

Issue 4: Forest Management

Forests can provide an abundance of clean air and water, sustainably harvested wood, a diversity of wildlife habitat, and enhanced recreation and aesthetics with comprehensive forest management. In urban areas, managed forests mitigate temperature extremes, regulate stormwater, control noise pollution, enhance local economies, improve healthy wildlife populations, increase rainfall infiltration/groundwater recharge, improve mental and physical health, mitigate the heat island effect, and address tree canopy issues.

Despite the benefits provided by managed forests, forest management in rural and urban areas is not a common practice throughout Kentucky. Compared to a national average of 57%, private individuals own 88% of Kentucky’s forest resources as shown in Figure 22.4 Of the remaining forestland, 10% is owned by federal ownership, and 2% is owned by state and local agencies.

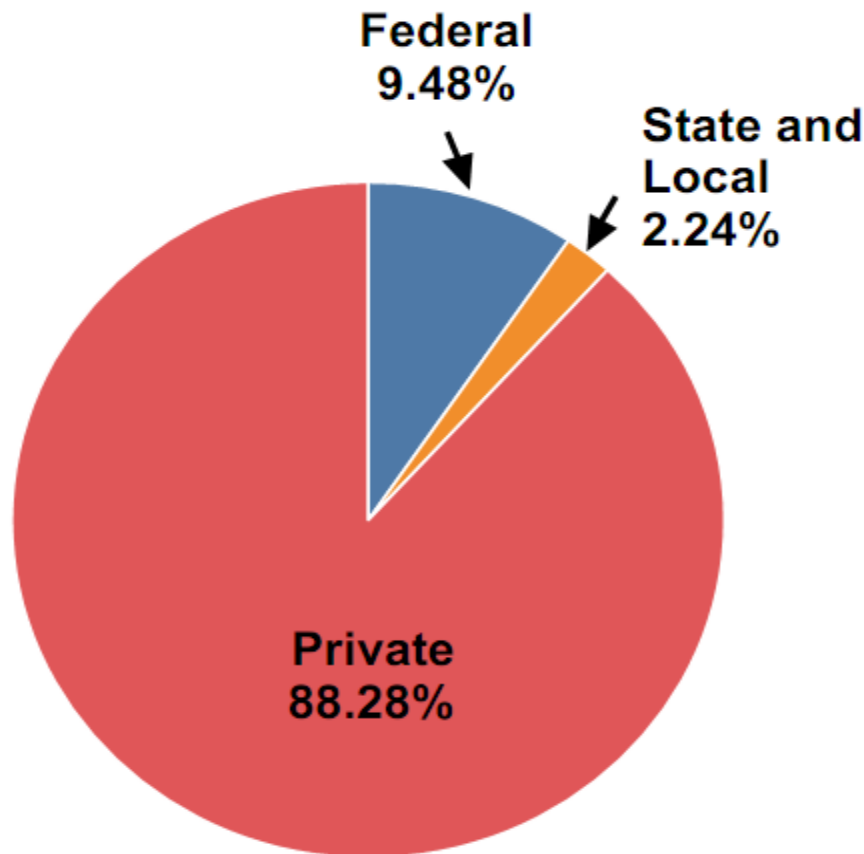


FIGURE 22 – KENTUCKY FOREST OWNERSHIP

As shown in Figure 23, private family-forest owners have many reasons for ownership with scenic beauty and natural diversity being amongst the top reasons cited. Interestingly, the reason for owning the land has little influence on whether or not timber harvesting is conducted. As shown in Figure 24, the reasons for timber harvesting are also similar regardless of the reason for ownership.

Typically, timber harvests are conducted because trees are mature, owners need money or wood for personal use, natural catastrophes have damaged trees, or in order to improve the quality of the remaining timber. Rarely is the harvest conducted because of a forest management plan, which indicates that efforts to increase public awareness of the importance of proper forest management remain a significant obstacle in Kentucky.

