated into the management of the landscape's natural resources, will be evident upon the landscape, and will lead to enhanced habitat diversity. The progress of activities and knowledge gained will be shared through education, public outreach, and the involvement of multiple landowners and natural resource managers. The goals and strategies outlined in this proposal are well in line with the Secretary's and Chief's "All Lands – All Hands" approach of involving partners in development of a common vision for restoration of ecological functions associated with healthy forest ecosystems. As described in greater detail in the landscape strategy, the land comprising the CRFLN has been designated a priority area for several

agencies, which have a long term goal of restoring southern Appalachian forests. The CRFLN project is critical if landscape-scale goals are to be achieved.

Economic conditions: The economic conditions in the area around the CRFLN are severely depressed. McCreary County, which comprises much of the area of the CRFLN, had an unemployment rate of 14.6% as of November, 2010, compared to 9.9% for the state and 9.3% for the nation. Thirty five percent of McCreary County residents live at or below the poverty line (17% statewide), only 6.7% have a college education (17% statewide), and just over half have graduated from high school. The median household income is \$22,000, compared to \$41,000 statewide. The CRFLN is committed to bringing revenue to the area in the form of business opportunities and job creation (see Benefits to Local Economies, p.19).

Ownership patterns: Due to the mosaic pattern of ownership in the CRFLN, nearly 75% of DBNF land is considered wildland-urban interface (WUI). Firewise communities in WUI areas have been using community fire protection and other funds to reduce fire risks on private land adjacent to the national forest. It should also be noted that the majority of wildfires on the CRFLN are human-caused, either deliberately or accidentally set. Within these WUI area, McCreary County, which comprises the majority of the CRFLN, has had an active Firewise program since 2001. That year, the county had 157 wildfires. Two homes were burned and the fire danger was so severe that schools were closed.

Current wildfire conditions: Forests of the CRFLN were devastated by storm damage in 1998 and 1999. An epidemic of southern pine beetle infestation followed in 2000 and 2001; 85% of the southern yellow pine trees in McCreary County were killed, creating a serious wildfire hazard. The heavy downed fuels and large number of snags continue to persist from these events, which presents a hazard to firefighters and increases the likelihood of spotting. A significant ice storm in 2008 added additional fuel loading. The recent spread of hemlock wooly adelgid into the CRFLN area will result in additional fuel buildups.

The range of fire behavior in the CRFLN falls between fuel models 9 and 10 (hardwood and pine leaf litter as primary fuels, with dead and down material contributing to torching spotting, and crowning; greater intensity and/or unpredictability at FM 10), depending on the availability of

pine debris. The heavy leaf litter from overstocking of deciduous trees contributes to fuel load. The density of trees also presents challenges during fire line construction. Currently, the CRFLN is in Fire Regime Condition Classes 2 and 3; that is, moderate and high departure from historic fire regime. Under these conditions, fire intensities and flame lengths are increased which, in turn, limits fire suppression capabilities by reducing the variety of both strategic and tactical fire suppression plans. More acres would be burned with a higher probability of losing key fire-dependent vegetation. Restoration goals are to move the area into classes 2 and 1; that is, conditions which more closely resemble historic fire regimes.

Current forest conditions: The forest within the CRFLN is vulnerable to pests, diseases, and other stressors that may increase with climate change. Without the mediating effects of fire, many areas of xeric pines and oaks have been encroached upon by mesic species, red maple in particular. The establishment of mesic species has prevented the regeneration of pines and oaks, thus significantly altering the ecosystem. Most stands are also overly dense, the lack of fire resulting in too many trees growing per acre. The increased competition for resources results in trees that are more stressed and less vigorous. When a drought and other natural disturbances occurred in the DBNF about a decade ago, the consequences of stressed, overstocked stands became evident. A large southern pine beetle outbreak occurred across the CRFLN and the wider forest. Tree mortality was high due to their already compromised condition, and 80% to 90% of yellow pines (shortleaf, Virginia, pitch)—more than 70,000 acres—were lost. Along with the loss of pine stands was the loss or removal of two dozen red-cockaded woodpeckers (RCWs), which had been successfully re-populating the CRFLN following recent relocation efforts. Immediately following the southern pine beetle outbreak, the RCWs that could be found were relocated to healthy pine stands in other states.

The uncertainties of climate change effects require forests be healthy in order to be resilient to disturbances, likely to include pest and disease outbreaks and drought. Some basal area reduction occurred as a result of pine mortality; however most areas affected by southern pine beetle remain overstocked to some degree. In those areas of high pine mortality, many of the understories that have not been burned are regenerating in thickets of mesic species. Some areas of the CRFLN have had some treatments to reduce basal area, while other areas have not.

Evidence suggests that the forests of Kentucky may have evolved with the influence of man-made fire over thousands of years. When European settlers arrived, however, the culture of burning was replaced with a culture of fire exclusion and suppression. After centuries of this altered management philosophy, fire mediated species have been unsuccessful at regeneration. In Attachment G (p. G-1) you'll find a map of a portion of the CRFLN, which shows the current distribution of sun-loving, fire-adapted herbaceous plants that are now uncommon on the DBNF. The map shows a small portion of the CRFLN, but represents the widespread trend that these plants are currently only found along roads, powerline corridors, trails, and waterways, where disturbance and an open canopy provides the conditions they need to thrive. These are the plants that at one time were likely distributed throughout the CRFLN, when the landscape was comprised of the open woodland and savanna forest types, but can now only survive where openings have been created for them.

Following the southern pine beetle outbreak, managers have been planting pines in stands across the CRFLN. To date, approximately 2,400 acres have been planted in shortleaf pine, but fire is needed to ensure successful seedling establishment. Planting has been done with wide spacing to allow for mixed stands.

Other species declines are expected in the near future, including hemlocks (hemlock woolly adelgid is present in the forest), dogwoods (already declining due to dogwood anthracnose), and possibly ashes (emerald ash borer is present in Kentucky). This area is also well within the historical range for American chestnut, which was all but eliminated by the chestnut blight during the early part of the 20th century. With the history of invasion of pests and pathogens and the threat of more outbreaks in the future, restoration treatments are needed to increase forest resiliency and ensure diversity.

Desired future conditions: The proposed treatments will move the project area towards the desired future conditions identified in the DBNF Forest Plan and by the CRFLN. In addition to more predictable and less severe fires, the desired future conditions include the conversion of some forest types to those that are no longer adequately represented. In the restored forest, approximately 40% of the landscape will be mixed oak – hickory or yellow pine (Shortleaf, Pitch,

Virginia) – oak dominated forest. The midstory will be dominated by fire-tolerant species (e.g., oak saplings, sourwood, dogwood, sassafras). The canopy will be closed (>60% crown cover) and the overstory basal area will be 60 – 120 ft²/acre. Fuels will consist of hardwood leaf litter.

Maintenance may require infrequent (11 – 12 year return interval) low intensity fire, silvicultural techniques, and/or herbicide treatments, with oak regeneration as an indicator of sustainability.

Approximately 25% of the landscape will be mixed oak or oak – yellow pine woodland, dominated by oaks and/or pines in the canopy, with a fire tolerant midstory and a well-developed herbaceous layer (comprised of low bush blueberry, huckleberry, mountain laurel, mapleleaf viburnum, with pockets of warm season grasses, asters, and other wildflowers). Overstory basal area will be 30 – 50 ft²/acre with a somewhat open canopy (25 – 60% crown cover). Oak and/or pine – oak regeneration will be abundant. Fuel will be a combination of leaf litter and herbaceous material. This desired future condition will be maintained by low intensity, frequent (2 – 5 years) fire and silvicultural techniques. On a site basis the burning cycle will be punctuated with fire free periods to allow for oak and/or pine regeneration.

Approximately 10% of the landscape will be oak or pine – oak savanna, which will have a very open canopy (<25% crown cover) with a basal area of 10 – 29 ft²/acre. It will be dominated by oaks (primarily white oaks) and/or shortleaf/pitch pine with a ground layer of grass/forbs and/or low shrubs. Fuels will be primarily grass/forbs with scattered leaf litter. Fire is the primary disturbance and maintenance agent, but silvicultural techniques and/or herbicide treatments may be utilized. On a site basis, the return interval will be 2 to 5 years; however, the burning cycle will be punctuated with fire free periods to allow for oak and/or pine regeneration.

Up to 5% of the landscape will be native grasslands located on appropriate sites, dominated by a diversity of grasses and forbs, maintained by frequent (2 to 5 year) high intensity spring and fall growing season burns. Burn rotations would also include some summer, lower intensity burns. Other maintenance disturbances may include mechanical and/or herbicide treatments.

An additional 20% of the landscape is occupied by mesic forest types, particularly in coves, lowland, and riparian areas. These areas are not targets of the CRFLN and will not be treated as part of this project.

Historically, the forests of the CRFLN were dominated by fire-tolerant chestnuts, oaks, and pines, with mesic species filling in coves and bottoms. Forest structure was a mosaic of closed canopy, open woodland, and savanna stands, which were maintained by fire. Fire suppression and human-caused disturbance have resulted in a modern forest that looks quite different.

