Forest Regeneration

Habitat HOW-TO'S

Often it is desirable to cut or regenerate overstory trees in hardwood forests in order to encourage the young, thick vegetation required as cover and food for wildlife such as ruffed grouse, rabbits, deer, blue-winged warblers, rufous-sided towhees, and white-eyed vireos. For instance, ruffed grouse require areas of young forest consisting of between 2000 to 8000 saplings at least 5 feet tall per acre. This dense, vertically oriented vegetation provides needed cover that is lacking in older, more open woods. Unfortunately, many people have a negative opinion of cutting trees. While timber cutting can have adverse environmental impacts when done in an irresponsible manner, the responsible harvesting of trees can be an important method of managing forestland for wildlife as well as for forest products. This Habitat How-To is primarily aimed at managing forestland for wildlife habitat. Landowners whose main objective is managing their forests for timber production should seek technical guidance from the Kentucky Division of Forestry (1-800-866-0555).

Another equally important reason to regenerate a hardwood stand is to encourage the regrowth of desirable tree species such as oaks and other hard mast producers. While all of our native tree species have important ecological functions, oaks are the dominant component of most of Kentucky's hardwood forests. Oak trees also provide acorns, which are one of the most important food sources for many of our wildlife species. However, in many areas forests have been degraded by high-grading, a timber harvesting method which removes all of the productive trees and leaves

Figure 1. Oak seedlings in the forest understory are referred to as "advanced reproduction."

It is most desirable for an oak forest to be composed of trees from both the red oak and white oak groups.

Oak trees provide acorns, which are one of the most important food sources for many of our wildlife species.

only poor quality trees of less desirable species. The low quality trees remaining after such harvests are detrimental because they shade the ground and prevent oaks, hickories, and other hard mast producing trees from growing back. When the large overstory trees in a forest stand are cut correctly, sunlight can reach the forest floor and stimulate the regrowth, or "regeneration" of a new, healthier forest.

Sprouts and Seeds: The Birth of a New Forest

Young trees that grow up to regenerate a forest after the overstory trees have been removed can come from three different sources: 1) stump sprouting, 2) advance reproduction, and 3) seeds. It is important to recognize which source is likely to be the most successful on a particular site in order to determine the most appropriate method of regeneration. Much of this discussion focuses on regenerating oak species. This is because, as previously mentioned, oaks provide an important food source for many wildlife species, but also because oaks are shade intolerant species. Shade intolerant species, like oaks, need lots of sunlight to regenerate, unlike shade tolerant species such as maples, which grow well under a closed forest canopy. This means that for oaks and other shade intolerant species to persist in a forest, there must be periodic natural disturbances or intentional human management to open up the canopy and let in sunlight. Shade tolerant species will be present regardless of whether or not the forest is managed.

Stump sprouting usually accounts for most of the saplings which grow back as a result of clear-cutting stands where the majority of the overstory trees are less than 16 inches in diameter at breast height (d.b.h.). Stump sprouts are desirable when attempting to regrow trees of the same species as those being cut. Stump sprouts will grow much faster than seedlings because they already have an established root system. To encourage stump sprouting, all overstory trees should be cut between November and March leaving stumps less than 12 inches above the ground.

Saplings already present in the understory prior to a timber harvest account for the second source of new tree growth. These saplings are collectively called advance reproduction. Advance reproduction of oaks or other desirable species is essential for successfully regenerating hardwood stands where stump sprouting is not likely. A minimum of 400 oak seedlings at least 4.5 feet tall per acre is necessary to successfully regenerate an oak-dominated forest stand. Suitable densities of oak advance reproduction often occur one to two years following a good year of acorn production. If adequate numbers of saplings are not available one year due to poor acorn crops during previous years, and there are healthy, mature oak trees present, the harvest should be delayed until the density of saplings is improved.

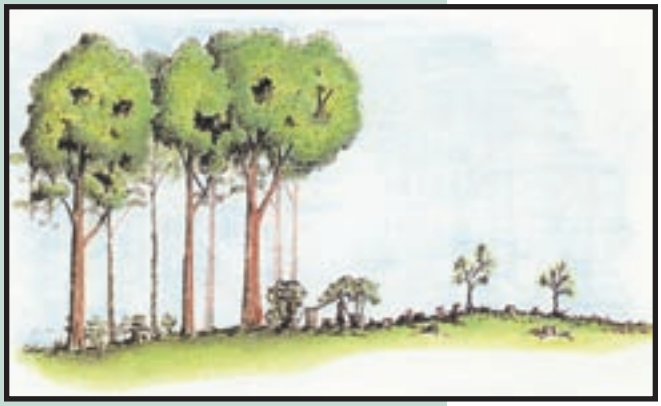


Figure 2. Example of clearcutting.

Advance reproduction of oaks tends to be most successful on drier south and west facing slopes where there is less competition from other tree species such as maples and poplar. When adequate advance reproduction is present, the stand should be regenerated by clear-cutting. Clear-cutting involves removing all trees in the stand larger than 1 inch d.b.h., except

for advance reproduction of oaks or other desirable species. This timber harvest technique provides high levels of sunlight to help the young oak sprouts compete with other less desirable trees that grow best in the shade. A modification of this method, which will benefit wildlife, is to leave some clumps of soft mast producing shrubs such as dogwoods, serviceberry, viburnums, and a few grapevines.