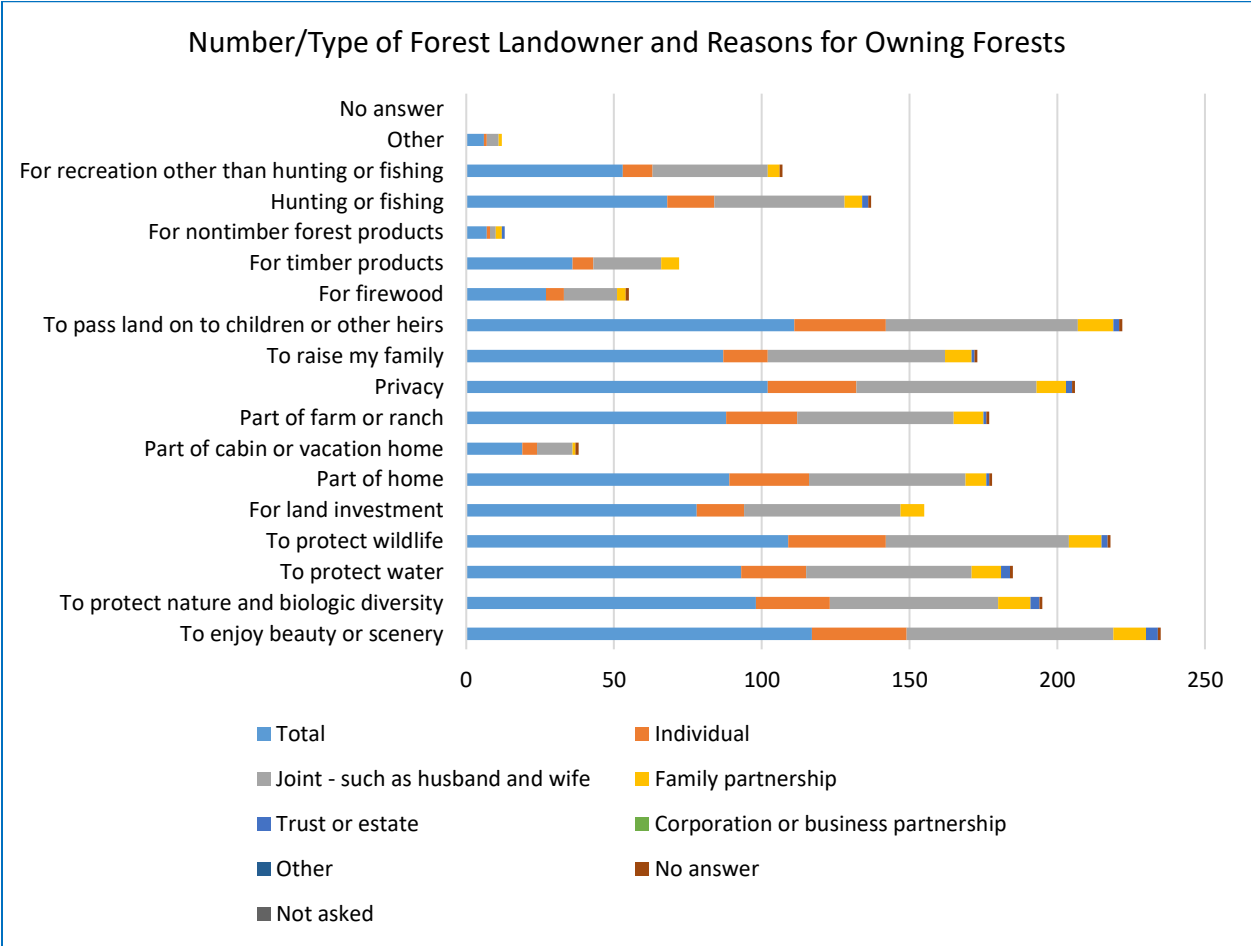


FIGURE 23 – KY PRIVATE FAMILY FOREST LANDOWNER REASONS FOR OWNING FORESTS

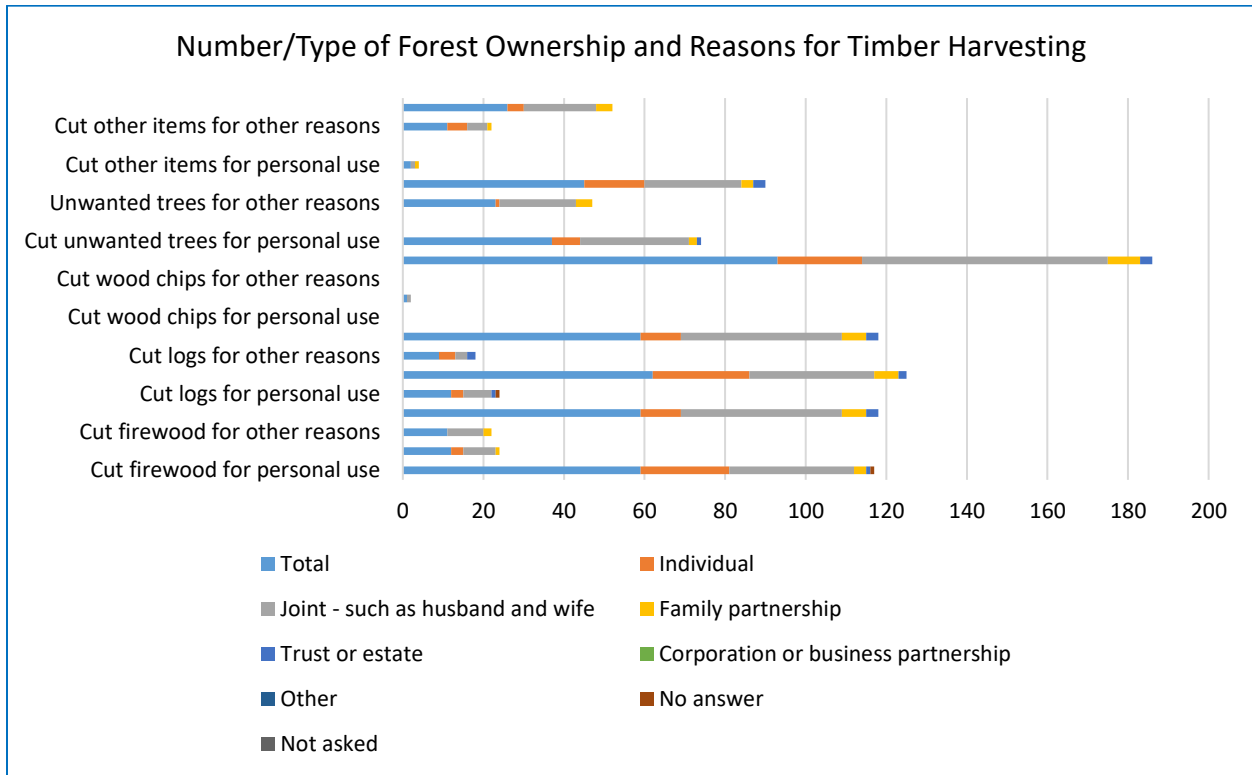


FIGURE 24 – KY PRIVATE FAMILY FOREST LANDOWNER REASONS FOR TIMBER HARVESTING

A. Current Status of Forest Management in Kentucky

Forest management can be conducted in many different ways according to the desired use of the land. In order to address how forests are managed in Kentucky, these management types have been divided into six categories for this report: “hands-off” management, preservation management, recreational management, wildlife management, sustainable forest management, and urban and community forest management. While these management types have been divided for ease of discussion, some areas may employ multiple management types in order to accomplish their objectives.

Forest management can occur on a landscape, stand, or individual tree level. Although landscape level management is desired, management of rural forested areas typically occurs at the stand-level in Kentucky due to ownership patterns. Stands are defined by human disturbance or by common species composition and structure. Stand-level management can be applied to many desired uses including wildlife, environmental concerns, or optimal tree production. However, management can also occur on the individual tree-level. Urban and community forest management ranges from management of individual street trees to city-wide tree canopy and heat island assessments. Many opportunities exist to expand urban forest management to the landscape level, which may include watershed-based planning, air quality mitigation, and other goals.