The fully restored CRFLN will be a mosaic of forest types and structures that will more closely resemble the pre-settlement forest. The goal of the restoration made possible through CFLRP funding is to move the CRFLN in the direction of long term restoration goals. At the end of the nine years of the project, the CRFLN area will be more diverse, will have forest types that are geographically arranged according to where environmental conditions are the best fit, will have lower risk of damaging wildfire in WUI areas, and will be less overstocked. The result will be a forest that is better equipped to adapt to changing environmental conditions and is more resilient to natural and anthropogenic disturbances.

Prior to the outbreak of southern pine beetle a decade ago a successful reintroduction of red cockaded woodpeckers (RCW) was underway in the CRFLN area. With the loss of the southern pines, those RCWs that were found were relocated to other states in order to prevent their loss. Following the restoration of southern pines, forest managers have re-establishment of an RCW population as a long term goal.

The long term goal of the restoration work is to open up forest stands so that 35% of the landscape is in woodland or savanna condition. Dozens of plant species that are reliant on woodland openings maintained by fire have been identified as having distributions throughout the CRFLN prior to European settlement. All of the populations have decreased significantly and many are now monitored as rare species by the Kentucky State Nature Preserves Commission. Many of these plant species should benefit from treatments proposed, especially the reintroduction of fire. For example, the small spreading pogonia (*Cleistis bifaria*) is listed as a Region 8 Regional Forester sensitive species and is found in the CRFLN. This striking orchid inhabits savannas and openings in

pine and oak woodlands and benefits from prescribed fire that maintains these conditions. Currently, in the CRFLN the wildflower is consigned to roadsides and powerline corridors, where disturbances and the open canopy allow it to survive. This is one key species that will likely benefit from proposed treatments.

The open forest types targeted in this proposal also provide important foraging habitat for the federally endangered Indiana bat. Additionally, the cerulean warbler, an International Union for Conservation of Nature (IUCN) vulnerable and state conservation species, may benefit from the creation of more open woodlands, increased structural diversity, and older, larger trees that will be left in forest stands. The prairie warbler, an IUCN least concern and state conservation species, may also benefit from more open woodlands and savannas, as well as early successional habitat that may result from some treatments. Both warblers have also been shown to respond positively to increased fire.

Summary of Landscape Strategy

The CRFLN restoration goals are well in line with objectives and goals outlined by a number of agencies across the region. Forest Service Region 8's Strategic Framework, the Southern Appalachian Restoration Collaborative, US Fish and Wildlife's Appalachian Landscape Conservation Cooperative, as well as Kentucky's Division of Forestry and Department of Fish and Wildlife Resources identify the southern Appalachians, and specifically the region that includes the CRFLN, as a priority area for restoration and conservation efforts. Their shared vision for the landscape includes conservation of rare species, increased forest diversity, reduction of wildfire risk, and re-introduction of fire onto the landscape, all of which are priorities identified in this proposal.

Specific goals for restoration of the CRFLN were based on an extensive analysis that identified ecological zones, defined as units of land that can support a specific plant community or plant community group based upon environmental and physical factors that control vegetation distribution. They may or may not represent existing vegetation, but instead, they represent the vegetation that could occur on a specific site with historical disturbance regimes. They are equivalent to LANDFIRE's Biophysical Settings, which "represent the vegetation that may have been dominant on the landscape prior to Euro-American settlement based on both the current

biophysical environment and an approximation of the historical disturbance regime.” For this analysis, the greater Southern Appalachian Mountains ecological zone was subdivided into focus landscapes based on samples of plant community type locations and their corresponding environments. One focus landscape that was modeled and mapped was the CRFLN.

The ecological zones identified in the CRFLN analysis are Dry Oak, Dry – Mesic Oak, Mesic Forest, Acidic Cove, Alluvial Forest, Shortleaf Pine – Oak, and Xeric Pine – Oak. Based on particular site characteristics (landform and soil moisture in particular), these zones can be correlated to the target forest types described in the Ecological Context (oak – hickory forest, pine – oak woodland, pine – oak savanna, prairie), as well as those mesic types not listed as targets for this project. Maps found in Attachment G (p. G-1) illustrate the ecological zones as well as the extent of fire-adapted communities across the CRFLN. The data from the potential vegetation analysis provide the evidence for what restoration is needed and will provide the basis for strategizing implementation of treatments.

The full landscape strategy may be found at: www.fs.fed.us/r8/boone/boonelandscape.pdf

Proposed Treatments

The CRFLN was selected and defined by the collaborative group several years ago, based on it being a representative sub-region of Southern Appalachians, and for the foundation of burning and other management that had already been done in the area. The location was presented to the greater Appalachian Fire Learning Network, and was subsequently selected to be a demonstration site, where FLN goals would be implemented using best management practices.

Treatments are designed to address desired future condition goals described in the ecological context. These goals were developed as a result of the ecological zone analysis described in the Landscape Strategy. What the CRFLN calls the Potential Vegetation map (Attachment G, p. G-1), the result of the analysis, illustrates the distribution of forest types (forest, woodland, savanna, prairie as the broad categories) as they could be expected to exist had it not been for anthropogenic impacts (primarily fire exclusion/suppression). The map provides the CRFLN with a science-based tool used to strategize treatments across the landscape based on where certain forest types are best suited.

Treatments described in this proposal will be geographically located based on analyses of the site characteristics (e.g. current vegetation, landform, soil moisture) and the potential vegetation map. Using this as a guide, treatments will be strategically placed in order to prioritize wildland-urban interface (WUI) areas, in particular to complement and maximize the effectiveness of work Firewise communities have been doing on private land adjacent to the forest. Initial treatments will also focus on areas in which progress towards desired future conditions has already been made and where NEPA is already in place. Close to 36,500 acres in the project area have NEPA completed (11,246 vegetation management; 25,200 prescribed burning) and another 3,750 acres have NEPA in progress (417 vegetation management; 3,335 prescribed burning). Several areas totaling a few thousand acres are nearing maintenance condition as woodland and savanna forest types; initial efforts will be made to attain these restoration goals. The major impediment to managers' abilities to improve forest structure is lack of capacity. Though the forest plan prescribes vegetation management and prescribed burning in numbers much closer to CRFLN goals, the prescriptions are at present unattainable due to staffing needs.

Prescribed burning: Currently the CRFLN is being burned at the forest's maximum capacity, which is insufficient for converting or maintaining desired forest types. For the pine – oak woodland and savanna forest types, the maintenance fire return interval would be between 3 to 5 years in order to combat encroachment by woody vegetation, with occasional lapses to allow for oak regeneration. In order to approach or achieve maintenance condition in treatment areas, prescribed burning will be increased from approximately 5,500 acres/year to 8,500 – 12,000 acres/year. Prescribed burning will be used in combination with other treatments in order to achieve maintenance condition. Fuel loads in the CRFLN are primarily leaf litter, which is heavy due to current overstocking, with the addition of post-southern pine beetle dead pine trees contributing to large fuel loads. Prescribed burning, in addition to treatments that will reduce stocking, will reduce hazardous fuel loads.

Basal area reduction: Overall, the CRFLN is considered overstocked, which results in trees that are stressed and highly susceptible to pests, pathogens, and other disturbances that may increase with climate change. In 2000, a southern pine beetle (SPB) outbreak killed 80% - 90% of shortleaf pines in the CRFLN. Indeed, the SPB outbreak would likely not have been as severe had

the trees been less stressed. In order to improve the resiliency of the forest, stocking levels must be reduced. Basal area reduction will be strategically placed according to the potential vegetation map (Attachment G, p. G-1) and will capitalize on previous silvicultural treatment areas. Some shortleaf pine plantation areas were completely killed by the SPB, and, with the lack of fire, have regenerated into dense thickets of young hardwoods. In other areas, the loss of shortleaf pines reduced basal area from 180 – 190 ft²/acre to 80 – 90 ft²/acre. In a few areas, the basal area was reduced to 70 ft²/acre or less. Even in those areas affected by the SPB, basal area is largely still too high in relation to DBNF goals for restoring woodland and savanna forest types. Additionally, the lack of fire has greatly impacted the reestablishment of the pines post-SPB outbreak, with mesic species crowding out pine seedlings. During the project period, approximately 22,500 acres of the CRFLN will be thinned, by either pre-commercial, stewardship, mid-story removal (to develop advanced oak regeneration), or commercial means. Two age shelterwood treatments will be used on an additional approximately 3,500 acres to approach woodland and savanna structure.

Planting: The loss of pines along with the lack of fire has allowed for substantial encroachment of mesic species on sites better suited for pine – oak forest type. Planting will be necessary in order to bring pine and oak back to the forest. Site preparation for planting will include prescribed fire and herbicide use. In order to address forest plan goals, approximately 2,500 acres of shortleaf and pitch pine have been planted in the last 5 years. CFLRP funding will allow for an additional 2,200 to 4,200 acres to be planted in pine in order to fulfill forest plan objectives. Pines will be planted widely spaced so that results are mixed pine – hardwood stands.

Regional efforts in partnership with the American Chestnut Foundation are currently underway to study the field conditions necessary for successful establishment and growth of blight-resistant American chestnut seedlings. The American chestnut was once a dominant species across the Appalachians and was an important part of a fire-mediated ecosystem. American chestnut restoration is a long term goal for the CRFLN.

Invasive species control: Forest-wide NEPA is nearing completion that proposes to treat invasives along roadsides. Within treatment areas, monitoring and treatment for invasives will be incorporated into all NEPA documents and monitoring plans as part of this project.

