EXAMPLE OF PUBLIC GOODS-TYPE: ALTERNATIVE WILDFIRE/FOREST FIRE RISK ASSESSMENT

Appendix 4-2

Standard Portion: Mitigation Strategy

Commonwealth of Kentucky Enhanced Hazard Mitigation Plan: 2013 Version

Kentucky Emergency Management (KYEM)
University of Kentucky, Martin School of Public Policy and Administration
Hazard Mitigation Grants Program (UK-HMGP)

Kentucky Energy and Environment Cabinet, Department for Natural Resources,
Division of Forestry (KDF)
Report by: Luke Saunier

The Division of Forestry under Kentucky's Energy and Environment Cabinet and its Department of Natural Resources provides an excellent example of what this hazard mitigation plan has termed the Public Goods-Type *mitigation action*. *The Division of Forestry is providing added insight and expertise to an already robust forest fire/wildfire risk assessment that benefits all mitigation stakeholders throughout the Commonwealth of Kentucky. Parts of this Appendix have been included in the* Risk Assessment *portion of this plan. It has been cited accordingly.*

Hazard Identification: Wildfire

Description

A wildfire is an unplanned fire, a term which includes grass fires, forest fires, and scrub fires either man made or natural in origin. There are three different classes of wildland fires (UK, 2010)

Types

• *Surface fires* are the most common type and burn along the floor of a forest, moving slowly and killing or damaging trees.
• *Ground fires* are usually started by lightning and burn on or below the forest floor.
• *Crown fires* spread rapidly by wind and move quickly by jumping along the tops of trees.
• *Spotting* can be produced by crown fires as well as wind and topography conditions. Large burning embers are thrown ahead of the main fire. Once spotting begins, the fire will be very difficult to control.

(Sand Hollow Fire, February 25, 2013, Whitley County, KY-Arson)

Wildland fires are usually signaled by dense smoke that fills the area for miles around. The average forest fire kills most trees up to 3-4 inches in diameter, in the area burned. These trees represent approximately 20 years of growth. In the case of up-slope burning, under severe conditions, almost every tree is killed regardless of size or type. When the trees are burned and everything is killed, then the forest is slow to reestablish itself, because of the loss of these young seedlings, saplings, pole and sawtimber trees.

Included in the destruction by fires are the leaf and other litter on the forest floor. This exposes the soil to erosive forces, allowing rainstorms to wear away the naked soil and wash silt and debris downhill, which will clog the streams and damage fertile farmlands in the valleys. Once the litter and

humus (spongy layer of decaying matter) is destroyed, water flows more swiftly to the valleys and increases flood danger.

Other consequences of wildfires are the death of and loss of habitat for the forest's wildlife. Even when the adult animals escape, the young are left behind to perish. The heaviest wildlife lost is felt by game birds since they have ground nesting habits. Fish life also suffers as a result of the removal of stream shade and the loss of insect and plant food is destroyed by silt and lye from wood ashes washed down from burned hillsides.

Wildfire Fuel Categories

• *Light fuels* such as shrubs, grasses, leaves, and pine needles (any fuel having a diameter of one-half inch or less) burn rapidly and are quickly ignited because they are surrounded by plenty of oxygen. Fires in light fuels spread rapidly but burn out quickly, are easily extinguished, and fuel moisture changes more rapidly than in heavier fuels.

• *Heavy fuels* such as limbs, logs, and tree trunks (any fuel one-half inch or larger in diameter) warm more slowly than light fuels, and the interiors are exposed to oxygen only after the outer portion is burned.

• *Uniform fuels* include all of the fuels distributed continuously over an area. Areas containing a network of fuels that connect with each other to provide a continuous path for a fire to spread are included in this category.

• *Patchy fuels* include all fuels distributed unevenly over an area, or as areas of fuel with definite breaks or barriers present, such as patches of rock outcroppings, bare ground, swamps, or areas where the dominant type of fuel is much less combustible.

• *Ground fuels* are all of the combustible materials lying beneath the surface including deep duff, tree roots, rotten buried logs, and other organic material.

• *Surface fuels* are all of the combustible materials lying on or immediately above the ground, including needles or leaves, duff, grass, small deadwood, downed logs, stumps, large limbs, and low shrubs.