If advance oak reproduction is not present due to a low number of mature oak trees, the stand should be regenerated with a 2 to 3 stage shelterwood cut. This method of harvesting removes approximately 30 – 40% of the canopy including suppressed or inferior oaks and all overstory trees other than mature, healthy oaks. The goal of this step is to encourage heavy acorn production from these healthy oak trees that are left, and at the same time promote favorable conditions for those seeds to sprout and grow rapidly by reducing competition from other trees. Once adequate advance reproduction has resulted from the first partial cut, the remaining large overstory trees can then be harvested. A shelterwood cut may take as long as 20 – 30 years to complete but the initial thinning will produce a thicker understory desirable as wildlife cover. On some highly productive sites, additional Timber Stand Improvement (TSI) practices may be required along with the shelterwood cut to successfully produce adequate oak regeneration. On some sites, oak regeneration may not even be practical.

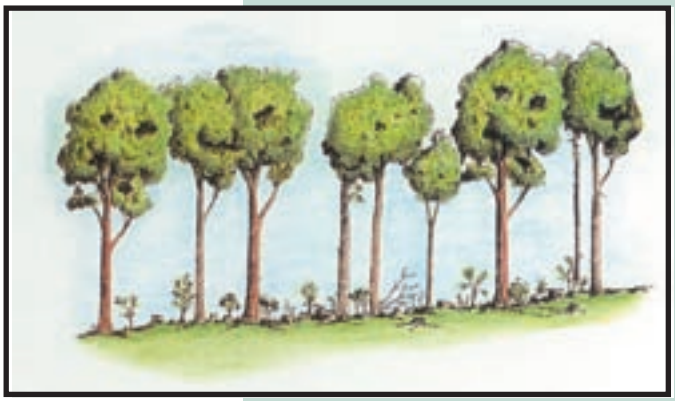


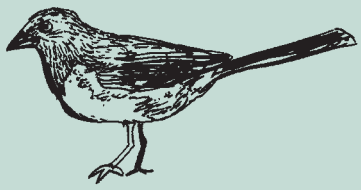
Figure 3. Diagram of a shelterwood cut.

Distribution and Size of Regeneration Cuts

The overall goal of hardwood forest regeneration should be to maintain forestland in various aged stands to provide for the different habitat requirements of a variety of wildlife. It is most desirable for an oak forest to be composed of trees from both the red oak and white oak groups. This is to assure both a good supply of acorns in years when one type might have a complete failure to produce seeds, and a relatively consistent food source through fall and winter (white oak acorns tend to drop earlier). At least 40% or more of the total forestland should be old enough to produce a reliable source of hard mast. Oak trees may begin producing acorns between 20 to 30 years of age but do not reach optimum acorn production until they are about 50 years old. In order to maintain at least 40% of the total forested area in trees 30 years old or older, no more than 10% of the forest should be regenerated within a 5 year period, assuming that you are starting with mature forest. This may be unrealistic if you are trying to remedy the effects of past high-grading and therefore have few mast producing trees at the start of the operation.

Regeneration cuts of 5 – 20 acres are most desirable, but even cuts of one acre or less can be beneficial on smaller properties. These cuts should be scattered throughout the forested area with at least 600 feet between cuts of the same age and should be interspersed with areas of mature forest. Another option would be to concentrate regeneration cuts around the edges of woodlands and leave a core area of mature trees within the forest. This type of management would ensure a gradual transition (feathered edge*) between forestland and surrounding habitats and reduce the negative effects of abrupt edges such as increased nest predation.

Landowners whose main objective is managing their forests for timber production should seek technical guidance from the Kentucky Division of Forestry at 1-800-866-0555.



SUMMARY OF OPTIONS:

- Purposes for Regeneration
  - To produce thick woody cover and browse
  - To alleviate the negative effects of mismanagement
- Sources of Regenerating Trees
  - Stump sprouts
  - Advance reproduction
  - Seeds
- Regeneration Methods
  - Clear-cut
  - Shelterwood cut
- Distribution and Size of Regeneration Cuts
  - Schedule of cuts dependent upon total acreage and maturity of woods
  - 5-20 acre cuts preferred
- Other Considerations
  - Piling brush
  - Seeding log landings and skid trails
  - Timber value
  - Necessary BMP's
  - Ongoing forest management

A portion of the cost of this publication was underwritten by the Forest Stewardship Program in cooperation with the Kentucky Division of Forestry.

Additional Management Considerations

Tree tops and other slash produced during a regeneration cut should be gathered into brush piles* which will provide cover for small wildlife. When left scattered throughout the forest at ground level, this slash can restrict the vision and movement of wildlife species such as ruffed grouse, making them more vulnerable to predators. Log landings and skid trails produced during forest management should be seeded to a legume* such as white clover or Korean lespedeza and on steep areas orchard grass or other desirable cool season grasses* (other than fescue) should be added to the mix to reduce erosion. These legumes will not only provide additional forage for wildlife but will also attract insects needed by young grouse, turkeys, and other birds.

In mature hardwood stands, forest regeneration can be accomplished as a by-product of harvesting marketable timber. Regenerating hardwood stands that have been high-graded will probably not produce marketable timber, but it may be a good source of firewood. In either case, Best Management Practices (BMPs) should be used to prevent erosion and other potential environmental concerns. In the years following a regeneration cut, the forest may require additional management or Timber Stand Improvement (TSI)*. The Kentucky Division of Forestry can provide you with information about appropriate BMP's for your operation. They can also provide additional technical assistance in planning and implementing regeneration cuts, as well as information on other forest management options.

***Related *Habitat How-To* references:**

- Brush Piles
- Cool Season Grasses
- Edge Feathering
- Legumes
- Timber Stand Improvement

Planning for My Property