Roads: No new permanent roads will be built as part of this effort. Unneeded roads will be decommissioned. We have conservatively estimated the need to decommission approximately 5 miles of unneeded roads through the life of this project.

Large Tree Maintenance: Although the treatments proposed here involve significant basal area reduction, the majority of material to be removed will be small diameter roundwood and in the forest mid-story. Retention of large overstory trees is an important component of the desired forest, woodland, and savannah treatment.

Watershed Improvements: Wildcat Branch is a 303(d)-listed stream in the project area that is impaired by low pH, heavy metal loading, and sedimentation, attributable primarily to acid mine drainage (AMD). DBNF is considering the use of a bioreactor treatment system to remediate AMD and is partnering with East Kentucky Power Cooperative to remove and burn an initial 1,000 tons of waste coal from the abandoned mine. These reclamation treatments will help improve the water quality of Wildcat Branch.

Three DBNF priority watersheds are encompassed by the CRFLN, including one state priority and one USFWS Critical Habitat. CRFLN treatments will integrate the watershed condition framework and incorporate watershed conservation practices, with a particular sensitivity to those areas with prior detrimental disturbances, to ensure improvement or maintenance of watershed condition.

Fire regime re-establishment and maintenance: Different prescribed fire methods will be used depending on the current and desired future condition of the stand in question. A general guide follows. The range of burn intervals varies depending on the combination of management tools used (burning, mechanical). *Capacity building/Cost reductions:* The CRFLN a limited number of days per year where conditions are right for burning, averaging about 12 days/year in the last several years. At current capacity, managers are unable to achieve prescribed burning goals within that window. CFLRP funding will increase capacity and allow more acreage to be burned in the same timeframe. At the same time, as restoration efforts move forward, the CRFLN fuel complex will begin to shift from heavy deciduous leaf litter to grasses. With the decrease in basal area, more light and wind will hit the forest floor, drying out fuels more rapidly. In these conditions,

prescribed burns will be quicker to implement and will reduce costs per acre. The number of wildfires will remain the same but the cost of suppression will decrease in restored conditions. As reflected in Attachment B (p. B-1), we have estimated nearly \$4.5 million in wildfire cost savings by the end of the project period.

Table 1 (p. 14) represents prescriptions that may be used to convert current forest types to those listed as desired future conditions.

Capacity building/Cost reductions: The CRFLN a limited number of days per year where conditions are right for burning, averaging about 12 days/year in the last several years. At current capacity, managers are unable to achieve prescribed burning goals within that window. CFLRP funding will increase capacity and allow more acreage to be burned in the same timeframe. At the same time, as restoration efforts move forward, the CRFLN fuel complex will begin to shift from heavy deciduous leaf litter to grasses. With the decrease in basal area, more light and wind will hit the forest floor, drying out fuels more rapidly. In these conditions, prescribed burns will be quicker to implement and will reduce costs per acre. The number of wildfires will remain the same but the cost of suppression will decrease in restored conditions. As reflected in Attachment B (p. B-1), we have estimated nearly \$4.5 million in wildfire cost savings by the end of the project period.

Table 1 - Desired Future Conditions and Fire Regime

Current Condition	Desired Future Condition	Prescription Options to Achieve Conversion to DFC (frequency – intensity – season)	Number of Burns
Mesic encroached forest	Mesic forest	None	0
Mesic encroached forest	Pine – oak forest	F – L – G (April)	2 - 4
		F – M – D	5 - 10
Pine – oak forest	Pine – oak woodland	F – H – G (Aug)	2 - 4
		F – H – D	5 - 15
		F – M – G (Aug)	2 - 4
		F – M – D	3 - 7
		Thin to 60 ft ² /acre	1+
Pine – oak woodland	Savanna	F – H – G (Aug)	3 – 7
		F – M – G	2 - 4
		Thin to 30 ft ² /acre	1+

Savanna	Prairie	F – H – G (April)	3 - 7
		F – M – G (April)	2 - 4
		Thin to 0 ft ² /acre	1+

Frequency (Frequent), Intensity (Low, Moderate, High), Season (Growing, Dormant). Each row of this table represents strategies that may be employed in order to convert the current forest type to a desired forest type. The third and fourth columns each provide a range of options for each type of conversion. The options vary depending on timing, frequency, and intensity of burn, with the associated number of burns needed to complete the conversion. For example, in order to convert an existing pine – oak forest to a pine – oak woodland, options include 2 to 4 frequent, high intensity, late growing season burns; or 5 to 15 frequent, high intensity, dormant season burns; 2 to 4 frequent, moderate intensity late growing season burns; etc. Any of those strategies should eventually achieve a similar result. The best strategies will be chosen based on previous burning in the area, local conditions that impact ability to burn at different intensities, and other consideration.

Education: The CRFLN group has placed an emphasis on public education as one of their goals. In order to successfully re-establish fire on the landscape, the public, especially those living in close proximity to the national forest, needs to support prescribed fire prescriptions. Some proposed actions include creating a self-guided driving tour through areas that have been successfully treated with prescribed burning, compared to areas not yet treated; and, develop a demonstration site used to educate professionals and the public on the different forest types included in desired future conditions. A color brochure describing the CRFLN, good fire vs. bad fire, and the target habitat types in the CRFLN is currently in production. It has been designed for distribution to the general public to help educate them on the CRFLN’s objectives and treatment methods.

Collaboration and Multi-Party Monitoring

After initial meetings of the regional Appalachian FLN, the CRFLN was chosen to serve as a sub-regional demonstration landscape; that is, an area in which best practices of the FLN process are implemented on the ground, with lessons learned to be shared throughout the region. Since 2007, the CRFLN has been holding regular meetings and workshops with representatives of nine agencies and organizations. Informed by current research and ecological analysis, the group determined by consensus what the role of fire was on the landscape prior to European settlement, and how historic fire regimes can be re-established through targeted management.

In a 2010 article published in *Ecology and Society*, the authors review the Fire Learning Network model as a device for breaking the “rigidity trap, an inability to apply novelty and innovation,” of fire management in the United States. They conclude,

The FLN facilitates cross-scalar circulation of ecological fire restoration perspectives and practices, enabling change at multiple scales simultaneously. The network fosters innovation among practitioners, influences plans and policies, and then builds on new guidance from those plans and policies to enable further experimentation and innovation. In this way, a multiscalar [at multiple scales] collaborative network like the FLN may be the means to engender greater social-ecological resilience by overcoming the rigidity traps that characterize many natural resource management bureaucracies. (Butler, W.H. and Goldstein, B.E. 2010. "The US Fire Learning Network: Springing a rigidity trap through multiscalar collaborative networks." *Ecology and Society* 15(3).)

The CRFLN has been meeting regularly as a collaborative group since 2007, having formed out of the greater Appalachian FLN in order to focus its efforts on the southern Appalachian region of eastern Kentucky. It is a group that has a goal of including all stakeholders in planning and implementing restoration strategies, and which places a high value on the inclusion of a diversity of interests. The group includes faculty from both the University of Kentucky and University of Tennessee; The Nature Conservancy, National Wild Turkey Federation; state divisions of fish and wildlife, forestry, and nature preserves; and a Firewise representative from McCreary County, which comprises much of the area of the CRFLN. At CRFLN meetings the group works together to determine the desired future conditions, priorities, and implementation strategies for the landscape. Since 2007, at a series of workshops for the greater Appalachian FLN, the CRFLN has presented their work to the regional network and solicited feedback. Going forward, the CRFLN hopes to include representatives from additional organizations and industry groups, including the East Kentucky Power Cooperative, Kentucky State Nature Preserves Commission, and Kentucky Heartwood, a forest protection NGO, all of which have already had some involvement with the CRFLN planning process. Goals and objectives reached by the group are based on the best available science, which was a requirement in the application process to become a demonstration FLN landscape (an extensive list of references can be found at the end of the Landscape Strategy). All collaborators listed on Attachment C (p. C-1) are committed to continuing their involvement as the CRFLN process moves from planning to implementation. A summary of the role some key collaborators have had in the CRFLN and their plans for continuing involvement follows.

Dr. Mary Arthur of the University of Kentucky Dept. of Forestry has conducted fire ecology research on the DBNF continuously since 1995 and has been a core member of the CRFLN since its inception. She has been instrumental in guiding the CRFLN in establishing a restoration strategy and contributes vast knowledge of fire-adapted ecosystems in the DBNF. Dr. Arthur will continue to provide her expertise to the CRFLN and is interested in contributing remote-sensing capabilities to monitoring efforts, as well as graduate student monitoring assistants.

Dr. Pat Keyser of the University of Tennessee, Knoxville, was an early member of the CRFLN and has a large research project established in the Freeman Fork area of the CRFLN. The project, Oak Woodland/Wooded Grassland Restoration Research, will study the effectiveness of a variety of treatments to restore oak woodlands and savannas, two CRFLN target forest types. Different combinations of vegetation management and prescribed burning will test which best encourage oak regeneration. The results of the study will inform treatments used throughout and beyond this project period.