1. “Hands-Off” Management

Many Kentuckians support a “hands-off” approach to management. While some promote this approach out of a desire to allow forest succession to progress unhindered, many do so simply out of convenience and passive neglect. To those who see the “hands-off” approach as an attractive conservation strategy, the

Southern Forest Resource Assessment states that removal of all human disturbances would have profound effects on the region's biota. Certainly, “hands-off” management in one area will not necessarily counter-balance intensive management elsewhere. To avoid regional population declines and species losses, land managers must have the flexibility to promote active management. This flexibility should not extend to the other extreme of promoting intensive forestry for wildlife conservation, but it does suggest that some level of active management will be necessary to maintain many still extant but imperiled species, including many found on present or proposed set-aside lands. Even when landowners are opposed to timber harvesting or silvicultural management, active planning and management including inventories and invasive species monitoring, is recommended to promote the best use of the resource. However, based on the National Woodland Owner’s Survey, many of Kentucky’s private family forest landowners plan to follow the “hands-off” approach to management Figure 25.⁷¹

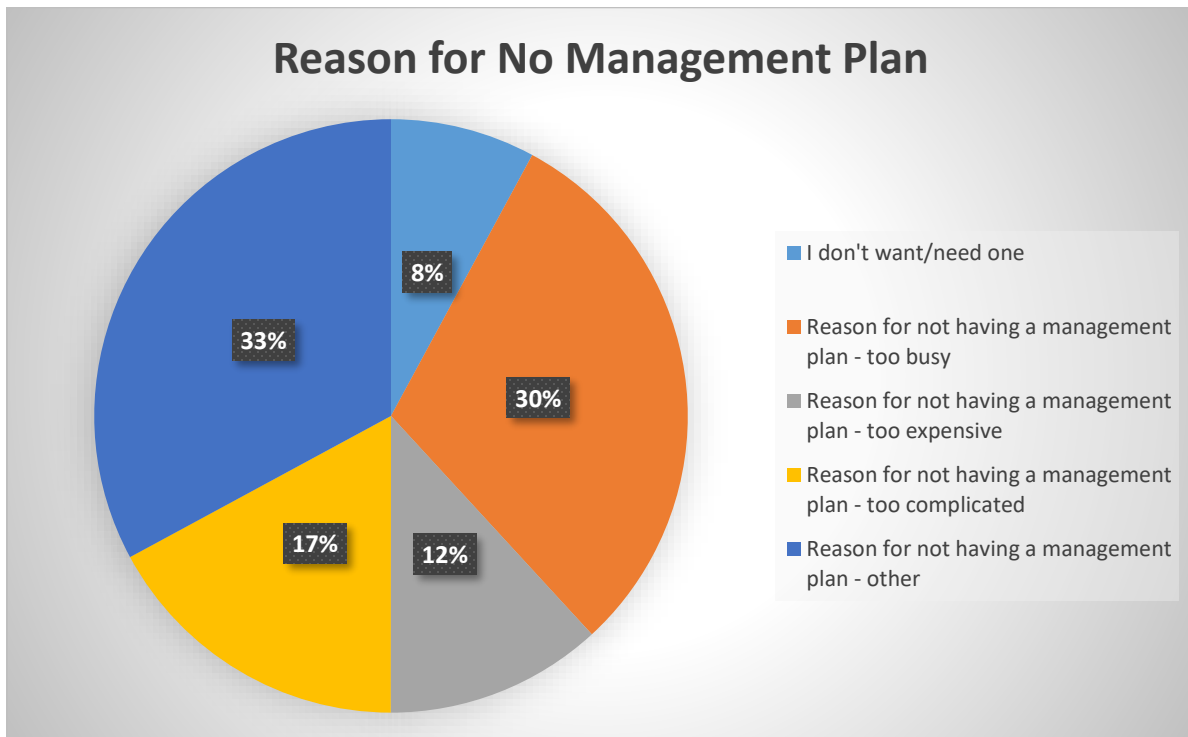


FIGURE 25 – REASONS FOR NO MANAGEMENT PLAN

2. **Preservation Management**

Preservation management is an active approach geared toward protecting unique and important resources and can include surveys of natural or historical resources, restoration of natural communities, enhancement of resources through invasive species removal, and ongoing maintenance.

The Office of Kentucky Nature Preserves (OKNP) protects and manages a diverse system of 41 state nature preserves and six state natural areas across the Commonwealth, from Mississippi River wetlands to Pine Mountain on the Virginia border, totaling over 25,000 acres. Activities center around several key focus areas: natural community restoration and management; rare species protection and enhancement; research and education; hiking trail maintenance; and the Registered Natural Areas Program. In areas with old-growth forest, rare or endangered species, or other unique natural resources, preservation management regimes

are used to protect these resources for future generations.

3. Recreational Management

Forest recreational use is widespread throughout Kentucky. Forest management may be focused on accommodating many types of recreation and minimizing the impacts of such use. Some active recreational uses, such as horseback and ATV riding, can be in competition with one another for trail utilization. Some passive recreational activities such as bird watching can compete against other interests. Therefore, managing for recreational use often involves active planning, proper trail design, and area use designations. Recreational trails also require regular maintenance due to the impacts of erosion and injury to surrounding vegetation caused by improper use, the spread of invasive species along the corridors, hazard tree removal, and maintenance of bridges or other human-made structures. Recreational managers may also enhance the aesthetic qualities of forests by planting along corridors or providing educational opportunities through interpretive signage. As the recreational use of Kentucky's forests expand, the need for increased management will also escalate.

