

4. From Field to Forest

By Peter Smallidge

New York has an abundance of forest. As you read in the previous chapter, however, the landscape was dominated by agricultural fields in recent decades. The process of field to forest is an interesting story and can help us understand strategies for managing our woodlands that



increase their value for timber and wildlife.

In the late 1800's, over 75% of New York was in farms, now New York has over 18 million acres of forest land, about 62% of the land area. As farms were abandoned, many acres began the succession from field to forest - a process typically characterized by a series of four stages. In many respects, these stages are similar to those that follow even-aged forest management, such as clearcutting. A variety of labels are used to describe these stages, but commonly they are known as: forest establishment, self-thinning, transition, and mature.

The forest establishment stage starts when land is abandoned after clearing, either by agriculture or harvesting. The first plants established are those that arrive by wind blown seed or other means, can survive in the conditions present, and can grow quickly. The first trees that often colonize an area include aspen, white ash, and sugar maple. The trees that can survive the first few years are adapted to grow quickly and fill the area. Usually within a few years, the area is full of trees and other plants are excluded. In other situations, perhaps where there was extensive erosion, or few mature trees nearby to provide seed, the process may take a much longer time period.

Once the area is filled with saplings with overlapping crowns, the stage of forest establishment ends and the self-thinning stage begins.



The succession of Cornell University's Arnot Forest over 30 years after a chemical wood harvest. Pictures courtesy of USFS Warren, PA.



The self-thinning stage is characterized by intense competition among the trees for resources. These include sunlight, water, and

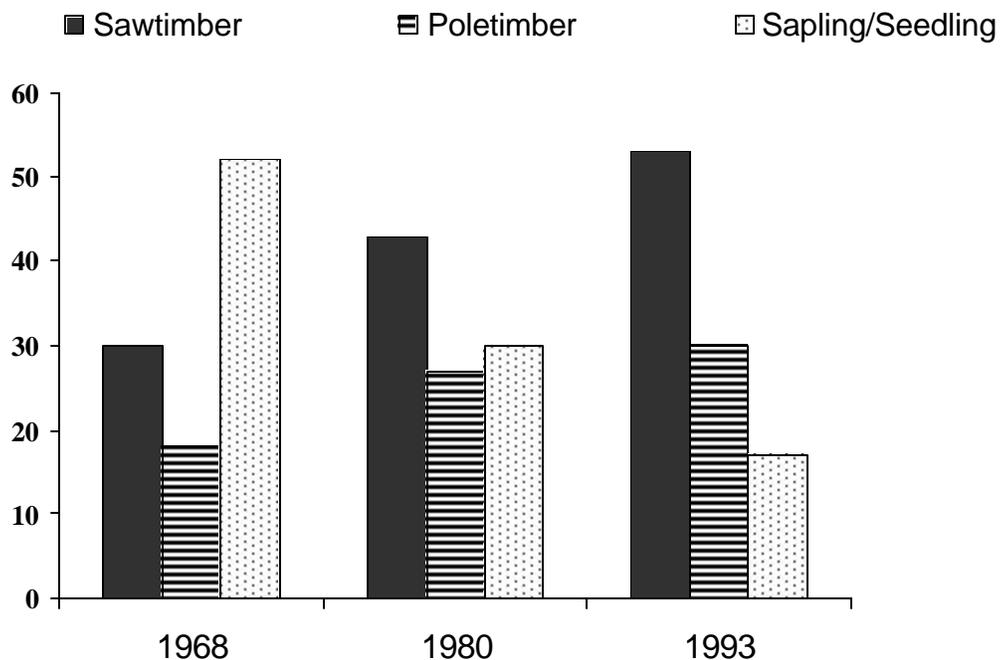
nutrients in the soil. The species able to grow the fastest will dominate. The slower species either die or persist with slowed growth. During this stage, the density of trees (number of stems per acre) is higher than at any other point. When the forest canopy closes, most understory plants, such as raspberry, die and leave a vacant understory. During this stage, the weaker trees and weaker species die and the forest begins to thin itself. Mortality is highest during this stage of forest succession. It's also during this stage when the lower branches of most trees begin to die and leave behind clear stems. During the end of this stage, the fastest growing trees and the fastest growing species have grown taller than other trees. As weaker trees die they leave openings in the canopy that allow light to enter and an understory to develop. Keep in mind that all trees are approximately the same age, but may vary greatly in height and diameter depending

on how they have responded to their environment. Depending on the soil characteristics and tree species present, at the end of the self-thinning stage the average tree diameter may be somewhere between 8 and 12 inches.

Before describing the characteristics of the transition stage, it's worth noting how we can use our knowledge of forest succession to help in forest management. Early in the self-thinning stage, the trees may only be a few inches in diameter and many hundred per acre. These are often too small and too numerous to justify intensive management. However, as the trees grow larger, and the best trees are distinguished from the poorer trees, the best trees can be favored as "crop trees" by thinning around them and increasing their access to soil resources and sunlight. This is also a time to start removing diseased and poor quality trees before they

Figure 1. Distribution of forest stand size-classes during the three most recent US Forest Service inventories. Source, USDA Forest Service Resource Bulletin NE - 132. 1995.

Timberland by Stand Size Class



spread pathogens to other trees and before they produce seed. For timber management, the best trees should be retained during these early stages for greater value and to maintain a source of good quality seed for future forests.

The transition stage is characterized by increased variety in the forest. Some species that have a short lifespan, like aspen and pin cherry, may start to die and leave behind small gaps in the forest canopy. These gaps provide increased sunlight and soil resources. Some new tree species can become established. Others, like American beech and sugar maple, may be present as saplings and if located near the gap can utilize the resources made available. In addition to the gaps created by tree deaths, some trees continue to grow more quickly than others in both height and diameter. Together with the gaps, the forest now begins to develop different layers of vegetation. Some wildlife species, like ruffed grouse that prefers thick stands during the establishment and self-thinning stages may be replaced by species such as the wood thrush that prefers multiple layers of vegetation.



Canopy opening in a transition forest

As the forest develops into the transition stage, many trees reach a point where they have commercial value (about 12 inches in diameter for many hardwoods). Some forest owners feel a strong urge to begin selling timber at this point. However, by removing the biggest trees, many

future options are sacrificed. When trees reach a commercial size, they have just reached the point when they can begin to accumulate large quantities of wood. These trees, perhaps 50 to 70 years old, if released from competition of neighboring trees will increase substantially in size and value in the next several years. On good soils with good species, a tree may increase 2 inches in diameter in 10 years. Larger trees are worth more than smaller trees because they have more volume (measured as board feet), but also because they are more economical to harvest and process and are more likely to be of higher quality. These larger trees, about the same age as the smaller trees, are a critical source of seed for the next forest. For those interested in the production of high quality timber, this stage is important for concentrating the growth on the best quality trees by removing the inferior quality trees. Too often, the best trees are removed as



soon as possible, and the quality of the stand is degraded while future options are lost.

The final stage of forest succession is that of the mature forest. In the mature

forest, there are trees of all sizes. If left unharvested, the largest trees (and many smaller trees) would die and either remain standing or they would fall and remove other neighboring trees. This would create large gaps in the canopy that would cycle through the same successional sequence but on a smaller scale. For those interested in harvesting timber, this stage also provides abundant opportunities for income and habitat creation for wildlife. With the aid of a professional forester, qualified logger, and after writing your forest management plan, you can select trees as single stems, small groups, or large patches to create a variety of conditions that allow for the rapid, healthy, and sustainable regrowth of the next forest.