In addition to *The Nature Conservancy's* (TNC) role in establishing the Fire Learning Network, TNC staff have been heavily involved in the CRFLN, providing extensive resources and expertise. The KY Chapter of TNC instigated the CRFLN project in 2006 and worked with DBNF leadership to establish the CRFLN within the greater Appalachian FLN. Three TNC staff members are dedicated to facilitating the collaborative process, providing momentum, and ensuring the best ecological management outcomes possible. TNC contributed to the production of the ecological zone analysis of the CRFLN, and has made possible the development of two relevant brochures, "Controlled Burning for Healthy Forest Management in the Appalachians" and "Restoring Diversity in the Cumberland River Fire Learning Network". TNC staff assisted in development of monitoring protocols for the CRFLN and participated in initial monitoring. They will continue to provide assistance to the CRFLN in prescribed burning, monitoring fire effects, and implementing public education and outreach strategies.

The *Kentucky Department of Fish and Wildlife Resources* (KDFWR) has been active on the CRFLN since its inception with staff participating in initial CRFLN planning efforts and regional and local workshops. KDFWR expects to continue to provide expertise and implementation and monitoring assistance. KDFWR has an active private lands program and will provide technical

guidance and cost-share incentives to private landowners within the CRFLN to achieve desired habitat conditions. The KDFWR Wildlife Division currently has monitoring in place within the CRFLN site for whitetail deer, wild turkey, bobcat, ruffed grouse, American woodcock, mourning dove, black bear, and song birds. There are also three mast production survey routes located within the CRFLN site. KDFWR also monitors water quality and aquatic species for selected water resources within the site. Additional monitoring of species and habitats will be considered as need arises.

The CRFLN developed a prescribed fire monitoring plan that will be used to measure prescribed fire implementation against objectives defined in burn plans and effectiveness of treatments towards achieving goals described in desired future conditions. The DBNF has commitments from The Nature Conservancy and the Kentucky State Nature Preserve Commission to assist in monitoring efforts and initial agreements are already in place. Monitoring protocols include the establishment of circular, .1 acre plots to measure pre- and post-burn vegetation, fuels, and fire severity.

The monitoring plan includes descriptions of four priority monitoring types—dry-xeric oak south, dry-xeric oak north, dry-xeric oak ridgetop, and dry-mesic oak north; that is, reference biophysical conditions on the landscape for which monitoring has been targeted. Prescribed fire monitoring will be focused in areas that fall under these categories. By identifying areas with these predetermined conditions, monitoring efforts are enhanced: if similar changes are detected across multiple monitoring units that represent the same biophysical conditions, then there is a good chance that the changes can be extrapolated for other similar sites without the need to monitor them. Each monitoring type was determined based on the following attributes: aspect, topographic position, forest type, age class, basal area, and ground cover.

Monitoring is expected to be a long term effort conducted by the multi-party monitoring team. Early monitoring will be more frequent in order to determine whether treatments are effective, whereas later monitoring, once sites have achieved maintenance condition, will be less frequent. Managers will continually evaluate monitoring results so that needed changes will become evident and can be addressed.

Utilization

There are an estimated 8,232,755 tons of live, small diameter biomass in the CRFLN. The mechanical treatments proposed for this project will include the removal of a portion of this biomass over the project period. Recent interest in biofuels has been growing in eastern Kentucky and a few options for biomass utilization may be available in the near future.

The East Kentucky Power Cooperative (EKPC) has coal-fired power plants throughout eastern Kentucky, including the Cooper plant within the CRFLN and less than 50 miles from the furthest most boundaries of the area. The DBNF and EKPC have been in biomass utilization discussions for the past several years. EKPC was a DBNF partner during the Cold Hill Project developed under the authority of the Healthy Forest Restoration Act, Titles II and IV where the Southern Research Station examined the economic feasibility of cutting and removing woody biomass from the DBNF immediately adjacent to the CRFLN. Coal-fired power plants can significantly reduce their sulfur dioxide (SO₂) and nitrous oxide (NO_x) emissions, both acid rain precursors, and reduce carbon dioxide (CO₂) emissions, by co-firing wood products with coal. EKPC has completed test burns of biomass at the Cooper plant and is currently conducting an economic feasibility study of co-firing wood products with coal in their Cooper plant as well as investigating the possibility of building a green tree boiler plant (100% biomass burning). The DBNF has provided biomass supply information to EKPC in response to their expressed interest in sourcing biomass from DBNF.

The DBNF has assisted Cox Interiors in Campbellsville, KY regarding application for a Woody Biomass Utilization Grant. The wood manufacturing company has a wood-to-energy program in place, in which they generate the heat and electricity needed for the company's operations by burning wood waste products. They have not been able to expand the generation facility beyond its initial capacity due to limited amounts of wood waste fuel available. Cox Interiors also produces animal bedding material from wood waste, which it has found to be a lucrative business. Future discussions with Cox Interiors may yield another beneficial utilization partnership. Other possible opportunities for biomass utilization exist near the CRFLN. Somerset

Pellet Fuel and the Burnside Kingsford Charcoal Plant may be interested in partnering with the DBNF as a supplier of biomass.

Benefits to Local Economies

Kentucky has the fourth highest poverty rate in the country. Two of the four counties represented in the CRFLN, McCreary and Whitley have critical poverty rates above 50% of the state average. These are both rural counties with less access to basic utilities and services. Kentucky ranks as one of the top three hardwood lumber producing state in the nation. Wood industries employ one out of every nine manufacturing workers in the state. A cornerstone of a thriving community lies in the success of small businesses. When local businesses succeed, they create positive ripple-like economic and social change throughout the local community. Successful businesses are more likely to create meaningful and well paying jobs in rural communities and help improve the life of its citizens.

The restoration needs in the CRFLN provide an economic growth opportunity for communities around the forest. We are projecting 25 jobs created annually for the 9 years of this project, with an additional 31 jobs annually induced as a result of treatments implemented. This adds up to approximately \$2,643,000 in benefits to local economies per year as a result of this project. Considering the economic condition of CRFLN communities, these contributions are not minor. All loggers currently used by the DBNF are local individuals or local companies. The DBNF will work to ensure that the jobs created by this project remain local.

Funding Plan

Funding estimates for this CFLR proposal are provided in the tables in Appendix F (p. F-1). The DBNF developed a detailed spreadsheet outlining the activities and costs associated with both the DBNF's normal appropriations and CFLR funding for all 9 years of this proposal. We scaled back our CFLR Funding Request to ensure reasonable certainty of matching appropriated funds under steady or declining appropriations due to the national economy.

Partnership in-kind estimates are based on existing agreements with state agencies and NGO's who have participated in the CRFLN and expressed commitment to continued support

throughout the life of the project. Additional opportunities for partnership funding are being pursued, but were not included in the Funding Tables of Appendix F.

Estimated forest product value (Line 5 in the Funding Tables) was calculated using a conservative estimate of product output and value. These values are contingent on successfully developing approximately 50% of our commercial timber sale treatments as stewardship contracts. We have been in discussions with the National Wild Turkey Federation to assist us in this endeavor.

ATTACHMENTS**Attachment A***Projected Accomplishments Table*

Performance Measure	Code	Number of units to be treated over 10 years using CFLR funds	Number of units to be treated over 10 years using other FS funds	Number of units to be treated over 10 years using Partner Funds	CFLR funds to be used over 10 years	Other FS funds to be used over 10 years	Partner funds to be used over 10 years
Acres treated annually to sustain or restore watershed function and resilience	WTRSHD -RSTR- ANN						
Acres of forest vegetation established	FOR- VEG-EST	2,205	2,212		789,467	791,567	
Acres of forest vegetation improved	FOR- VEG-IMP	8,700	8,700		3,512,671	3,512,671	
Manage noxious weeds and invasive plants	INVPLT- NXWD- FED-AC	1,675	1,925		899,390	1,013,578	
Highest priority acres treated for invasive terrestrial and aquatic species on NFS lands	INVSPE- TERR- FED-AC						
Acres of water or soil resources protected, maintained or improved to achieve desired watershed conditions.	S&W- RSRC- IMP	1,440	1,440		1,662,076	1,662,076	
Acres of lake habitat restored or enhanced	HBT- ENH-LAK	900	900		101,591	101,591	

Performance Measure	Code	Number of units to be treated over 10 years using CFLR funds	Number of units to be treated over 10 years using other FS funds	Number of units to be treated over 10 years using Partner Funds	CFLR funds to be used over 10 years	Other FS funds to be used over 10 years	Partner funds to be used over 10 years
Miles of stream habitat restored or enhanced	HBT-ENH-STRM	90	90		203,182	203,182	
Acres of terrestrial habitat restored or enhanced	HBT-ENH-TERR	54,360	54,390		2,171,950	2,172,715	
Acres of rangeland vegetation improved	RG-VEG-IMP						
Miles of high clearance system roads receiving maintenance	RD-HC-MAIN	104	117		45,796	50,796	
Miles of passenger car system roads receiving maintenance	RD-PC-MAINT	576	648		247,296	274,296	
Miles of road decommissioned	RD-DECOM	2.5	2.5		5,468	5,309	
Miles of passenger car system roads improved	RD-PC-IMP	2	2		35,315	35,315	
Miles of high clearance system road improved	RD-HC-IMP	1	1		11,424	11,424	
Number of stream crossings constructed or reconstructed to provide for aquatic organism passage	STRM-CROS-MTG-STD	2	4		347,782	647,782	
Miles of system trail maintained to standard	TL-MAINT-STD						

