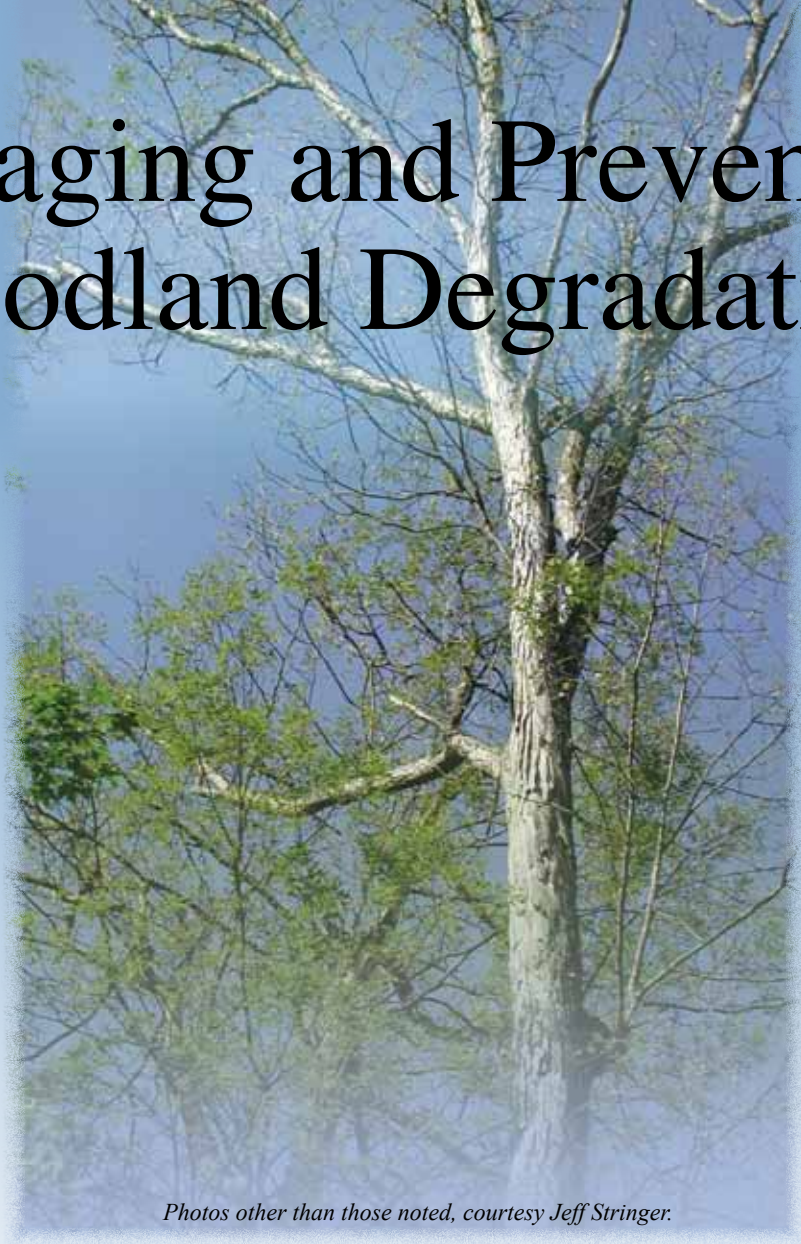
Managing and Preventing Woodland Degradation

by Jeff Stringer



Photos other than those noted, courtesy Jeff Stringer.

Woods cover a significant percentage of Kentucky's landscape. They contribute greatly to our enjoyment and financial well-being as individuals and as a state. Given this fact, it is ironic that data indicate the majority of woods have been historically mismanaged and abused, and unfortunately, they continue to be so. The majority of this abuse is not through malicious intent but rather through lack of attention and ignorance. In your capacity as a woodland owner, natural resource professional, logger, or an individual who cares about Kentucky woodlands, do you know what constitutes abuse? Do you know the signs of this abuse and how to fix it?

Abuse leads to degradation. Simply put, degrading the woods means letting it get to a condition where it does not fully meet our objectives and has lost or is losing its ability to maintain growth, vigor, and regeneration of its naturally occurring species. This article outlines the different types of degradation that reduces the health and resiliency, timber value, and habitat quality for wildlife of our woodlands as well as our ability to maximize ecosystem services.

A number of abuses both past and present are occurring in our woodlands. Each of these abuses when occurring with enough frequency and intensity can degrade woodlands significantly. Undoubtedly, the majority of woods in Kentucky has been or is being affected by uncontrolled harvesting, wildfire, grazing, invasion by exotic species, aging, and a host of natural occurrences such as insects and disease outbreaks, storms, and droughts. Each of these degrades specific aspects of our woodlands. Understanding these abuses and their characteristics, some of which are blatantly obvious and some that are insidious, helps us to chart a course for preventing degradation and restoring damaged woodlands.

