

XI. Regeneration

Obtaining and encouraging development of desirable regeneration is a management need that has not been adequately addressed on the private, non-industrial forest. This is primarily because of the rather intensive treatments, such as clearcutting, that are frequently associated with regeneration practices.

This 0.4-acre opening was made by cutting commercially removable trees. Openings of this size, and somewhat larger, are acceptable to many landowners.

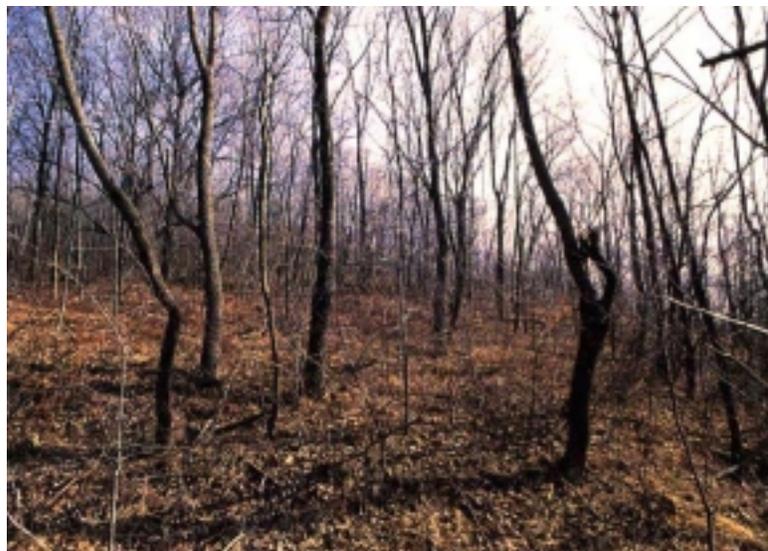


Because many landowners are sensitive to these practices, doing regeneration work on large areas of an individual's property is often not an option.

However, addressing regeneration by treating one or more small portions of the property is sometimes acceptable. Many landowners will agree to openings of 0.4 to 1-acre in size.

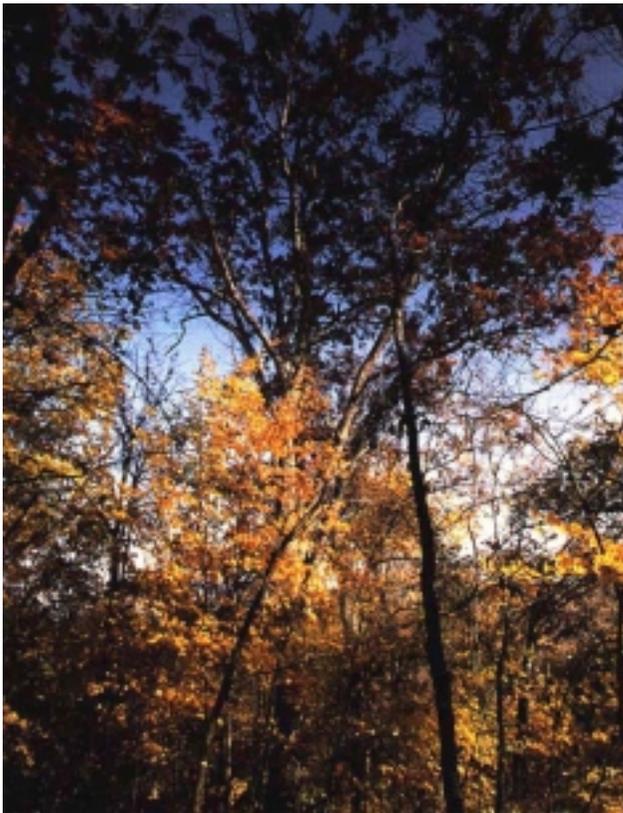
The physiographic characteristics of a site and the successional stage of the vegetation found there are two major factors influencing the effectiveness of prescribed regeneration treatments. The two factors are interactive, so you need to consider the combined effects when prescribing management activities designed to meet the germination and early growth requirements of a desired species.

Many private, non-industrial forests are on land that was previously used to grow agricultural crops. As a result, these sites may be occupied by trees that are quick to capture open land, but may be poorly suited to growing well on the site.



First, evaluate the physiographic characteristics of the site. Is it a cool, moist, north-facing, lower slope, or a hot, dry, steep, south-facing, upper slope?

If the site is moist and very productive, there is a high probability of finding late successional species established in the understory just waiting to take the place of the present overstory. When this is the case, it may be more practical to direct management activities to the late successional species for the site instead of trying to maintain the present cover type.



When the early successional species are preferred on mesic sites, intensive management activity may be necessary to perpetuate them. They require significant site disturbance to establish, and they receive tough competition from other plants.