Performance Measure	Code	Number of units to be treated over 10 years using CFLR funds	Number of units to be treated over 10 years using other FS funds	Number of units to be treated over 10 years using Partner Funds	CFLR funds to be used over 10 years	Other FS funds to be used over 10 years	Partner funds to be used over 10 years
Miles of system trail improved to standard	TL-IMP-STD						
Miles of property line marked/maintained to standard	LND-BL-MRK-MAINT						
Acres of forestlands treated using timber sales	TMBR-SALES-TRT-AC	3,833	3,833		0	0	
Volume of timber sold (CCF)	TMBR-VOL-SLD	34,500	34,500		2,054,109	2,054,109	
Green tons from small diameter and low value trees removed from NFS lands and made available for bio-energy production	BIO-NRG	71,300	71,300		0	0	
Acres of hazardous fuels treated outside the wildland/urban interface (WUI) to reduce the risk of catastrophic wildland fire	FP-FUELS-NON-WUI						
Acres of wildland/urban interface (WUI) high priority hazardous fuels treated to reduce the risk of catastrophic wildland fire	FP-FUELS-WUI	32,000	32,000		1,715,740	1,715,740	

Performance Measure	Code	Number of units to be treated over 10 years using CFLR funds	Number of units to be treated over 10 years using other FS funds	Number of units to be treated over 10 years using Partner Funds	CFLR funds to be used over 10 years	Other FS funds to be used over 10 years	Partner funds to be used over 10 years
Number of priority acres treated annually for invasive species on Federal lands	SP- INVSPE- FED-AC	1,220	1,220		137,177	137,177	
Number of priority acres treated annually for native pests on Federal lands	SP- NATIVE – FED-AC						

Attachment B: R-CAT Results and Rationale

Results:

R-CAT Results	
Proposal Name: Cumberland River FLN CFLRP	
Start Year	2011
End Year	2024
Total Treatment Acres	102,500.00
Average Treatment Duration	5
Discounted Anticipated Cost Savings - No Beneficial Use	\$ (4,438,138)
Discounted Anticipated Cost Savings - Low Beneficial Use	\$ (4,438,138)
Discounted Anticipated Cost Savings - Moderate Beneficial Use	\$ (4,438,138)
Discounted Anticipated Cost Savings - High Beneficial Use	\$ (4,438,138)

Rationale:

Proposal Name: Cumberland River FLN CFLRP	Documentation Page
This page is intended to help you record and communicate the assumptions and calculations that feed the risk and cost analysis tool package spreadsheet	Response / Information Column
Was the analysis prospective (projecting activities, costs and revenues that are planned by the proposal) or retrospective (using actual acres, revenues and costs in an analysis looking back over the life of the project)?	Retrospective
Start year rationale:	
End year rationale:	
Duration of treatments rationale:	5 years was entered as a best guess average, initially, benefits would likely have a shorter duration, as repeated treatments occur, length of effectiveness is expected to increase
All dollar amounts entered should reflect undiscounted or nominal costs, as they are discounted automatically for you in the R-CAT spreadsheet tool? Did you provide undiscounted costs, and in what year data are your costs and revenues provided.	

Proposal Name: Cumberland River FLN CFLRP	Documentation Page
Average treatment cost per acre rationale:	Treatment cost for 2011 is reflective of the current allocation of approx 45/acre to the forest, with understanding that approximately 50% is not allocated at the project level, each consecutive year has the 4% interest rate, compounded forward from FY11 to FY24, calculations documented in: coons-E:FLN/CFRLP/pburn_cost_int_calcs.xls
Rationale for actual costs per acre of treatment by year is used:	
Average treatment revenue per acre rationale:	In regards to prescribed fire there is no expectation of revenue.
This tool is intended to be used to estimate Forest Service fire program costs only, did you conduct your analysis this way or have you taken an all lands approach?	Only Forest Service fire program costs are considered
Total treatment acres calculations, assumptions:	Treatment areas will have multiple entrances/ignitions on a varied schedule. The schedule will depend primarily on the ground conditions that are obtained through monitoring plot evaluations. It is expected that "entrances" will be more frequent initially and as conditions change, the time in between implementations will increase. Out year expectations are that 15+ years would eventually pass in between treatments with prescribed burning.
Treatment timing rationale with NEPA analysis considerations:	Treatment timing for areas currently under NEPA are within a range supported by references in Landfire for each of the represented Biophysical Settings identified. Use of "Simone Data" in conjunction with additional ground proofing during IRMS evaluations will aid in determining additional treatment areas and time frames.
Annual Fire Season Suppression Cost Estimate Pre Treatment, Assumptions and Calculations	
Did you use basic Landfire Data for you Pretreatment Landscape?	Yes
Did you modify Landfire data to portray the pretreatment landscape and fuel models?	No
Did you use ArcFuels to help you plan fuel treatments?	No
Did you use other modeling to help plan fuel treatments, if so which modeling?	Yes, the forest contracted Steve Simone to use existing data from a variety of sources to determine current and potential natural vegetation
Did you model fire season costs with the Large Fire Simulator?	No
If, so who helped you with this modeling?	N/A
If not, how did you estimate costs, provide details here:	NFMAS data from 1999 was compounded to represent current and future year valuation using a standard interest rate of 4%,

Proposal Name: Cumberland River FLN CFLRP	Documentation Page
Did you apply the stratified cost index (SCI) to your Fsim results?	No, less than 5% of the historical fire occurrence is within the target acreage of 300+ where SCI is intended for use, compared to the SCI information from WFDSS, the NFMAS calculated costs appear to be closer to realistic for the CFLRP area
Who helped you apply SCI to your FSIM results?	N/A
Did you filter to remove Fsim fires smaller than 300acres and larger than a reasonable threshold?	N/A
What is the upper threshold you used?	N/A
Did you use median pre treatment costs per fire season?	N/A
Did you use median post treatment costs per fire season?	N/A
Did you test the statistical difference of the fire season cost distributions using a univariate test?	N/A
What were the results?	N/A
	WUI acres within the CFLRP total 113930.
Did you estimate Burned Area Emergency Response (BAER) costs in you analysis?	No
Did you use H codes or some other approach to estimate these costs?	N/A
Did these cost change between pre and post treatment?	N/A
Did you estimate long term rehabilitation and reforestation costs in your analysis?	No
How did you develop these estimates, and did these cost change between pre and post treatment?	N/A
Did you include small fire cost estimates in your analysis?	The Daniel Boone 2011 "allocation" for suppression cost was \$1,717,352.00, of which the 2 districts that fall within the proposed CFLRP have been allocated 99,323.90 for pre-suppression fire suppression costs using NFMAS calculations
If so, how did you estimate these costs, what time period is used as a reference, and did these cost change between pre and post treatment?	NFMAS Values from 2007 were used in conjunction with historical fire occurrence (1997-2009) within the CFLRP boundary Size Class A fires only accounted for 1% of the 116 incidents documented with a per acre cost of \$2,874. Size Class B fires accounted for 55% of all documented fires with a per acre cost of \$493.00. Class C fires accounted for 40% of the fires at \$148.00 per acre average and Class D fires, averaging \$97.00 per acre account for the remaining 4% of the analysis area. Change in cost post-treatment could occur if ignitions occur within 1-5 years
Did you include beneficial use fire as a cost savings mechanism in your analysis?	Yes, The GIS calculated area for the entire CFLRP is 251735 acres, with the FS lands within the CFLRP totaling 153873 acres.

Proposal Name: Cumberland River FLN CFLRP	Documentation Page
How did you estimate the percent of contiguous area where monitoring is an option for pretreatment landscape?	Spatial data for the six Fire Management Unit (FMU) was queried to select areas that did NOT have specified resource concerns (biological, source water, heritage, fire exclusion). The remaining FMU's (general forest and wilderness) were then clipped with the special data for the Wildland Urban Interface (WUI). The resulting 33741 acres represented are outside of the WUI and have no known resource concerns.
How did you estimate the percent of contiguous area where monitoring is an option for post treatment landscape, and why did you select the percentage of your landscape for low, moderate and high?	The total number of acres of wilderness and general forest that did not fall within the predetermined WUI (totaling 33741 acres) was used to determine the High percentage of 22% for "monitored" area. This percentage was cut in half for the Moderate, and halved again for the low.
How did you derive an estimate for the percentage of full suppression costs used in fire monitoring for beneficial use?	A guess/assumption of overall cost being close to the same as full suppression costs, with consideration for: much longer duration, local knowledge of the practicality of using aerial and water (boating) monitoring in addition to ground based monitoring due to terrain features, higher daily costs than only ground based. Safety of employees and the public would require increased costs for notification within the effected area.
Did you ensure that you clicked on all the calculation buttons in cells in column E after entering your estimates?	Yes
Did you make any additional modifications that should be documented?	