Uncontrolled Selective or Partial Harvests

The majority of timber harvesting that occurs in Kentucky is selective harvesting (see reference 1). While selective harvesting can be correctly done, it requires marking by a professional and harvesting by a conscientious and competent logger. The majority of selective harvests, over 80 percent in Kentucky, are not undertaken with an eye to improving the woods for the long term. Practices such as high-grading that remove only the best-quality timber not only "mines" the good-quality trees from the woods, reducing the potential timber value, but also removes valuable species, such as the oaks, that produce hard mast for wildlife. Once a woods is selectively cut using a high-grade two or three times, it can functionally lose its ability to generate timber income for a long period of time. Further it may have lost species that are important from a wildlife, ecosystem and timber standpoint that cannot easily be restored. A poor logger can also injure remaining trees in a selective cut that leads to long-term internal rot and loss of timber value. While the presence of some rotten trees and snags in a woods can be good for some wildlife species, studies in Kentucky and adjoining states have shown that inattentive logging can result in the damage of up to 25 percent of the sawtimber-sized trees and 50 percent of the pole-sized trees in a woods. However, these same studies have shown that loggers can easily keep damage to below 10 percent if logging is done with care. Correct selective harvesting typically involves the removal of economically mature timber (if revenue is an ownership objective) as part of an improvement harvest that also removes poor-quality trees and includes provisions for regeneration.

Considering regeneration when implementing a selective harvest is critical. It is important to make sure that nothing is done in the woods that reduces its ability to adequately regenerate now or in the future (Table 1). For example, harvesting all the mature oak trees from a stand may leave the stand with no way to regenerate oaks, especially if there are no seedlings, saplings, or pole-sized oak trees of that species in the woods. A properly planned selective harvest would ensure

that some of these "mother" trees are left to produce acorns for future regenerations. In some cases, there may be pockets where overstory trees are all mature or overmature. Removing them and allowing for a pocket of natural regeneration to develop in what is called a group opening can aid in maintaining a diversity of age classes and species and actually improve habitat for some wildlife species.

Photo courtesy: Steve Gray, Kentucky Division of Forestry

Basal wounding and rot developing from skidding damage 15 years ago.

Table 1. Uncontrolled Selective or Partial Harvests

Region: all counties in Kentucky	
Woods at risk: all stands with high-quality sawtimber trees	
Characteristics	**Results**
• removal of only high-value sawtimber trees (high-grading)	• loss of future timber value potentially to the point of rendering the woods unmerchantable
• leaving poor-quality and/or noncommercial species	• loss of important species
• removal of hard mast species (e.g., oaks, walnut)	• reduction in valuable wildlife food source • reduction in overall biodiversity and loss of important species
• partial cut leaving greater than 50% of the trees standing	• prevents regeneration of species requiring light such as walnut, oak, yellow-poplar, ash, and increasing maple, beech, and other species that can tolerate the shade
• skidding and felling damage	• increasing heart-rot and long-term loss of timber volume and value
Prevention: Have a forester mark a selective harvest that includes improvement of the woods and maintenance of proper regeneration. A wildlife biologist can aid in the development of a harvest plan if wildlife is a primary objective. Select a good logger who provides references to woodland owners where selective harvests have been completed. Consulting foresters can be used to develop a timber harvesting contract that includes provisions for protecting trees that will not be harvested.	

Uncontrolled Commercial Clearcuts

Commercial clear cutting, the removal of all trees greater than six inches in diameter and up, occurs in areas where there is a pulpwood market and will likely occur where some biomass markets emerge. Commercial clear cutting can be used as a tool to rehabilitate some natural stands that have been significantly degraded when a new age class is required to reestablish proper species composition and growth. However, uncontrolled commercial clear cutting can negatively change species composition, reduce the presence of hard mast species, allow for invasion by exotic species, and degrade wildlife habitats for some species (Table 2). As is the case with selective harvesting, it takes a knowledgeable professional to be able to prescribe the proper size, timing, and conditions under which a commercial clearcut can be used appropriately to regenerate a woods. A professional forester will also know when an alternative regeneration method such as group openings, group selection, shelterwood, or a two-age