4. Wildlife Management

Active forest management for wildlife in Kentucky is very common. The economic benefits for those willing to lease land for hunting or other recreational activities, aid in this popularity. Game species such as white-tailed deer, turkey, bobwhite quail, and waterfowl are primary management objectives. Forest management can be augmented with techniques to directly enhance wildlife habitat for these game species, and at the same time, non-game species. Wildlife management can be easily incorporated into existing forest management plans.

Wildlife can provide many aesthetic and recreational benefits to landowners such as wildlife viewing, hunting, and fishing. Some birds disperse acorns and other seeds while others consume insects that would otherwise damage trees. Bats reduce mosquito populations. Earthworms help to turn over the soil and recycle nutrients. Numerous other complex relationships between wildlife are present in forests.

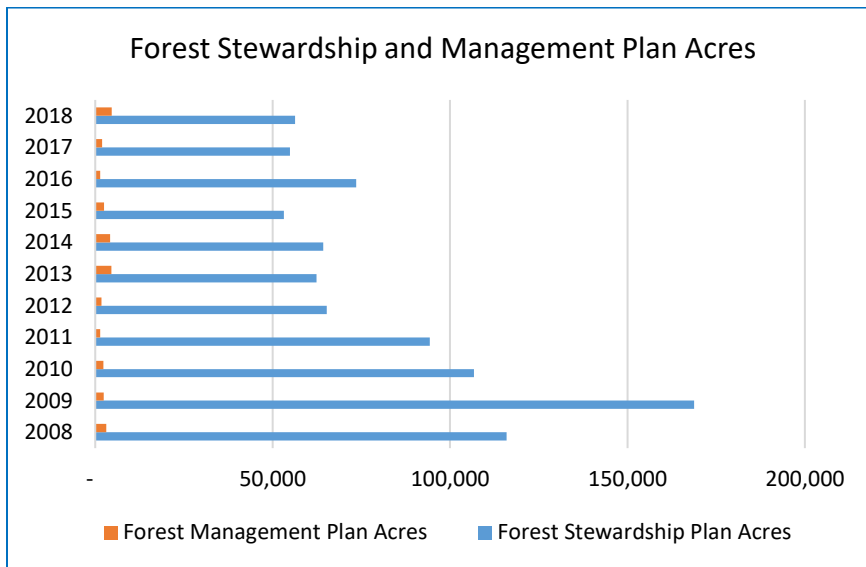
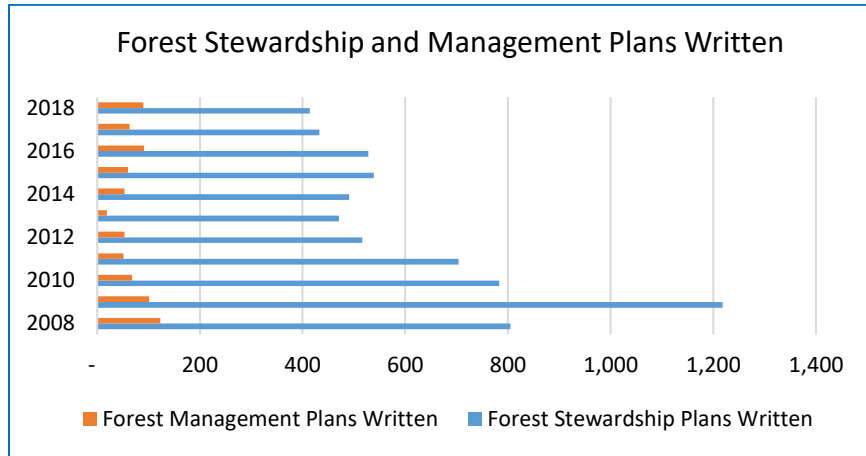
Specific actions to create a variety of wildlife habitat primarily relate to a diversity of timber harvesting. Examples of specific actions include leaving mature trees in a stand to enhance structural diversity, retaining a variety of species/age-structure trees, clearcutting in small areas, and retention of snags (standing dead trees) to provide nesting habitat. Additional wildlife benefits may be obtained with natural regeneration techniques such as seed tree cuts and shelterwoods, and with management practices such as mid-rotation thinning and prescribed burning. Management strategies such as these are commonplace to promote habitat for threatened and endangered federal and state listed species. In Kentucky, the most notable example is the Indiana bat.

5. Sustainable Forest Management

Sustainable forest management (SFM) can be described as the attainment of balance between society's increasing demands for forest products and benefits, and the conservation and maintenance of forest health and diversity. In Kentucky, SFM is the primary approach advocated by the KDF to assist private forest landowners, and is utilized on state-managed forestlands.

The Kentucky Forest Stewardship Program is one avenue by which the KDF promotes SFM to private forest owners. The service is provided for free to private forest owners who own ten or more acres of forestland and desire proper timber production, improved wildlife habitat, clean water, scenic beauty, or improved

recreational use. The distribution of Forest Stewardship and Forest Management plans and associated plan acres are shown on Figures 26A and 26B.



FIGURES 26A AND 26B – EXISTING FOREST STEWARDSHIP PLANS AND ACRES

State forests are also managed by the KDF and its partners using the sustainable management approach to ensure biological diversity and sustainable use. They are managed as working forests, and education demonstration areas exist in each. Figure 27 shows the location of the ten current state forests.