Attachment C: Members of the Collaborative

Organization Name	Contact Name	Phone	Role
Daniel Boone NF	Nancy Ross	859-745-3100	Facilitator of collaborative; Proposal development
Daniel Boone NF	John Omer	606-864-4163	Proposal development
The Nature Conservancy	Jeff Sole	502-682-1477	Leader of collaborative; Proposal development; monitoring; implementation
KY State Nature Preserve Commission	Martina Hines	502-573-2886	Monitoring
U. of Kentucky	Mary Arthur	859-257-7596	Proposal development; ongoing research;
U. of Tennessee	Pat Keyser	865-974-7346	Proposal development; ongoing research
National Wild Turkey Federation	Jadd Campbell	270-275-9073	Stewardship contracts
KY Division of Fish and Wildlife Resources	Steve Beam	606-677-1098	Proposal development; monitoring; implementation
KY Department of Fish and Wildlife Resources	Rebecca Littleton	606-878-9595	Proposal development; monitoring; implementation
KY Division of Forestry	Brandon Howard	606-337-3011	Participant in collaborative
East Kentucky Power Cooperative	Jeff Brandt	859-745-9367	Biomass utilization

Attachment D: Letter of Commitment

The Daniel Boone National Forest has received letters of commitment from each agency that has been involved in the Fire Learning Network and who intends to continue involvement in this project in the future.

We, the undersigned, who have been working as a collaborative group since 2007 to explore and define restoration goals in the Cumberland River Fire Learning Network area, commit our continued contributions to this collaborative effort. With funding awarded for the Collaborative Forest Landscape Restoration Program, we will share our expertise and resources in order to implement treatments as described in this proposal. We will also encourage active participation from other agencies and organizations, which are not yet a part of this collaborative. With our combined efforts we anticipate making great strides towards the long term restoration goals of the CRFLN.

Frank Beum, Forest Supervisor, Daniel Boone National Forest

Terry Cook, KY State Director, The Nature Conservancy

Donald Dott, Director, Kentucky State Nature Preserves Commission

Mary Arthur, Professor, University of Kentucky Dept. of Forestry

Terrell Baker, Chair, University of Kentucky Dept. of Forestry

Pat Keyser, Professor, University of Tennessee Knoxville

Robert Abernethy, Assistant VP of Agency Programs, National Wild Turkey Federation

Jon Gasset, Commissioner, KY Department of Fish and Wildlife Resources

Leah MacSwords, State Forester, Kentucky Division of Forestry

Attachment E: Predicted Jobs

	Employment (# Part and Full-time Jobs)			Labor Inc (2010 \$)		
	Direct	Indirect and Induced	Total	Direct	Indirect and Induced	Total
Thinning-Biomass: Commercial Forest Products						
Logging	4.3	4.7	9.1	171,646	197,442	369,088
Sawmills	2.7	5.6	8.3	115,236	209,894	325,130
Plywood and Veneer Softwood	0.6	0.8	1.4	26,536	31,774	58,310
Plywood and Veneer Hardwood	1.9	2.7	4.6	69,218	82,881	152,098
Oriented Strand Board (OSB)	-	-	-	-	-	-
Mills Processing Roundwood Pulp Wood	0.7	2.9	3.6	60,275	120,270	180,544
Other Timber Products	3.6	5.4	9.0	180,850	285,299	466,148
Facilities Processing Residue From Sawmills	0.8	3.2	4.0	61,621	122,054	183,675
Facilities Processing Residue From Plywood/Veneer	0.1	0.5	0.6	9,062	17,949	27,011
Biomass--Cogen	0.2	0.2	0.4	21,881	13,603	35,484
Total Commercial Forest Products	14.9	26.0	40.9	716,323	1,081,166	1,797,489
Other Project Activities						
Facilities, Watershed, Roads and Trails	0.4	0.2	0.6	16,786.6	11,771.8	28,558.5
Abandoned Mine Lands	0.0	0.0	0.0	0.0	0.0	0.0
Ecosystem Restoration, Hazardous Fuels, and Forest Health	9.0	1.8	10.8	287,493.3	77,220.8	364,714.1
Commercial Firewood	0.0	0.0	0.0	0.0	0.0	0.0
Contracted Monitoring	0.0	0.0	0.0	0.0	0.0	0.0
Total Other Project Activities	9.3	2.1	11.4	304,280	88,993	393,273
FS Implementation and Monitoring	1.1	3.4	4.5	314,880	138,001	452,881
Total Other Project Activities & Monitoring	10.4	5.5	16.0	\$619,160	\$226,994	\$846,153
Total All Impacts	25.3	31.5	56.8	\$1,335,483	\$1,308,160	\$2,643,643

Attachment F: Funding Estimate

Funds to be used on NFS lands for ecological restoration treatments and monitoring that would be available in FY 2011 to match funding from the Collaborative Forested Landscape Restoration Fund	
Fiscal Year 2011 Funding Type	Dollars/Value Planned
FY 2011 Funding for Implementation	\$872,870
FY 2011 Funding for Monitoring	\$40,133
1. USFS Appropriated Funds	\$892,870
2. USFS Permanent & Trust Funds	\$0
3. Partnership Funds	\$0
4. Partnership In-Kind Services Value	\$20,133
5. Estimated Forest Product Value	\$0
6. Other (specify)	
FY 2011 Total (total of 1-6 above for matching CFLRP request)	\$913,003
FY 2011 CFLRP request (must be equal to or less than above total)	\$481,275
Funding off NFS lands associated with proposal in FY 2011 (does not count toward funding match from the Collaborative Forested Landscape Restoration Fund)	
Fiscal Year 2011 Funding Type	Dollars Planned
USDI BLM Funds	\$0
USDI (other) Funds	\$0
Other Public Funding	\$0
Private Funding	\$0

Funds to be used on NFS lands for ecological restoration treatments and monitoring that would be available in FY 2012 to match funding from the Collaborative Forested Landscape Restoration Fund	
Fiscal Year 2012 Funding Type	Dollars/Value Planned
FY 2012 Funding for Implementation	\$835,350
FY 2012 Funding for Monitoring	\$50,000
1. USFS Appropriated Funds	\$805,350
2. USFS Permanent & Trust Funds	\$50,000
3. Partnership Funds	\$0
4. Partnership In-Kind Services Value	\$30,000
5. Estimated Forest Product Value	\$0
6. Other (specify)	
FY 2012 Total (total of 1-6 above for matching CFLRP request)	\$885,350
FY 2012 CFLRP request (must be equal to or less than above total)	\$727,413
Funding off NFS lands associated with proposal in FY 2012 (does not count toward funding match from the Collaborative Forested Landscape Restoration Fund)	
Fiscal Year 2012 Funding Type	Dollars Planned
USDI BLM Funds	\$0
USDI (other) Funds	\$0
Other Public Funding	\$0
Private Funding	\$0

Funds to be used on NFS lands for ecological restoration treatments and monitoring that would be available in FY 2013 to match funding from the Collaborative Forested Landscape Restoration Fund	
Fiscal Year 2013 Funding Type	Dollars/Value Planned
FY 2013 Funding for Implementation	\$1,114,685
FY 2013 Funding for Monitoring	\$50,000
1. USFS Appropriated Funds	\$1,134,685
2. USFS Permanent & Trust Funds	\$0
3. Partnership Funds	\$0
4. Partnership In-Kind Services Value	\$30,000
5. Estimated Forest Product Value	\$0
6. Other (specify)	
FY 2013 Total (total of 1-6 above for matching CFLRP request)	\$1,164,685
FY 2013 CFLRP request (must be equal to or less than above total)	\$1,114,165
Funding off NFS lands associated with proposal in FY 2013 (does not count toward funding match from the Collaborative Forested Landscape Restoration Fund)	
Fiscal Year 2013 Funding Type	Dollars Planned
USDI BLM Funds	\$0
USDI (other) Funds	\$0
Other Public Funding	\$0
Private Funding	\$0

Funds to be used on NFS lands for ecological restoration treatments and monitoring that would be available in FY 2014 to match funding from the Collaborative Forested Landscape Restoration Fund	
Fiscal Year 2014 Funding Type	Dollars/Value Planned
FY 2014 Funding for Implementation	\$1,397,749
FY 2014 Funding for Monitoring	\$60,000
1. USFS Appropriated Funds	\$1,315,238
2. USFS Permanent & Trust Funds	\$31,250
3. Partnership Funds	\$0
4. Partnership In-Kind Services Value	\$30,000
5. Estimated Forest Product Value	\$81,261
6. Other (specify)	
FY 2014 Total (total of 1-6 above for matching CFLRP request)	\$1,457,749
FY 2014 CFLRP request (must be equal to or less than above total)	\$1,285,238
Funding off NFS lands associated with proposal in FY 2014 (does not count toward funding match from the Collaborative Forested Landscape Restoration Fund)	
Fiscal Year 2014 Funding Type	Dollars Planned
USDI BLM Funds	\$0
USDI (other) Funds	\$0
Other Public Funding	\$0
Private Funding	\$0

Funds to be used on NFS lands for ecological restoration treatments and monitoring that would be available in FY 2015 to match funding from the Collaborative Forested Landscape Restoration Fund	
Fiscal Year 2015 Funding Type	Dollars/Value Planned
FY 2015 Funding for Implementation	\$1,605,399
FY 2015 Funding for Monitoring	\$60,000
1. USFS Appropriated Funds	\$1,522,888
2. USFS Permanent & Trust Funds	\$31,250
3. Partnership Funds	\$0
4. Partnership In-Kind Services Value	\$30,000
5. Estimated Forest Product Value	\$81,261
6. Other (specify)	
FY 2015 Total (total of 1-6 above for matching CFLRP request)	\$1,665,399
FY 2015 CFLRP request (must be equal to or less than above total)	\$1,492,888
Funding off NFS lands associated with proposal in FY 2015 (does not count toward funding match from the Collaborative Forested Landscape Restoration Fund)	
Fiscal Year 2015 Funding Type	Dollars Planned
USDI BLM Funds	\$0
USDI (other) Funds	\$0
Other Public Funding	\$0
Private Funding	\$0