Table 2. Uncontrolled Commercial Clearcut

Region: regions where pulpwood or biomass markets exist	
Areas at risk: all stands	
Characteristics	**Results**
• removal of all commercial trees greater than 5 to 6 inches	• opening stands allows for abundant regeneration of fast-growing species that can outcompete slower-growing oaks and other important species unless provisions for their regeneration have been taken into account • habitat loss for some wildlife species through the loss of mature tree cover and loss of large woody debris • establishment of new age class provides habitat and food for some early successional species
• unrestricted whole tree skidding	• disturbance of the litter or duff layer over large areas can enhance invasion by exotic invasive species • reduction in advance regeneration (naturally produced sapling and seedlings) of some species such as oaks
• removal of all woody biomass including tops	• long-term nutrient depletion
Prevention: Have a forester lay out the size and shape of harvest areas and provide the correct timing to help with regeneration of the desired species. Conduct post-harvest practices such as site preparation for natural regeneration that remove noncommercial species and damaged trees that remain or potentially provide the planting of some species such as pines where appropriate. These practices can be potentially paid for in part by farm programs. Provide conditions associated with the harvest and removal of treetops that ensure that an appropriate number of tops stay in the woodlands for their nutrients and minimize the skidding disturbance in areas where a large amount of advance regeneration is present.	

deferment harvest should be employed to allow for regeneration and protect other aspects of the woods. A forester can also recommend treatments that can be done in association with a commercial clearcut to remove undesirable trees from the stand after harvest and provide more room for valuable trees to establish and grow.

Wildfire

Uncontrolled burning can lead to long-term degradation of the woods (Table 3). Unfortunately, many believe that as long as a fire does not kill the large trees in a woods, then no harm was done. However, even many of our ground fires, while they do not kill large trees, wound standing timber causing long-term internal rot and loss of timber value. Studies have shown that wildfire wounds greater than 13 inches across in sawtimber-sized trees can lead to long-term timber volume losses of 100 to 200 board feet per tree. For many trees, this is a significant amount of their total potential volume and value. Uncontrolled fires, regardless of their severity can also lead to changes in regeneration and provide a seedbed for the invasion by exotic species. While every county in Kentucky has the potential for wildfires, woodlands in eastern Kentucky are under more risk because of the severe slopes that cause wildfires to become intense as they race uphill and the difficulty in fighting fires in this rough terrain. Also, where storm damage has created large amounts of fuel, woods are at risk from intense wildfires (see reference 2). While it is now known that historical fires played a part in shaping the species composition of our woodlands and prescribed fires can be used to manage some of our woodlands for some objectives, a prescribed or managed fire is far different from uncontrolled wildfires that currently happen all too often in Kentucky.

Fire damage leading to severe heart rot.

Table 3. Wildfire

Region: all regions, with eastern Kentucky counties most susceptible	
Areas at risk: all stands; especially at risk are drier sites such as south- and west-facing slopes and ridge tops	
Characteristics	**Results**
• basal wounding to sawtimber- and pole-sized trees	• long-term development of heart rot leading to hollow trees and loss of timber value
• death of small trees and exposure of mineral soil	• can allow for the regeneration of species that stump and root sprout well • exposed mineral soil makes possible regeneration of species from seed including invasive exotics
Prevention: Have a forester indicate areas at risk from wildfire. Develop a set of fire lines or fire roads that provide natural fire breaks at the edge of the woodlands and maintain them during the fall before the fire seasons. Assess areas where there is a large amount of debris on the ground and get the debris touching the ground where possible to aid in its rotting and decrease its burning potential. Make sure neighbors abide by burning bans during fire seasons.	

Grazing

Historically, it was very common for cattle, hogs, horses, goats, and other livestock to graze the woods. A few head on a large number of acres was not problematic. However, the majority of farms allowing cattle access to the woods have the potential of significantly reducing natural regeneration and produce internal rot in standing timber trees, unnoticeable until the trees are cut down (Table 4). Studies have shown past woodland grazing can result in up to nearly a 50 percent reduction in timber values. Removing cattle and other livestock from the woods is one of the first prerequisites for good woodland management.

Table 4. Grazing

Region: regions associated with the cattle industry	
Areas at risk: stands open to unrestricted access by cattle and other livestock	
Characteristics	**Results**
• perpetual browsing and consumption of small seedlings and saplings	• stopping the development of natural regeneration required to maintain some tree species, especially oaks and species tolerant of the shade such as maple and beech
• compacting soil and wounding of lateral roots	• internal rot of standing trees and loss of timber value
Prevention: Fence off woods and remove cattle and livestock. Do not feed in the woods or use the edge for feeding.	

Compare seedling and sapling abundance on left side of the road where grazing is allowed to the right side of the road that has been fenced, precluding grazing for 15 years.

Aging

Many woods have canopy or overstory trees that developed from past events such as a major timber harvest or abandonment of a field. These events created a roughly even-aged group of trees that have continued to grow into the large canopy trees that are now present (Table 5). Each species of tree has a particular age that it normally reaches before starting to decline and eventually dying (Table 6). As the canopy trees reach this age, they become more susceptible to insects and diseases, droughts, and other natural disturbances. If the overstory of a woodland is composed of a significant number of short-lived species, canopy trees may start to die rather dramatically over a 10- to 20-year period. While this is natural, it does cause concern through the loss of timber value and aesthetics. If this mortality is viewed as problematic, a harvest of selected trees can be accomplished to reduce value loss and manage the dying overstory. If management is aimed at providing for old-growth forest, a plan should be developed to deal with the gaps created by the loss of short-lived trees. While small gaps are a part of an old-growth forest and provide positive wildlife attributes, gaps can also lead to invasion by exotic species, and a plan to scout for and eradicate invasive species should be developed. Further, short-lived species can be removed prior to their death to help manage the situation and provide for increased vigor of long-lived species.