Kentucky's State Forests

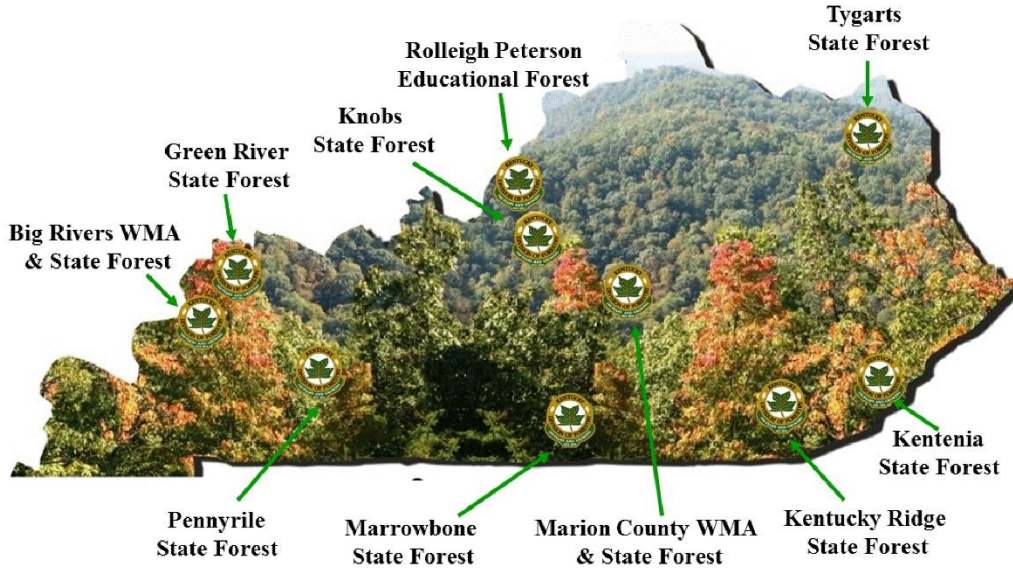


FIGURE 27 – KENTUCKY STATE FORESTS

6. *Urban and Community Forest Management*

Urban forests encompass all of the trees in a community. The numerous benefits provided by urban forests can be enhanced and sustained through active management, effective planning and ordinance development, strong municipal leadership, and community involvement.

In larger urban areas as well as smaller communities, trees help reduce temperature extremes and noise levels, conserve energy, improve mental and physical health, enhance economic development, increase property values, slow traffic patterns, improve air and water quality, and help mitigate stormwater runoff. Trees also add character to cities and towns by providing aesthetic buffers, softening the outline of human-made structures, and providing space definition and landscape continuity. Trees create feelings of relaxation and well-being, provide privacy and a place for recreation, provide a sense of solitude and security, enhance student's focus, increase workplace satisfaction and job performance, and have even been shown to shorten post-operative hospital stays when patients are given room views of trees and open spaces. Despite these advantages, communities suffer from improperly planted, poorly maintained, or neglected trees. Often urban forestry objectives are low priority in smaller communities and are unfunded.

The Kentucky Urban and Community Forestry Council, whose mission is to improve urban forest management, serves in an advisory role to the KDF on urban forestry-related issues throughout the state. The Council supports urban forestry work by providing a forum of learning and information distribution and by participating in active research to determine the most effective ways to manage urban forests.

In several larger Kentucky communities, cities have carried out tree canopy analyses to determine overall canopy coverage, areas most in need of tree canopy, and strategies for addressing low tree canopy areas. Invasive insects such as the Emerald Ash Borer have had a profound impact on tree canopy in Kentucky communities over the past ten years, and a tree canopy analysis can help prioritize planning, planting needs and opportunities. Additionally, Louisville conducted a heat island study to determine the dangers facing the city as a result of the urban heat island, and actions that the city, residents, and businesses can take to mitigate urban heat.

Non-profit organizations, educational institutions, and other urban forestry-related entities play a key role in addressing tree canopy issues, improving management of our urban forests, and engaging communities. Trees Louisville, Inc. and Louisville Grows are well-established organizations that service the Jefferson County area and work directly with public schools and communities. Trees Lexington is a newly established organization addressing Lexington's tree canopy issues. The Urban Forest Initiative (UFI), which is part of the University of Kentucky, is working to elevate the perception, value, and function of the urban forest on UK's campus, in Lexington, and in other areas of Kentucky. The Northern Kentucky Urban and Community Forestry Council (NKUCFC) works in northern Kentucky to improve the management of trees and greenspaces for the protection and enhancement for future generations. The Nature Conservancy of Kentucky, in cooperation with University of Louisville, the National Institutes for Health, Louisville Metro Government and other partners is carrying out the Green Heart project in Louisville, which examines the impact of urban greening on human health. Additionally, tree boards throughout the state play an important role in addressing communities' needs by working directly with municipal governments and local partners.

The Arbor Day Foundation's Tree City USA®, Tree Campus USA®, and Tree Line USA® programs, in cooperation with the USFS, the National Association of State Foresters, and state forestry agencies, provides direction, technical assistance, public attention, and national recognition for communities, colleges, and utilities that manage their urban forests and public trees. Communities, colleges, and utilities that participate in these certification programs follow a management framework to enhance, expand, and protect trees.

B. Direct Threats

While each of the forest health-related threats are also threats to forest management, forest management itself is threatened by the fact that management in the predominantly privately-owned forests of Kentucky (and the Southeast in general) is not commonplace. Part of this problem may also be a lack of awareness about the services available from the KDF and the Kentucky Association of Consulting Foresters. Many of the private landowners do not understand long-term investment opportunities associated with timber value and some may not understand that the timber has any value at all, particularly on small lots. Even when private landowners harvest their timber they seldom request the advice and services of consulting foresters or the KDF. Therefore, the only way to reach them may be through outreach programs, public notices and direct contact. Many such programs exist, but may require targeted expansion to particular regions, such as eastern Kentucky. In addition, the capacity reduction at the KDF has lengthened the time required to prepare a management plan, which may dissuade some forest landowners.

Others may know about the services available, but may not be interested due to the risks. Natural risks such as wildfire, wind damage, ice damage, and drought can damage the forest at any given time during the rotational period, which may range up to 80 to 100 years. Insects, diseases and non-native invasive plant species may also be expensive to manage and may result in substantial losses to the forest.

The risk of decreasing timber values may also deter landowners from management. The wood industry that produces products such as cabinets, hardwood flooring, millwork, cooperage, dimension components, hardwood pallets, crossties, etc., both in Kentucky and nationally, has experienced market fluctuations. The health of the secondary wood industry is directly connected to the national economy and specifically to housing starts and remodeling, for which many of the products produced by the industry in Kentucky are manufactured.