• *Aerial fuels* are all of the green and dead materials located in the upper canopy, including tree branches and crowns, snags, hanging moss, and tall shrubs.

Fuel Types

• *Grass*. Found in most areas, but grass is more dominant as a fuel in desert and range areas where other types of fuel are less prevalent. It can become prevalent in the years after a fire in formerly timbered areas.

• *Shrub* (brush). Shrub is found throughout most areas of the U.S. Some examples of highly flammable shrub fuels are the palmetto/ gallberry in the Southeast, sagebrush in the Great Basin, and chaparral in the Southwest.

• *Timber litter*. This type of fuel is most dominant in mountainous topography, especially in the Northwest.

• *Logging slash*. This fuel is found throughout the country. It is the debris left after logging, pruning, thinning, or shrub-cutting operations. It may include logs, chunks, bark, branches, stumps, and broken understory trees or shrubs.

Fuel Characteristics

• *Fuel moisture* is the amount of water in a fuel. This measurement is expressed as a percentage. The higher the percentage, the greater the content of moisture within the fuel.

How well a fuel will ignite and burn is dependent, to a large extent, on its moisture content. Dry fuels will ignite and burn much more easily than the same fuels when they are wet (contain a high moisture content). As a fuel's moisture content increases, the amount of heat required to ignite and burn that fuel also increases. Light fuels take on and lose moisture faster than heavier fuels. Wet fuels have high moisture content because of exposure to precipitation or high relative humidity, while dry fuels have low moisture content because of prolonged exposure to sunshine, dry winds, drought, or low relative humidity (UK, 2010).

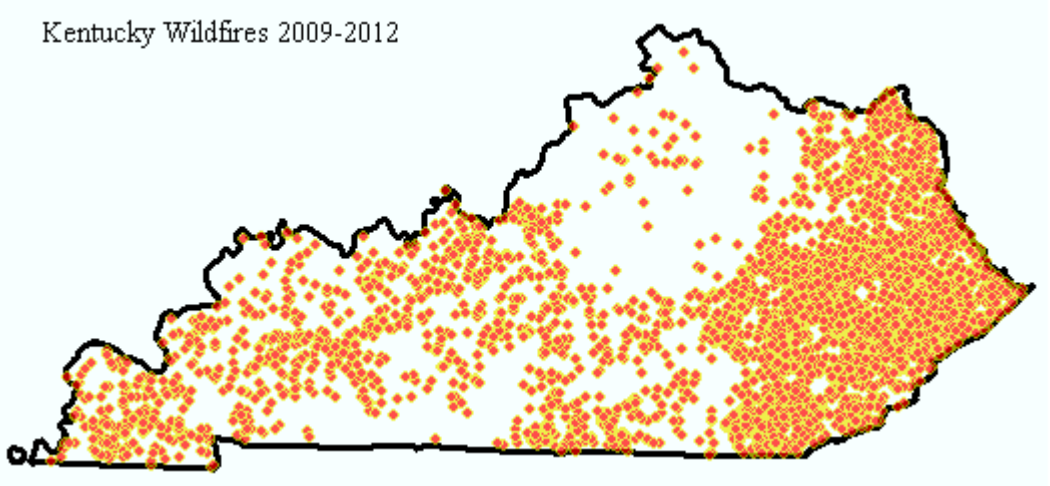
The Wildfire Threat in Kentucky

There are two defined wildfire seasons in Kentucky: February 15-April 30 and October 1-December 15. These spring and fall seasons are separated by periods of higher moisture and colder, less conducive fire weather. Leaf drop in the fall from deciduous hardwood trees produces a thick litter layer in forested areas which rapidly carries expanding wildfires. Tall grasses across the state become very flammable in the fall and during periods of drought. Wildfire occurrence is possible outside of these defined fire seasons during any prolonged periods of drought. During these wildfire seasons, specific outdoor burning laws have been established to lessen the occurrence of damaging wildfires. Kentucky Revised Statute 149.400 prohibits outdoor burning during these fire seasons between 6 am and 6 pm unless at a distance of at least 150 feet from woodlands or brushland.