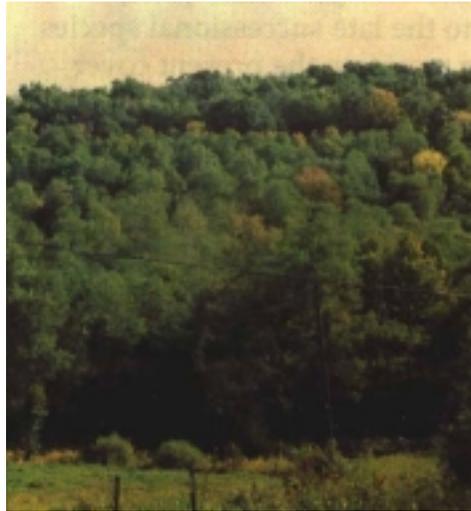
Where growing conditions are less favorable because of factors like low available moisture, poorly drained soil, or shallow soil, it is often easiest to maintain early successional species. For example, a chestnut oak ridge may be easy to maintain in that species because there aren't many other species that effectively compete on that site.

On this northeast-facing slope, the sugar maple understory is ready to replace the oak overstory. It would require an intensive understory treatment to establish oak regeneration and enable it to successfully compete with the sugar maple.

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Think about the history of the area. How did the currently existing overstory and understory get there? Where on the successional scale is the stand currently located? For example, is the stand in an early successional stage after reverting from agricultural use, or is it a late successional forest with the most recent activity being a partial harvest 40 years ago?

The indications of past activities are on the landscape for those who learn to read the signs. An old fenceline, still visible from a distance, is a clue that past land use below the fence may have been different from that above it.



The present species in the overstory is usually just one of several options you may have on the site. To evaluate how practical it is to regenerate any particular species, consider the natural dynamics of the site and how the species composition will change over time in the absence of any specific management activities.

Within the constraints established by the physiographic characteristics of the site and the successional stage of the forest, there may be an opportunity to influence species composition with management activities.

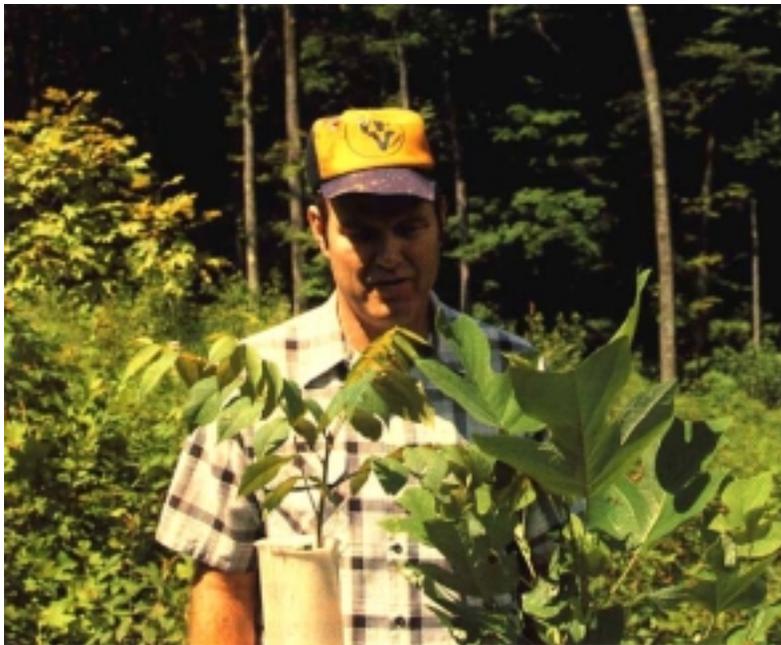
For example, the size, shape, and directional orientation of the openings affect the light reaching the forest floor. Influencing light affects the temperature and moisture content of the soil, with subsequent effects on the establishment and early growth of regeneration. Creating light, temperature, and moisture conditions that favor one species over another is the primary means we have of influencing species composition.

Below this old fenceline was open field where hay was harvested. Tree species whose seeds are dispersed by wind or transported by small animals now occupy the site. Above the fence was pasture with residual trees. It is now a two-aged stand with the older residual trees having been the seed source for the immature trees.



Because many private, non-industrial ownerships in the eastern United States are old farms, agricultural land that is reverting to trees is a common forest condition encountered on this ownership category. Frequently, portions of these productive sites are occupied by commercial tree species that have poor form. These patches of poor-quality timber trees are good places to make openings where desirable regeneration can be established and developed.

It may also be appropriate to establish regeneration artificially. This can be done in openings or under canopies that have been opened to admit additional light to the forest floor. Artificial regeneration can be established by planting nursery stock. It can also be achieved by direct seeding with appropriate protection from predation. Tree shelters can be used to improve survival and early shoot growth of seedlings while protecting them from animal damage.



