September 25, 2007

Robinson Forest White Paper[1]

This purpose of this paper is to provide information regarding Robinson Forest, the 14,786 acre research, demonstration, and teaching forest of the University of Kentucky. This white paper focuses on the 10,000 acre main tract where the majority of forest research, demonstration, and teaching occurs (see map).

General Questions
Regarding Management of Robinson Forest and the SMZ Study

Where is Robinson Forest?

It is on the interior rugged section of the Cumberland Plateau near Jackson, Kentucky in Breathitt, Perry, and Knott counties.

What is the Purpose of Robinson Forest?

Robinson Forest was given to the University in trust and is managed to conform to its legal requirements in a manner that is consistent with the spirit of the trust and the goals and objectives of the land grant mission of the University of Kentucky. The trust stipulates that what is now known as Robinson Forest be used "... for the purpose of agricultural experimental work and teaching, and for the practical demonstration of reforestation." It further indicates that the "… proceeds of the sale of said property or any part thereof and the net revenues derived from the operation of said property of the University shall be used to further the purposes of the trust hereinabove defined, and for such other purposes as will tend to the betterment of the people of the mountain region of Kentucky as may be agreed upon by the parties hereto." A quote from Mr. Robinson provides more insight into his intent "… to make the mountain section a more profitable as well as a more comfortable place in which to live and work, and to fit its people to live and do that work." (Smith 1981, Kentucky Agriculture Experiment Station).

Who Makes Decisions Regarding Robinson Forest?

The Board of Trustees has ultimate authority and responsibility for all university-owned property. The Department of Forestry in the College of Agriculture maintains and manages operations at the Forest on a day-to-day basis, within the guidelines and processes approved by the BOT in the 2004 Management Plan.

What is the Objective of the Streamside Management Zone Study?

The study is intended to clarify the timber harvesting practices needed to avoid negative environmental impacts and assist Kentucky forest owners and managers in protecting water quality in rugged terrain. The research is designed to determine the effects of differing amounts of stream protection on water quality and aquatic biota. It is designed to determine if the current streamside management zones (SMZs) that loggers are required to use (see below) are effective and to what degree extra protection is required. This study could impact all logging operations in the state that have streams and drainage channels (over 80 percent). SMZs dictate the width and number of trees that must be

[1] This paper was developed by members of the faculty and professional staff of the Department of Forestry for students of the University of Kentucky. Faculty members involved in the development of this white paper represent a broad range of specialties and interests spanning all aspects of the issues discussed.

maintained around all perennial streams. This project will provide detailed information on this aspect of stream protection. In addition, the research will explore measures that are currently not required to protect headwater ephemeral and intermittent streams. These headwater streams are very important; for every mile of first order perennial streams at Robinson Forest there exist approximately ten miles of ephemeral channels and intermittent streams.

Will the SMZ Study Generate Income for the Project?
No. The Streamside Management Zone study will not receive any funds from harvested timber because it is funded by water quality research funds.

Will the SMZ Study Generate Income for the University?
Yes. After paying for operational costs, anticipated net revenues will be administratively split between University administration and the College of Agriculture. The University portion will be used to support the Robinson Scholars program, and the College of Agriculture's portion will be used to support educational, research, and demonstration programs that are directly associated with Robinson Forest.

Technical Questions
Regarding Management of Robinson Forest and the SMZ Study

Is Robinson Forest Old-Growth?
No. Mowbray and Robinson Lumber harvested all the merchantable timber on Robinson Forest from 1900 – 1920. Corn and other crops were grown on farms that were established in "hollows" during the 1800s and early 1900s. The current forest is about 80-100 years of age. Some consider the youngest old growth in the United States to be 150 years of age. In other instances the 100 year mark is used to define old growth. However, there is more to an old growth designation than simply age. True old-growth forests have certain ecological and structural characteristics such as an abundance of large downed trees, standing snags, cavity trees, light gaps, and characteristic herbaceous and wildlife species. Some areas of the main tract of Robinson Forest possess some of these structural and physical characteristics, but cannot yet be considered old growth. Robinson Forest is best described as a mature forest.

Can Robinson Forest Become Old Growth?
Yes. All of the Forest can become old growth. This can also be said of a number of eastern Kentucky forests ranging from sections of the Daniel Boone National Forest to individual private holdings, contingent upon management consistent with the development of old growth attributes. The least disturbed and most highly protected portion of Robinson Forest is the Buckhorn Watershed (1,550 acres). It has been set aside for passive research, teaching, and demonstration activities and for development into old growth forests in the future. Other areas in the forest have been set aside for long-term hydrologic research (Little Millseat and Falling Rock) and will naturally develop into old growth.