Others may be affected by the long-term commitment that forest management requires. Forest management is labor intensive and can be expensive. Many private forest landowners in Kentucky are 55 years of age or older. Many landowners may not be able to physically manage the manual labor or find help willing to aid in the work. The lack of market for woody debris and low quality trees makes such work undesirable for commercial loggers. Investments made today by landowners may not be recovered for several years and may not be recovered by the current landowner of the property. Considering the risks involved in long-term forest management previously discussed, some landowners are just not willing to invest the time and expense required. Although several cost-share programs are available to landowners, there still seems to be a lack of incentives attractive enough to encourage them to pursue forest management opportunities. Distance from the property may also be factor.

Other possible factors responsible for a lack of management include:

- Disconnect from the forests
- Multiple owners with competing interests
- Public perception with “ugly” harvesting
- Mistrust of government / technical advice / funding
- General lack of priority for landowners
- Change in demographics from rural to urban society with diverse values

C. Opportunities

1. Certification Programs

Certification programs promoting sustainable forest management continue to be an opportunity for Kentucky forest landowners to gain recognition and provide an avenue of certified forest products into the marketplace locally, regionally and nationally. Management plans developed by the Kentucky Division of Forestry and forestry consultants play a very integral part in all certification programs within the state.

a. American Tree Farm System® (ATFS)

ATFS certifies land management to the American Forest Foundation’s Standards of Sustainability. Under these standards, private forest landowners must develop a management plan and pass an inspection by an ATFS inspecting forester.⁷² As of 2019, the Kentucky state tree farm program had 619 certified tree farms encompassing 144,748 acres. ATFS reinforces its commitment to forest conservation through continuing education opportunities and outreach activities. ATFS certification is currently free for landowners.

b. Sustainable Forestry Initiative® (SFI)

Sustainable Forestry Initiative® (SFI) Inc. is a fully independent, non-profit organization dedicated to promoting sustainable forest management. Both SFI and ATFS are part of the international non-profit, non-governmental organization, *Programme for the Endorsement of Forest Certification* (PEFC). SFI works with

conservation groups, local communities, resource professionals, landowners, and countless other organizations and individuals who share its passion for responsible forest management. The SFI forest certification standard is based on principles that promote sustainable forest management, including measures to protect water quality, biodiversity, wildlife habitat, species at risk, and forests with exceptional conservation value.

The Kentucky SFI Committee is a subcommittee of the Kentucky Forest Industries Association (KFIA), and hosts an open meeting at the KFIA annual meeting to discuss on-going projects and to provide a general program update. The SFI committee has been a valuable financial sponsor and supporter of certifying Kentucky state forests and the KDF is a member of the committee.

c. The Forest Stewardship Council (FSC)

Forest Stewardship Council is a non-profit organization devoted to encouraging the responsible management of the world's forests. FSC sets high standards that ensure forestry is practiced in an environmentally responsible, socially beneficial, and economically viable way. Landowners and companies that sell timber or forest products seek certification as a way to verify to consumers that they have practiced forestry consistent with FSC standards. Independent certification organizations are accredited by FSC to carry out assessments of forest management to determine if standards have been met. These certifiers also verify that companies claiming to sell FSC certified products have tracked their supply back to FSC certified sources. This chain of custody certification assures that consumers can trust the FSC label.

FSC's model of certification allows products that flow from certified forests to enter the marketplace with a credential that is unique. Any FSC-labeled product can be traced back to a certified source. This aspect of the system is the basis for any credible certification system and is the link between consumer preference and responsible, on the ground forest management.

FSC certification within Kentucky has been accomplished by group certifiers under the auspices of the University of Kentucky, Center for Forest and Wood Certification, (CFWC). The CFWC reduces landowner costs by participating in group certification and also by having their forestland "dual" certified by FSC, ATFS and SFI.

2. Urban Forestry Programs

Urban forests provide economic, environmental, human health, and social benefits to communities. The KDF's urban and community forestry program helps communities develop long-term, self-sustaining programs to create stronger, healthier, more economically viable, and safer communities across Kentucky. These goals are accomplished through:

- Technical assistance to municipalities, nonprofit organizations, tree boards, educational institutions, and private landowners;
- Support for green infrastructure projects, community programs, and other urban and community forestry work through grant funding;
- Educational opportunities and support for the KDF field staff, communities, and institutions and related programs and events;
- Administration of Arbor Day Foundation certification programs.

a. Tree City USA®, Tree Campus USA®, and Tree Line USA® Programs

The Arbor Day Foundation's Tree City USA®, Tree Campus USA®, and Tree Line USA® programs,

administered by the KDF, provide a framework for communities, colleges and utility companies to manage and expand their public trees. Tree City USA® program provides direction, assistance and national recognition for communities that have a sustainable urban forestry program. Tree City USA® communities realize numerous benefits:

- Framework for action – provides direction for urban forestry programs.
- Financial benefits – reduced costs for energy and stormwater management, boosts property values.
- Education – connects communities to state forestry partners, organizations and individuals.
- Community pride – recognition promotes tree care, volunteer opportunities, and builds stronger ties in neighborhoods.
- Publicity – the Tree City USA® award and the celebration of Arbor Day show recognition for the valuable work carried out in the community.

The city of Lexington has the longest active enrollment in the Tree City USA® program in Kentucky totaling 31 years. Currently, 38 communities are recognized as a Tree City USA®.

The Tree Campus USA® program recognizes colleges and universities that use effective tree management programs, connect with the community to foster healthy urban forests, and engage the student body in campus urban forestry projects. To be recognized as a Tree Campus USA®, colleges must have a campus tree advisory committee, a tree care plan, a tree program with dedicated annual expenditures, an Arbor Day observance or event, and provide a service learning project according to the program standards. Currently, 11 campuses are recognized as a Tree Campus USA®.