Table 5. Aging

Region: all counties	
Areas at risk: all stands, particularly those with even-aged stands of short-lived species	
Characteristics	**Results**
• canopy trees reaching their biologic maturity	• increased tree mortality and loss of canopy trees • creation of canopy gaps • inability of trees to weather injury and insect and disease attacks • loss of timber value due to heart rot and injury development
Prevention: Foresters can assess the woods' relative age. Harvests can be used to remove aged trees when appropriate where timber value is an issue. Also, regulating tree density using thinning can improve individual tree vigor. Where timber is not an issue, developing a plan to scout for and remove invasive exotic species that establish into naturally occurring gaps is recommended.	

Table 6. Average life spans of tree species common to Kentucky.

Species	Average
white oak	194
beech	168
sugar maple	162
northern red oak	151
chestnut oak	141
shagbark hickory	137
yellow-poplar	136
bitternut hickory	133
black walnut	131
white ash	129
black oak	129
mockernut hickory	127
pignut hickory	117
black cherry	115
shortleaf pine	110
red maple	106
scarlet oak	105
Virginia pine	76
sassafras	69

Insects, Disease, Storms, and Droughts

A host of natural disturbances can cause degradation of woodlands (Table 7). Insects and disease pathogens occasionally increase in abundance and can kill and weaken trees. Droughts typically reduce the vigor of trees, and several years of drought or, in some cases, a significant single drought can cause individual trees to become weakened and susceptible to insects and diseases that they succumb to (see reference 3). Wind and ice storms can uproot trees and damage crowns. In some instances, these occur to a significant extent and with enough intensity to provide long-term growth reductions, changes in species composition, and loss of value (see reference 4).

The two-lined chestnut borer attacks oaks that have been damaged by drought or are otherwise in decline. The larva tunnel under the bark and disrupt the flow of 'food' and water.

Photos above courtesy: Larvae: Robert A. Haack, USDA Forest Service, www.forestryimages.org Adult: USDA Forest Service - Northeastern Area Archive, USDA Forest Service, www.forestryimages.org

Table 7. Insects, Disease, Storms, and Droughts

Region: all counties	
Areas at risk: all stands	
Characteristics	**Results**
• death or weakening of individual trees in small groups	• loss of timber value • potential invasion of exotic species if canopy gaps are large enough
• physical damage to canopy trees	• openings in the canopy can increase invasion of exotic species • some insects and diseases can proliferate in damaged trees • loss of timber value
Prevention: Natural disasters cannot be predicted. However, maintaining proper density of trees can improve their overall health and vigor. Removal of aging trees and susceptible trees with a timber harvest can improve growing space and vigor of remaining trees. Use a forester to provide assessment of the condition of woods and recommend practices to improve tree health allowing them to weather disturbances better.	

Summary
Most degradation can be eliminated or reduced to a manageable level through good woodland management and the use of professional foresters, wildlife biologists, and careful loggers. Understanding how woods are degraded and how to protect them is an important part of taking care of woodlands. Management of some type is required regardless of whether your objective is timber production or developing an old-growth woods. Unfortunately, in this day and time with the presence of exotic invasive species and other pressures on our woods, benign neglect (the decision to do nothing) is sure to lead to long-term degradation. A good place to start your planning, regardless of your objective is by contacting the Kentucky Division of Forestry to help develop a Stewardship Plan or to renew an old plan. Discuss issues of past abuse with your forester and ensure that in your use of the woods that you are not adding to the problem.

Kentucky Woodlands Magazine References:
www.ca.uky.edu/KYWoodlandsmagazine/Past.php
Click on the issue to locate the title you wish to view.

(1) "Selective Harvesting" Part 1 and 2, Kentucky Woodlands Magazine, Volume 3 Issue 2: 1-3 and Volume 3 Issue 3: 1-3

(2) "Wildfire and Woodlands: Assessing and Reducing Risk", Kentucky Woodlands Magazine Volume 4 Issue 2: 1-4

(3) "Woodland Health" Kentucky Woodlands Magazine Volume 4 Issue 1: 1-4, "Evaluating Ice Damage" Kentucky Woodlands Magazine Volume 4 Issue 1: 6-7

(4) "Tree vigor" Kentucky Woodlands Magazine Volume 2 Issue 2: 8-9 and "Spring freeze, summer drought, and our woodlands future" Kentucky Woodlands Magazine Volume 2 Issue 2: 1-3

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