Does Robinson Forest Support Wildlife that is Sensitive or of Interest?
Yes. Because of its large size and unfragmented nature, Robinson Forest supports the full range of neotropical migrant bird species that are expected in this part of North America. Some wildlife species, such as the cerulean warbler and Rafinesque's big-eared bat, have been found at the Forest and have been recommended or are being considered for federal listing under the Endangered Species Act of 1973. The Forest is an important migratory stop-over for birds flying to breeding grounds in Canada or wintering grounds in South America. Robinson Forest also supports a variety of vernal wildflowers including several terrestrial orchids, trilliums, and others typical for the region. Because the Forest is isolated by nearby mining activities from larger forests to the east, it does not support a resident bear population – only the odd wandering male has been documented. The recently introduced elk has been documented in Robinson Forest, but because it is primarily a grazer and browser of early successional woody plants, it spends little time in the mostly closed canopy forest. The University of Kentucky mascot, the wildcat (or bobcat) is a permanent resident of the Forest.

Are there any State-listed Threatened or Endangered Plant Species?
No. Although a number of species have been found that are listed as "uncommon" in Kentucky's flora, no state listed threatened or endangered plant species is known to occur at Robinson Forest.

Are Pre-Historic and Historic Sites Protected?
Yes. Pre-historic sites including rock shelters containing chert factories, and a petroglyph site of aboriginal origin are protected. While homesteads and discarded logging equipment were present when UK acquired the property in 1923, there was no program to maintain or restore them and the majority are now gone. The few historic sites including old logging equipment, farmsteads, and fields have been identified and are considered when planning for research, demonstration, and teaching activities. In some instances research on these sites has been undertaken.

Are the Streams in Robinson Forest Pristine?
No. Streams in Robinson Forest vary in their degree of quality. None are pristine relative to Southern Appalachia standards due primarily to geologic factors and past land use history. Many are of high quality relative to eastern Kentucky standards. All were impacted by past timber harvesting and farming, but have recovered from these perturbations. Weirs for monitoring water quality and quantity were installed on the major streams at the Forest in the early 1970s. Weirs alter the stream continuity within the watersheds and may hinder migration patterns of some fish species. Sediment, nutrient, and carbon transport in these streams are also influenced by the presence of these structures. Data have been collected from these monitored watersheds for about 30 years. The Little Millseat and Falling Rock watersheds are all small reference (control) watersheds of approximately 150 acres with very good long-term water quality. Coles Fork, the largest watershed on the forest (approximately 4,200 acres) has very good water quality and is being continuously monitored. The Clemons Fork watershed (approximately 3,400 acres) is devoted to manipulative hydrologic research, and is the site of the Streamside Management Zone project (see below). Previous experiments on smaller watersheds within the larger Clemons Fork watershed include the aerial application of fertilizer in the 1970s and forestry best management practices studies in the

1980s. The main stem of Clemons Fork has lower water quality than Coles Fork, Little Millseat, or Falling Rock due to changes in water chemistry correlated with activities associated with adjacent surface mining.

Will the Streamside Management Zone Study Impair Streams at Robinson Forest?
The SMZ study is a large one due to the research requirements of the project. Ten relatively small (first order) watersheds of approximately 140 acres will be examined. All of these are contained in the Clemons Fork watershed. Eight of these totaling approximately 1,100 acres will be subjected to treatment (harvesting). The other two will remain untreated. The water and biota from all of these areas have been and will remain under measurement. The area involved in the treatments covers about 30% of the Clemons Fork watershed. All timber harvesting equipment will be monitored using onboard GPS equipment as a part of the research. All timber will be skidded away from the streams and removed from the forest through adjoining lands. No treatments are on the main stem of Clemons Fork. Suspended sediment, water quality, and water quantity effects are predicted to occur in the small watersheds involved in this study and to a significantly lesser degree in the main stem of Clemons Fork. However, due to the size of the treated areas and the nature of the treatments, stream water impacts will be short-term (on the order of less than 5 years) and will not permanently degrade or impair the treated sub-watersheds or the larger Clemons Fork watershed.

Will the Streamside Management Zone Study Impact Terrestrial Ecosystems at Robinson Forest?
Yes. The treatments will impact both plant and animal species. While some species of wildlife will increase due to the treatments (*e.g.*, ruffed grouse, neotropical migratory birds requiring early successional habitat such as the indigo bunting, and some reptiles), others requiring interior forest habitat may be reduced or eliminated in the treated areas. Refugia (suitable habitats) for these species exist in untreated areas adjacent to each of the treated watersheds. Open areas will cause fragmentation and can lead to an increase in the number of generalist and predatory species (*e.g.* cowbirds responsible for nest parasitism). While the forest is expected to recover its interior forest conditions, it will be several decades before this occurs. A few species that have been impacted will start to move back into the treated areas after canopy closure around 10 years post harvest. Some plant species, such as bloodroot, may take considerably longer to re-colonize the treated areas. It is possible that some species may not recolonize the treated areas. However, the species that are now present recolonized or survived after the widespread logging that occurred in the early 1900s. It is possible that climate change and other factors that are different today (*i.e.* an introduced elk herd, more numerous invasive and exotic species, reduction in wildfire, elimination of grazing and farming), will result in a different successional trajectory. However, the area treated will regenerate a forest similar in tree species composition to the current forest especially if attention is given to ensuring the natural regeneration of the area. The treatments involving timber harvest will create haul roads and skid trails; disturbances such as these are typical colonization sites for invasive plant species. The invasion by exotic species is one of the most important issues relative to the protection of biodiversity and ecosystem stability at Robinson Forest. All roads and trails in treated watersheds have been intensively surveyed for invasive species. Further, a network of transects and survey plots have been established throughout the watersheds and searched for invasive plants. This network will be surveyed for the presence of

invasive plants at periodic intervals after the treatment. These data will be used to develop spatial models to help forest managers and owners better predict and protect their forests from invasion. Approximately $66,000 has been set aside for the control or removal of undesirable plant species. Other funds will be requested if needed for this purpose.