The Tree Line USA® program recognizes utility companies that focus on best practices of quality tree care, annual worker training, and tree planting and education. Currently, three utility companies are recognized as a Tree Line USA®.

b. Arbor Days

Kentucky celebrated its 123rd Arbor Day in 2019. County Judge Executives across the Commonwealth signed proclamations for Arbor Day. A total of 199,740 tree seedlings were sold and distributed for Arbor Day and other spring events in 2019.

c. Community-Based Reforestation

Annually, three large community-based reforestation events occur in Kentucky. These events focus on expanding urban forests and protecting waterways through community tree planting, education, and improving the environment, economy, and quality of life in the region.

- Reforest the Bluegrass – 20th year in Lexington, where over 1,000 volunteers planted 8,000 trees.
- Reforest Northern Kentucky – 13th year in northern Kentucky, where 200 volunteers planted 2,000 trees.
- Reforest Frankfort – 11th year in Frankfort, where 800 volunteers planted 1,200 trees.

3. Cost Share and Grant Programs

The KDF partners with a variety of federal and state cost-share programs in order to help landowners finance the implementation of forest management practices. Table 22 lists some of the more common programs and their funding sources.

The Kentucky Heritage Land Conservation Fund (HLCF) also provides a source of funding for land

preservation and conservation.⁷³ The HLCF funding is generated through the Nature License Plate, unmined minerals tax, and environmental fines. Access to the HLCF is focused on:

- Natural areas that possess unique features such as habitat for rare and endangered species
- Areas important to migratory birds
- Areas that perform important natural functions that are subject to alteration or loss
- Areas to be preserved in their natural state for public use, outdoor recreation and education.

These funds are distributed 50% to local governments, colleges, universities, and other agencies, 10% to the KDFWR, 10% to the Department of Parks, 10% to KSNPC, 10% to the Kentucky Wild Rivers Program, and 10% to the KDF.

Although many such cost-share programs are available, they often require a Forest Stewardship Plan in order to receive the funding. The KDF currently lacks the number of foresters necessary to meet the increased public demand for providing stewardship and management plans.

TABLE 2 – COMMON COST-SHARE PROGRAMS FOR FORESTRY PRACTICES

COST-SHARE PROGRAM	PROGRAM OBJECTIVE	APPLICABILITY AND RATES
Conservation Reserve Program (CRP)	Restore riparian corridors in crop and pastureland; remove highly erodible cropland from production	50% over 10 to 15 years but with an annual rental payment based on site productivity
Environmental Quality Incentives Program (EQIP)	Promote agricultural production, forest management, and environmental quality to optimize environmental benefits	Incentive payments available to complete conservation improvements in 1 to 10 year contracts
Healthy Forest Reserve Program	Easement program to restore, enhance, and protect forest ecosystem functions	30-year contracts and 10-year cost share agreements; restricted to Cumberland River Basin Watershed
Conservation Stewardship Program	Conserve and enhance soil, water, air, and related natural resources	Annual payments on 5 year contracts for new and existing activities

4. Economic Incentives

Economic incentives are often the easiest way to promote new ideas. Due to the financial significance of forest-related products, Kentucky stands to benefit greatly from sustainable management. Traditionally, wood products have stimulated forest management, and practices such as agroforestry provide alternative ways to produce revenue on forestland. Currently, many policies are being discussed and developed nationally regarding carbon sequestration and biofuels for energy.

a. Wood Products

The U.S. is the world's leading producer of lumber and wood products used in residential construction, and in commercial wood products such as furniture and containers. Nationally, Kentucky continues to fluctuate between the third and fourth largest hardwood lumber producing state. As of 2019, Kentucky' forest economy contributes \$13.5M to the Commonwealth's economy when all direct, indirect, and induced benefits are included. Forest product industries are found within 113 of Kentucky's 120 total counties⁸.

Urban wood utilization provides municipalities and communities with an opportunity to reduce tree removal expenses to the landfill, especially after catastrophic mortality resulting from insect damage to community and street trees. Both traditional and local niche wood markets can also capitalize on urban wood utilization after windstorms or tornadoes, aiding communities in reducing clean-up costs and lessening impacts on local landfills. Communities such as Lexington, Louisville, and northern Kentucky have shown some interest in utilizing their hazard trees after insect infestation and storm related events into wood products in addition to providing mulch. Some loggers in the interface areas have shown interest in working with local tree service companies to salvage urban trees and the interest is expected to continue to increase. In some interface areas of the state, it is not uncommon for homeowners (hobbyists) or larger landowners to own and operate portable sawmills which is ideal to utilize urban wood.

Non-timber forest products (NTFP) derived from the forest include ginseng (most valuable, with annual harvests of several million dollars), bee products, native and exotic mushrooms, maple syrup, craft materials, fence posts, and fuel wood are examples of additional economic opportunities. A 2016, University of Kentucky, College of Agriculture publication on Ginseng by Cheryl Kaiser and Matt Ernst stated Kentucky led the nation in wild ginseng production. At that time Kentucky was one of 19 states with an approved wild ginseng export program. During the 2019-2020 ginseng season in Kentucky, state agriculture records have 95 individuals registered with a continued interest in ginseng harvest within the forests of the state.

b. Biofuels

Wood is a renewable resource that can be stored in various forms and is available in most of the U.S. Biomass is a term used to describe plant materials, especially those that can be converted to some form of energy or fuel. Biofuels (fuels from biomass) are attractive sources of energy because they are renewable. Biofuels are considered carbon-neutral which means that the carbon released when these materials are used for energy is absorbed at about the same rate by the plant materials grown to replace what initially was used.

The KDF has supported past forest biomass utilization research and efforts through membership of the “Statewide Wood Energy Team” (SWET) coordinated through the state Office of Energy Policy. Combined Heat and Power (CHP) development utilizing forest and industry residue in eastern Kentucky has been a focus with researchers of the University of Kentucky. Firing woody biomass with coal and other additives is also being researched and may have significant future implications upon the state forestry sector.