Kentucky averages 1484 wildfires a year that burn 38,000 acres of private lands. During the past ten years, these wildfires have destroyed 270 homes, structures, and improvements valued at $4,145,216.00. However, during the same time frame, 7,129 homes and structures have been saved by wildland firefighters for a value of $332,018,580.00. In the past five years wildfires in Kentucky have also been attributed to the deaths of at least five citizens including one Kentucky Division of Forestry firefighter. Based on a recent study conducted by the University of Kentucky and the Kentucky Division of Forestry (KDF), the loss in timber value over this ten year period exceeds $139,450,000.00(Reeves, Stringer, 2010). With such a clear threat to life, and property, identifying successful wildfire mitigation projects has become a priority for the state.

Kentucky's wildfire risks are compounded by the state's extremely high arson rate. Kentucky has the highest arson rate of all the 13 southern states. In fact, 62 percent of all wildfires in Kentucky are deliberately set by arsonists. Over 90 percent are human caused. These high numbers also represent a high potential for prevention efforts.

The area of Kentucky generally referred to as Appalachia poses the greatest wildfire risk within the state due to the mountainous terrain, limited access roads, and high arson occurrence. This area is the most heavily forested area of the state and heavier fuel loading increases the risks of wildfire. To illustrate the concentration of wildfires in Kentucky within Appalachia, the attached map reflects fire occurrence data for just the past three years.

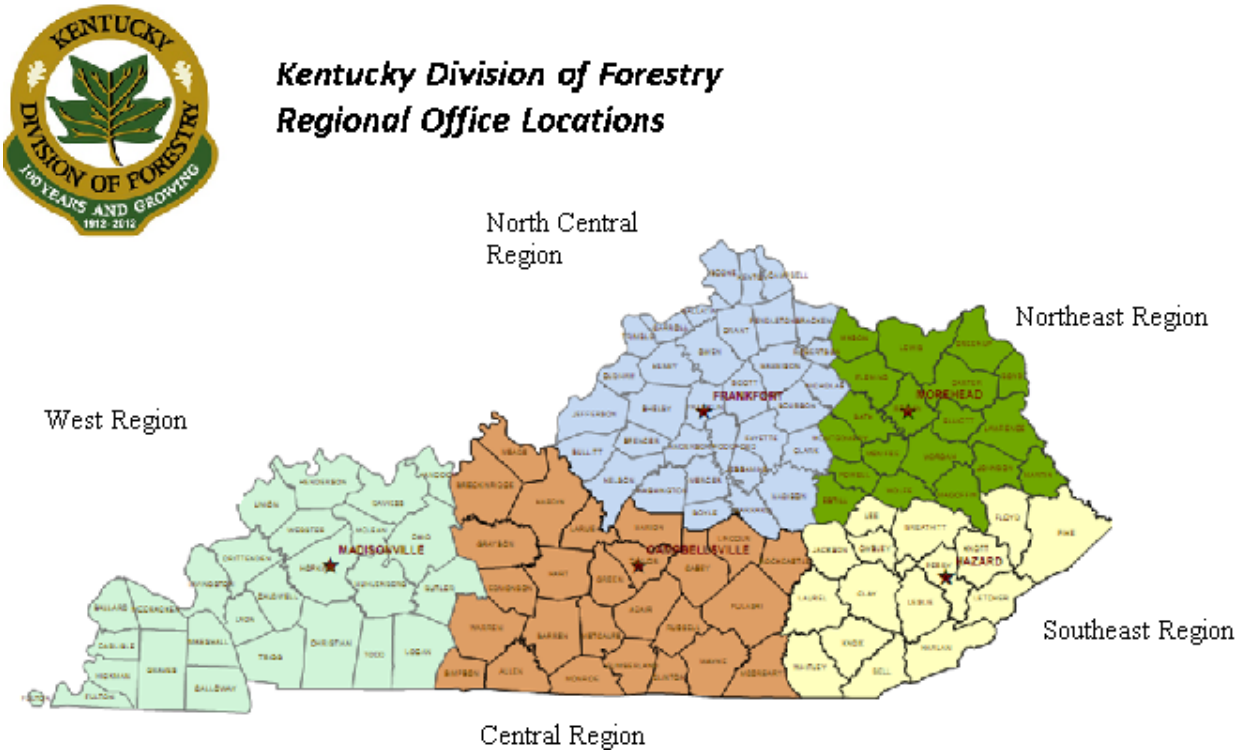


(Source: Kentucky Division of Forestry, 2013)