What Are the Current Plans for Robinson Forest?

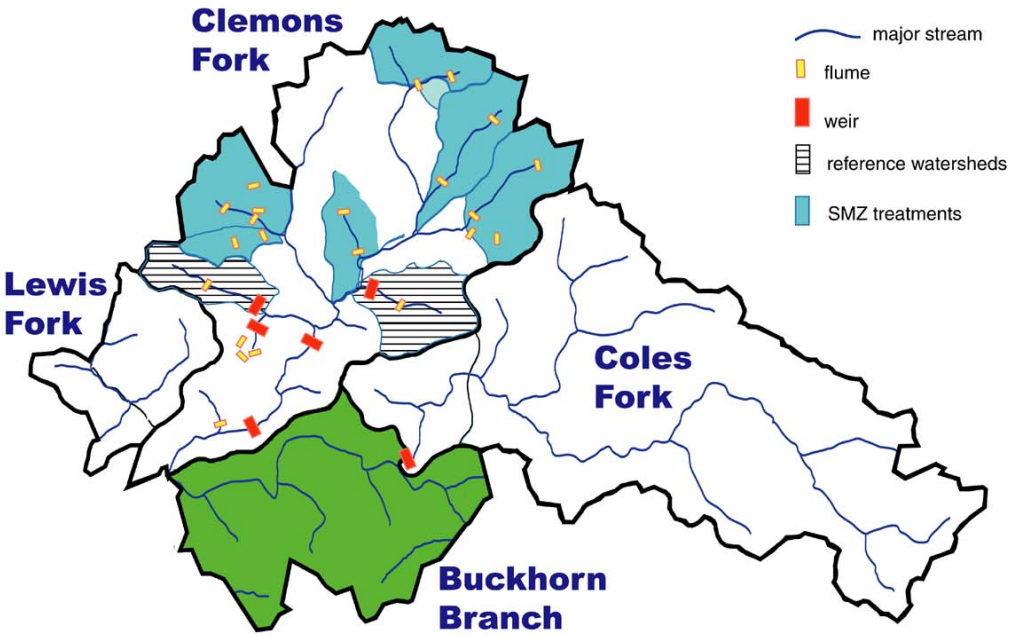
Robinson Forest was conveyed to UK in trust for the purposes of agricultural experimental work, teaching, and the demonstration of reforestation. The Forest is currently managed for and is home to a wide range of research, demonstration, and teaching activities, including (but not limited to) active and passive ecologic and hydrologic studies, continued monitoring of undisturbed reference watersheds, silvicultural research and demonstration, development of old growth areas, and formal teaching and continuing education activities. Currently the Forest is third-party certified under the American Tree Farm System. Planning is on-going for global green certification of the Forest through the Forest Stewardship Council and the Rainforest Alliance's SmartWood Program as well as the Sustainable Forestry Initiative.

What are the Benefits from the SMZ Research?

The SMZ project will ultimately provide information pertaining to the conservation of soil and water resources, and associated biota, in areas where forest harvesting occurs. In Kentucky alone, there are 1.25 million acres of oak-hickory forests that are of a similar age class as those found in Robinson Forest (70-90 years). In addition, the State also contains 6.4 million acres of this forest type between the age of 40 and 70 years that is maturing and will be harvested to some extent in the near future. Finally, results from this study could have direct impacts on how those future harvests are implemented (see Objectives of the SMZ Study above). The research is of direct interest to the Kentucky Forestry Best Management Practices Board; the Board has reviewed the research sites and has been updated on the project as it has progressed. The Board and the Agriculture Water Quality Authority will review results of the study to determine if current SMZ standards are adequate to protect forest stream quality. If the research indicates that a change in SMZs is necessary for protection of streams in Kentucky, the groups have the capacity to change the requirements and, thus, change the protection afforded to all streams in Kentucky where timber harvest can occur.

Requirements of Logging in Kentucky Relative to Water Quality

The Kentucky Forest Conservation Act of 1998 requires that all commercial timber harvests (defined as those harvests conducted by loggers and landowners that hire help to do their own logging) since 2000 are required to have a Kentucky Master Logger on-site and in charge of the operation and are required to use Best Management Practices for Water Quality Management including the use of SMZs. Recent research information indicates a 78 percent compliance rate with SMZ requirements. The Kentucky Division of Forestry inspects logging operations for these requirements. To-date over 45,000 inspections have been completed at the rate of approximately 6,500 per year. If loggers are in violation they are provided an opportunity to correct the problem. If not, they are subject to fines and designation as a Bad Actor.


Clemons
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