In stands where the forest is more mature, openings can frequently be established using a commercial harvest. This may provide some income for the landowner. However, it can also affect regeneration conditions.

When equipment is used to remove timber products, there is usually disturbance to the duff layer of the forest floor. This exposure and mixing of mineral soil with partially decomposed organic matter provides seed bed conditions more favorable to some species than to others.

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It may be desirable to use some artificial reforestation techniques to influence the species composition of the new stand. Tree shelters were used here on planted nursery stock to establish a component of black walnut.

This area was old pasture that had succeeded to non-commercial and poorly formed commercial species. The trees in this opening were cut during the dormant season to encourage sprouting of desirable species and regeneration of a higher-quality stand of trees.



If advanced regeneration is an important part of a Crop Tree Management prescription, use six-foot radius plots to inventory existing regeneration. Follow procedures described in the SILVAH¹ manual (or other

applicable guide for your region) to evaluate the adequacy of the established regeneration. Then determine the prescription that is appropriate for its stage of development.

If there is no place where desirable regeneration is established, select an area where it can be, and determine what is needed to accomplish it. If the species you want to regenerate is an intolerant with an adequate available seed source on the site, you may not need advanced regeneration. Just make the opening.

For some species (such as oaks and hickories), establishing regeneration is more of a process than an event. Therefore, it may take several years to accomplish the task.

If the species you want to regenerate needs to be established as advanced regeneration on that site, you will need to create the conditions that favor its establishment. This may involve using management activities like treating midstory competitors with herbicides. At the appropriate time, you may also need to open the main crown canopy by deadening or felling some of the trees in the dominant and codominant crown classes.

Frequently, Crop Tree Management prescriptions that release a relatively large number of crop trees per acre admit sufficient light to encourage understory development that includes desirable species. When this is the case, you may ignore the understory if its development doesn't coincide with the maturity of the crop trees being managed in the main crown canopy.

^{1/} SILVAH (SILViculture of Allegheny Hardwoods) was developed by the Northeastern Forest Experiment Station to facilitate the inventory, analysis, and prescription writing for hardwood stands in the Northeast.

If there is no place where desirable regeneration is established, select an area where it can be, and determine what is needed to accomplish it.

Another option is to manage the understory by maintaining sufficient light on the developing crop trees to keep them growing vigorously. This allows you to manage the unit as an even-aged stand by removing the overstory (in essence a two-cut shelter-wood).

Two-aged management is another option in some eastern hardwood types. At different points in time, two-aged stands have immature crop trees in the understory, midstory, and eventually the overstory canopy. The immature crop trees need sufficient light and space to develop as they grow through these various canopy levels. When the older age class of overstory crop trees reaches maturity and the younger crop trees are in the main crown canopy, the older age class can be harvested. New reproduction in the understory occupies the space made available by the removal of the mature trees. This cycle is repeated, always maintaining two age classes of trees on the site. The younger age class is about one-half the age of the older class.



This Crop Tree Management prescription released the maximum number of available crop trees. It permitted enough sunlight to reach the forest floor to establish regeneration in the understory. This area can easily be managed as an even-aged stand by removing the overstory during the next 20 years. It could also be managed as a two-aged stand.



In this two-aged stand, the younger tree in the center has now reached the same height as the older age class of trees that border it on both sides.

Factors to consider in the location of regeneration areas are not limited to the present condition of the forest site. You must also weigh the aesthetic effects, both positive and negative, of a regeneration treatment. For instance, you might ask yourself where an appropriately designed regeneration treatment would be most beneficial to wildlife and the people who enjoy observing the wildlife.

Dealing with the social aspects of establishing and developing desirable regeneration is probably one of the greatest challenges facing managers of the private, non-industrial forest. Establishing small openings (0.4 to 1-acre) is a viable option that needs greater application.

Cutting 0.4-acre openings results in trees of different ages. Trees in the foreground of this photograph are four years old. The middleground trees are 14 years old, and the background trees are more than 80 years old.



Showing landowners what prescribed regeneration treatments will look like is probably the most effective way to help them decide if they are willing to manage crop trees for future generations.

To minimize the amount of treatment that must be carried out, be opportunistic. Carefully evaluate where openings will be made to take advantage of existing desirable reproduction. For example, if oak regeneration is desirable, look for portions of the property where it is already established.

If landowners are not concerned about applying a regeneration treatment on a stand-level basis, there is no reason to be artificially constrained to treatments of 0.4 to 1-acre in size. You may want to discuss with landowners the benefits of regenerating the species that will best accomplish their property goals. Showing landowners what prescribed regeneration treatments look like is probably the most effective way to help them decide if they are willing to manage crop trees for future generations.