Research of sustainable harvesting techniques is particularly important due to the increased risk of soil erosion and impacts to water quality, as well as threats to forest communities. In preparation of the utilization of woody biomass into the future and protection of forest sustainability, the KDF formulated “**Recommendations for the Harvesting of Woody Biomass**” (2011). Development of woody biomass products is forecasted to provide future jobs and income, decrease energy costs, and provide landowners an opportunity to grow trees on a short rotation.

c. Agroforestry

Agroforestry is an integrated agricultural method that employs the interactive benefits of combining trees and shrubs with crops and/or livestock. It combines agricultural and forestry technologies to create more diverse, productive, profitable, healthy, and sustainable land use systems. Agroforestry provides many livelihood and environmental benefits, including:

- Enriching the asset base of poor households with farm-grown trees
- Enhancing soil fertility and livestock productivity on farms

- Linking economically challenged households to markets for high-value fruits, oils, cash crops and medicines
- Balancing improved productivity with the sustainable management of natural resources
- Maintaining or enhancing the supply of environmental services in agricultural landscapes, for water, soil health, carbon sequestration and biodiversity
- Some of the under-utilized agroforestry practice opportunities in Kentucky include managing for water quality via riparian plantings, (the most prevalent method), shelterbelts, windbreaks, silvopasturing systems and producing nut tree orchards in coordination with grazing opportunities. With nearly half of Kentucky's land base in agriculture, there exists a tremendous opportunity to promote agroforestry and its benefits to traditional landowners managing annual crops, and livestock.

d. Carbon Sequestration and Markets

The demand for carbon marketing has fluctuated over the last decade due to international, national, and state politics related to the Climate Action Plan, cap and trade legislation proposals, and the repeal of the 2017 Clean Power Plan. Recently, California's cap and trade legislation, along with increased interest in Oregon, have provided a catalyst of renewed interest by Kentucky forestland owners to participate in their carbon offset projects. Currently, three major carbon registries exist within the US: the **Climate Action Reserve Registry**, the **American Carbon Registry**, and the **Verra**. In 2021, the airline industry has plans to utilize the **Corsia** Registry (currently in development) to substitute the current taxing scheme of international flights being taxed differently between destination points. In an effort to treat all airlines fairly, the plan is to utilize the carbon-offset market uniformly over all international airspace to compensate for the taxing irregularities encountered between countries.

The Kentucky Chapter of the Nature Conservancy, which promotes the TNC's Working Woodlands Carbon Program, estimates approximately 170,000 acres of Kentucky forestland have carbon projects by private developers, (such as TIMO's), and other aggregators, under the California regulatory market as "Improved Forest Management" projects. There also exists to a much lesser extent, "volunteer" market carbon projects which are less financially lucrative than the "regulatory" markets. It is unknown how many acres of Kentucky forests are included within that market category. Overall, demand for forest carbon credits have been increasing, and projections suggest this demand will continue to rise in the near future.

To determine the extent and general location of forestry carbon marketing within the state, three different carbon registries were researched: the Climate Action Reserve, the American Carbon Registry, and Verra. Data retrieved from the carbon registries indicate that approximately 170,000 acres of Kentucky Forestland is currently under contract for carbon credits. (April 2019)

Kentucky's Berea College, which comprises approximately 7,500 forested acres in Madison County, has an Improved Forest Management Project financed by New Forest, and is registered with California's Climate Action Reserve Program. The carbon offset credits will be used for compliance in the Air Resources Board of California's greenhouse gas cap and trade program.

In addition to the Berea College project, information from the Climate Action Reserve Registry shows Improved Forest Management carbon projects for approximately 27,675 acres located in Bell, Knox and Whitley counties; 39,630 project acres located in Lewis, Greenup, Carter, Elliott, and Lee counties; and another 38,625 project acres located in Wayne, Pulaski, McCreary, Harlan, Letcher, Pike, Floyd, Magoffin, Johnson, Morgan, Lawrence and Martin counties.

The American Carbon Registry references two main forest carbon projects for an approximate total acres of 55,500 located within Bell, Breathitt, Clay, Estill, Harlan, Jackson, Knox, Lee, Leslie, Letcher, Magoffin, Owsley, Perry and Whitley counties. Robinson Forest, (Perry, Breathitt, and Knott counties) managed by the University of Kentucky’s Department of Forestry, has approximately 10,000 acres of forestland enrolled under the *Working Woodlands Carbon Program*, of the Kentucky Chapter of the Nature Conservancy. Other known carbon aggregators working within Kentucky include:

- GreenTrees (CORSIA emerging market opportunity)
- Ducks Unlimited (CORSIA emerging market opportunity)
- FORECON Ecomarket Solutions, LLC

e. Tax Credits and Deductions

A reforestation tax credit and amortization deduction allows landowners to potentially deduct for qualifying reforestation expenses on qualifying property when reporting federal income taxes. Many forestry management costs and cost-sharing funds, including site preparation, seedlings or seeds, planting, tools, and depreciation on equipment could be included; however, landowners should always check with a certified public accountant or tax advisor to determine eligibility concerning tax laws since they can change on an annual basis.

5. Education

Education opportunities are an important part of increasing the amount of management occurring on Kentucky’s forestlands. Some educational efforts on forest management include the woodland owners’ short courses, carbon sequestration information, timber theft and trespass information, assessing storm damage, timber tax information, ATFS and Kentucky Woodland Owner’s Association information, Kentucky Firewise Community Grants Program, and forestry education for the general public. One specific example of how educational efforts could be expanded is increased distribution of the *Kentucky Woodlands Magazine*, an important resource for non-industrial private forest owners.

The Woodland Owner Short Course is an excellent educational opportunity available for private forest landowners. Through a partnership of University of Kentucky Department of Forestry, KDF, and numerous other agencies and organizations, courses for children and adults of all experience levels aid in educating the public on how management goals may be achieved. The day-long courses are periodically available for minimal costs at select locations throughout the state. By expanding the geographic locations offering the courses as well as their frequency, the participation in this educational opportunity may be expanded.