Funds to be used on NFS lands for ecological restoration treatments and monitoring that would be available in FY 2016 to match funding from the Collaborative Forested Landscape Restoration Fund	
Fiscal Year 2016 Funding Type	Dollars/Value Planned
FY 2016 Funding for Implementation	\$2,331,287
FY 2016 Funding for Monitoring	\$60,000
1. USFS Appropriated Funds	\$2,136,265
2. USFS Permanent & Trust Funds	\$62,500
3. Partnership Funds	\$0
4. Partnership In-Kind Services Value	\$30,000
5. Estimated Forest Product Value	\$162,522
6. Other (specify)	
FY 2016 Total (total of 1-6 above for matching CFLRP request)	\$2,391,287
FY 2016 CFLRP request (must be equal to or less than above total)	\$2,107,424
Funding off NFS lands associated with proposal in FY 2016 (does not count toward funding match from the Collaborative Forested Landscape Restoration Fund)	
Fiscal Year 2016 Funding Type	Dollars Planned
USDI BLM Funds	\$0
USDI (other) Funds	\$0
Other Public Funding	\$0
Private Funding	\$0

Funds to be used on NFS lands for ecological restoration treatments and monitoring that would be available in FY 2017 to match funding from the Collaborative Forested Landscape Restoration Fund	
Fiscal Year 2017 Funding Type	Dollars/Value Planned
FY 2017 Funding for Implementation	\$2,479,608
FY 2017 Funding for Monitoring	\$60,000
1. USFS Appropriated Funds	\$2,172,075
2. USFS Permanent & Trust Funds	\$93,750
3. Partnership Funds	\$0
4. Partnership In-Kind Services Value	\$30,000
5. Estimated Forest Product Value	\$243,783
6. Other (specify)	
FY 2017 Total (total of 1-6 above for matching CFLRP request)	\$2,539,608
FY 2017 CFLRP request (must be equal to or less than above total)	\$2,142,075
Funding off NFS lands associated with proposal in FY 2017 (does not count toward funding match from the Collaborative Forested Landscape Restoration Fund)	
Fiscal Year 2017 Funding Type	Dollars Planned
USDI BLM Funds	\$0
USDI (other) Funds	\$0
Other Public Funding	\$0
Private Funding	\$0

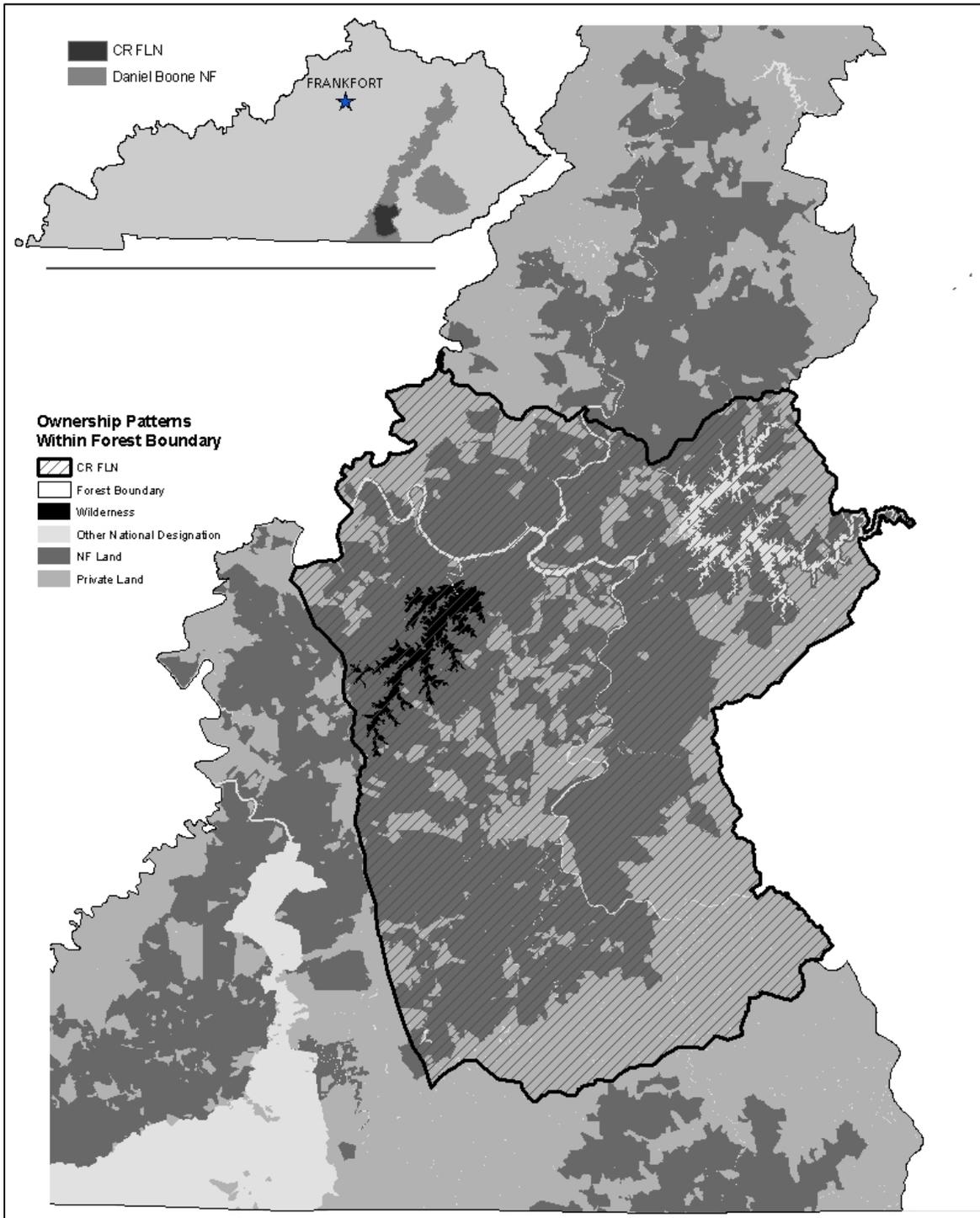
Funds to be used on NFS lands for ecological restoration treatments and monitoring that would be available in FY 2018 to match funding from the Collaborative Forested Landscape Restoration Fund	
Fiscal Year 2018 Funding Type	Dollars/Value Planned
FY 2018 Funding for Implementation	\$2,615,977
FY 2018 Funding for Monitoring	\$60,000
1. USFS Appropriated Funds	\$2,308,444
2. USFS Permanent & Trust Funds	\$93,750
3. Partnership Funds	\$0
4. Partnership In-Kind Services Value	\$30,000
5. Estimated Forest Product Value	\$243,783
6. Other (specify)	
FY 2018 Total (total of 1-6 above for matching CFLRP request)	\$2,675,977
FY 2018 CFLRP request (must be equal to or less than above total)	\$2,278,444
Funding off NFS lands associated with proposal in FY 2018 (does not count toward funding match from the Collaborative Forested Landscape Restoration Fund)	
Fiscal Year 2018 Funding Type	Dollars Planned
USDI BLM Funds	\$0
USDI (other) Funds	\$0
Other Public Funding	\$0
Private Funding	\$0

Funds to be used on NFS lands for ecological restoration treatments and monitoring that would be available in FY 2019 to match funding from the Collaborative Forested Landscape Restoration Fund	
Fiscal Year 2019 Funding Type	Dollars/Value Planned
FY 2019 Funding for Implementation	\$2,649,046
FY 2019 Funding for Monitoring	\$60,000
1. USFS Appropriated Funds	\$2,341,513
2. USFS Permanent & Trust Funds	\$93,750
3. Partnership Funds	\$0
4. Partnership In-Kind Services Value	\$30,000
5. Estimated Forest Product Value	\$243,783
6. Other (specify)	
FY 2019 Total (total of 1-6 above for matching CFLRP request)	\$2,709,046
FY 2019 CFLRP request (must be equal to or less than above total)	\$2,311,513
Funding off NFS lands associated with proposal in FY 2019 (does not count toward funding match from the Collaborative Forested Landscape Restoration Fund)	
Fiscal Year 2019 Funding Type	Dollars Planned
USDI BLM Funds	\$0
USDI (other) Funds	\$0
Other Public Funding	\$0
Private Funding	\$0