Kentucky Division of Forestry

The Kentucky Division of Forestry (KDF) was created in 1912 (known then as the Board of Forestry) to protect Kentucky's forest. Over-harvesting, clearing for agriculture, and wildfires had devastated the forest. In response to this the Kentucky General Assembly empowered a new Board of Agriculture, Forestry and Irrigation to act as a forestry commission for the state. By 1913 under the guidance of the Board of Forestry, the first Fire Protection Association was organized in Harlan County. Landowners paid a yearly one cent per acre forest protection tax. By 1915 the area of protection encompassed 200,000 acres and extended to neighboring counties.

Today the Kentucky Division of Forestry protects nearly 12 million acres of privately owned forest acres across the state. The mission statement for the Division is to protect, conserve and enhance the forest resources of the Commonwealth through a public informed of the environmental, social, and economic importance of these resources. The Division currently has 146 full time employees, made up of foresters, county rangers, and tree nursery workers. In 2013 KDF restructured its nine district offices into five regional offices, concentrating resources and personnel to more efficiently meet the state's fire suppression and forest stewardship challenges.



Firewise

The Firewise program was initially developed by the National Fire Protection Association (NFPA) in response to the severe wildfires of 1986 which burned over 1400 homes nationally. The programs intent is to save lives and property from wildfire by teaching people how to adapt to living with wildfire and encourages neighbors to work together and take action now to prevent losses. The program encourages homeowners and communities to take responsibility for wildfire mitigation where possible (NFPA, 2013).

This simple yet effective flyer instructs home owners on how to protect their homes from wildfire.

Firewise came to Kentucky initially in 2003 with four workshops centered around a CD-ROM: "Living on the Edge." These workshops were aimed at Kentucky citizens living within the wildland urban interface (WUI). Additional workshops were held over the next few years and attendance was expanded to include fire departments and county officials. In 2004 a dedicated Firewise Specialist position was created by KDF to maximize the program's outreach efforts. In the past 7 years, $2.4 million dollars in federal pass through grants were awarded by KDF to 50 Kentucky communities. These funds were used to remove the hazardous fuels around 1,741 individual homes within the wildland urban interface. This work was accomplished through partnering with 39 individual volunteer fire departments

that used the grant funds to purchase the necessary equipment and tools to complete the mitigation. Additional Firewise projects throughout Kentucky include fire breaks, dry hydrants, fire truck turn-arounds, and 911 home address signage making it easier for fire departments to find homes.

One of the key requirements of the grant is the formation of a Community Wildfire Protection Plan (CWPP). A CWPP is a collaborative strategy for reducing wildfire vulnerability in a community. The plan includes an assessment of the community's wildfire vulnerability, local organizations, and resources available to assist with wildfire mitigation and response, and an action plan for implementing wildfire mitigation projects. Wildfire mitigation actions may include wildland fuel management, community outreach and education, Firewise building retrofit and landscaping, policy and regulation recommendations, and/or wildland fire response improvements (http://www.wildfiremitigation.org/). This plan allows communities to target specific risks within the wildland interface and effectively mitigate these risks with the most effective method.

Southern Wildfire Risk Assessment (http://southernwildfirerisk.com/about/aboutswra.html)

Fire management personnel face a complex problem that is compounded by increasing fire intensities due to the accumulation of vegetative materials, continued residential growth into wildland fire-prone areas and increasing firefighting costs. The Southern Group of State Foresters (SGSF) determined that a process is needed to assess fire threat, and related values at risk. The process should provide managers with a strategic view of the state to improve public safety and protect them from property losses like those experienced in recent severe fire occurrence years.

The Southern States recognize the problems they are facing and pooled resources to fund a region-wide risk assessment to identify areas at risk for wildland fire within each State - the **Southern Wildfire Risk Assessment**. The project was undertaken by the SGSF with both state and federal support including USDA Forest Service Region 8, US Fish & Wildlife Service, Bureau of Indian Affairs, and the National Park Service. The project is administered by the Texas Forest Service (TFS).