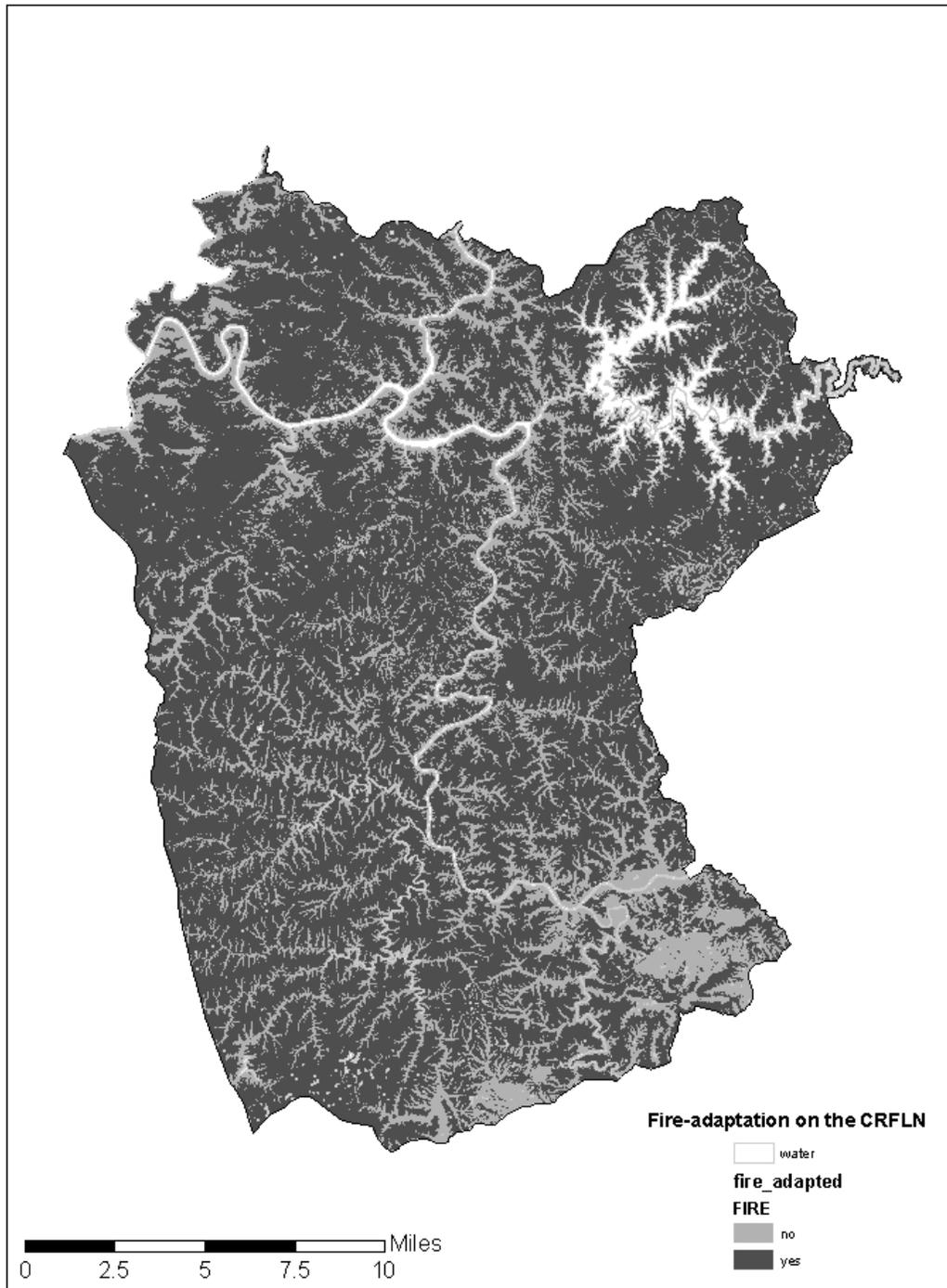
Funds to be used on NFS lands for ecological restoration treatments and monitoring that would be available in FY 2011-2019 to match funding from the Collaborative Forested Landscape Restoration Fund	
Fiscal Year 2011-2019 Funding Type	Dollars/Value Planned
FY 2011-2019 Funding for Implementation	\$15,901,971
FY 2011-2019 Funding for Monitoring	\$500,133
1. USFS Appropriated Funds	\$14,629,328
2. USFS Permanent & Trust Funds	\$456,250
3. Partnership Funds	\$0
4. Partnership In-Kind Services Value	\$260,133
5. Estimated Forest Product Value	\$1,056,393
6. Other (specify)	\$0
FY 2011-2019 Total (total of 1-6 above for matching CFLRP request)	\$16,402,104
FY 2011-2019 CFLRP request (must be equal to or less than above total)	\$13,940,434
Funding off NFS lands associated with proposal in FY 2011-2019 (does not count toward funding match from the Collaborative Forested Landscape Restoration Fund)	
Fiscal Year 2011-2019 Funding Type	Dollars Planned
USDI BLM Funds	\$0
USDI (other) Funds	\$0
Other Public Funding	\$0
Private Funding	\$0

Attachment G: Maps

Map 1. The Cumberland River Fire Learning Network Landscape

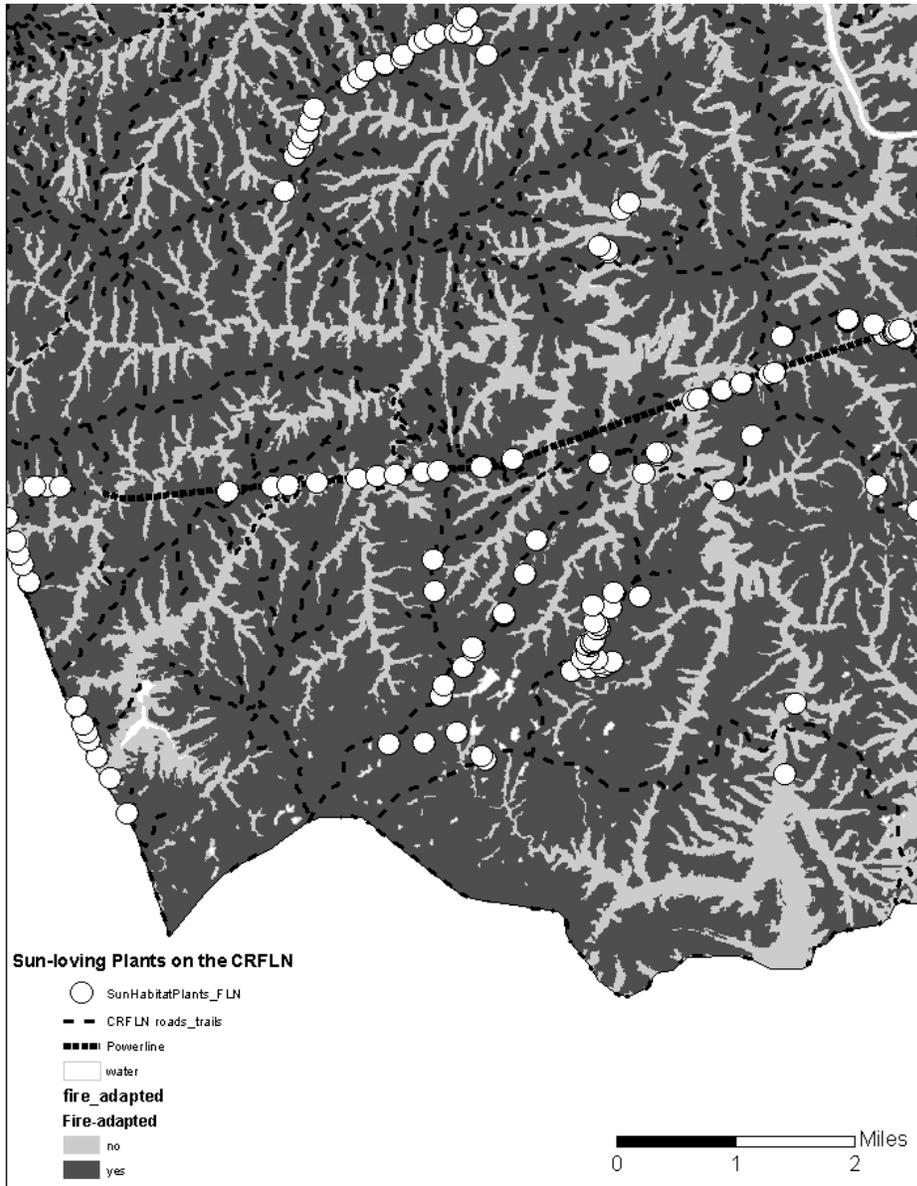


Map 2. Fire-adapted landscapes in the CRFLN



Dark gray areas are the combined fire-adapted ecological zones (dry oak, shortleaf pine – oak, xeric pine – oak, dry – mesic oak). Light gray areas are non-fire adapted ecological zones (mesic, acidic cove, alluvial) or water.

Map 3. Portion of the southwest section of the CRFLN showing current relationship of native sun-loving plants to roads, trails, powerline corridors, and rivers.



All shades of dark gray show areas that support fire-adapted vegetation (dry oak, shortleaf pine – oak, xeric pine – oak, dry – mesic oak). All shades of light gray show areas of non-fire adapted vegetation (mesic, acidic cove, alluvial) or water. Most of the sun-loving plants are naturally associated with woodland, savanna, or prairie. Plants that occur along water courses are those that are able to survive on open scour bars; many are also found in upland sites. Plants plotted include several that are monitored by DBNF and are uncommon on the forest, species that are considered rare on the forest, a Region 8 Regional Forester sensitive species, and some that are

monitored by the state. Many of these species, which are now confined to these corridors, will be lost if habitat isn't conserved or expanded.

Map 4. Potential Vegetation: Ecological zones in the CRFLN (this map only visible in color)