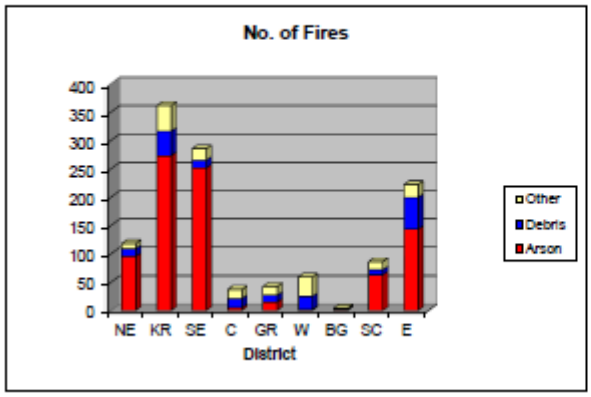
The Southern Wildfire Risk Assessment (SWRA) project reflects the latest achievements in regional risk assessment and provides a consistent, comparable set of results as a foundation for prevention and mitigation planning. The SWRA results assist the States in allocating available resources to meet the needs of the existing wildfire situation. This will help each State to prioritize those areas where tactical analyses and community interaction or treatments might be necessary to reduce fuels and the risk from wildland fire.

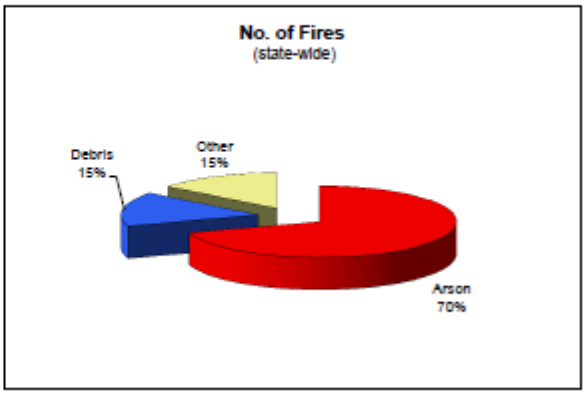
The purpose of the SWRA is to identify the potential for serious fires within the South and to prioritize areas where mitigation options may be desirable. The SWRA can also be used to locate areas within the states where interagency planning may be of value to effectively manage wildland fire risk. The results can be used to complete a more detailed analysis at the local level and communicate wildland fire management issues to the public. The results of the risk assessment are used to:

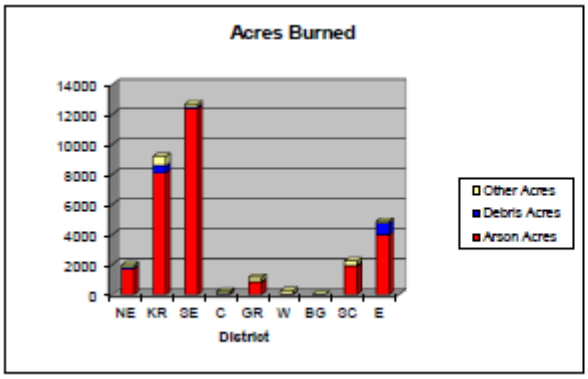
- Identify those areas most prone to wildfire
- Identify and categorize Communities-at-Risk
- Identify areas where mitigation measures may be of greatest value due to wildfire threat and risk
- Facilitate communication among agencies to better define priorities and improve emergency response
- Facilitate communication with local residents to address community needs.

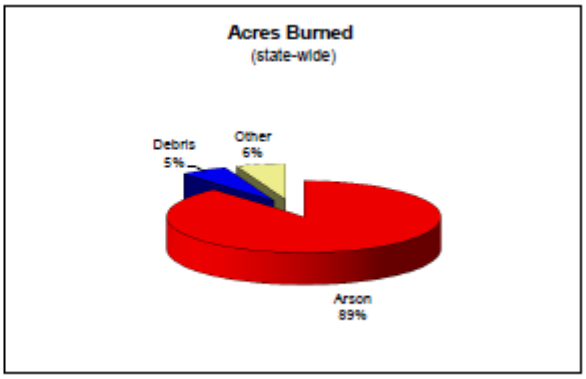
The data provided by SWRA will be used to focus Kentucky Firewise outreach efforts within high risk communities of Appalachia.

Kentucky Division of Forestry
2012 Wildfire Charts









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