

# Forests are ever changing

By Scott Bowe

I have had the opportunity to speak with many people about the importance of forests and the multitude of products that come from our forests. One common misperception is that forests stay the same. This is understandable since forests change slowly over many years and the casual observer may not see the change. I have also explained to people that forests can be conserved, they can be managed and improved, but they can't be preserved. This last statement is met with disbelief, but preservation implies no change, and that is impossible with forests because they always change. Even if a forestland owner chooses not to manage their forest, change will move forward within.

One of the main drivers of forest change is called *forest succession*.

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*Forests change. It is natural and the process continues all around us.*

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Forest succession is the natural replacement of plant species in an area over time. For example, let's consider an abandoned farm field in northern Wisconsin. This was a common occurrence back in the 1940s and 1950s when many farmers concluded that the climate and short growing season made farming in the north difficult. Forests that were once cleared and stumped for farm fields transitioned back into forests through forest succession.

Before we get too far into forest succession, I should mention that all tree species are not created equally when it comes to their ability to tolerate shade. *Tolerance* is a term that forest-

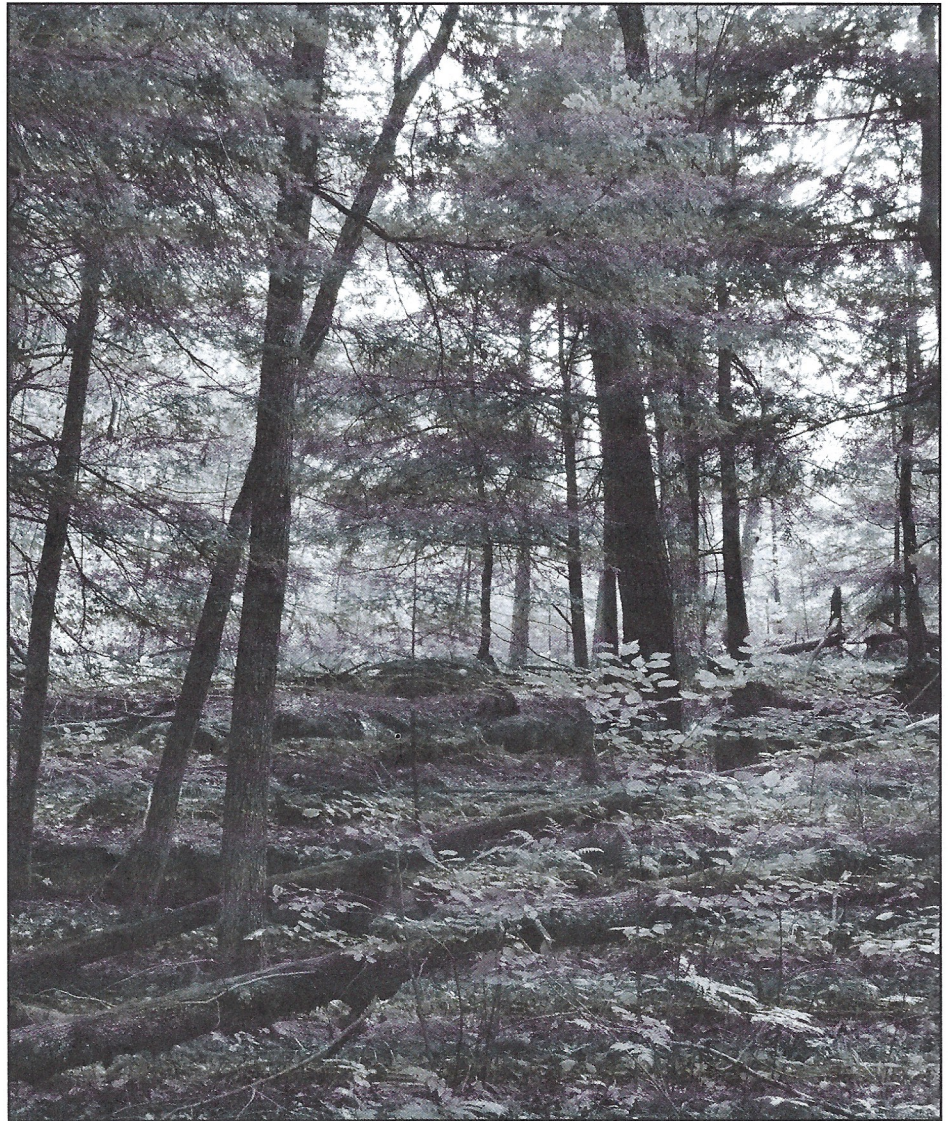


Photo: Barbara A. Schmitz

**Forest succession, or the natural replacement of plant species in an area over time, is a driver of forest change.**

ers use to indicate a tree's capacity to develop and grow in the shade of and in competition with other trees. Some tree species, such as sugar maple and balsam fir, can successfully grow in very shaded conditions. I often joke that sugar maple can grow in the dark, but it is not too far from reality. Sugar maple seedlings can grow under the full shade of a mature forest canopy. Other species, such as aspen and jack

pine, need full sunlight for growth and development. We categorize tree species tolerance to shade as very tolerant (sugar maple), tolerant (basswood), intermediate (red oak), intolerant (paper birch) and very intolerant (aspen).

Back to forest succession; the first plant community to move into these abandoned farm fields are *grasses, forbs and shrubs*. This plant community transitions into the *shrubs and*



*seedlings* stage where trees initially share, then begin to dominate the site. Trees eventually overtop and out-compete the forbs and shrubs. The intolerant trees continue rapid height growth while the tolerant trees occupy their respective niche in the sapling/pole stage.

The next stage in forest succession is called a *young stand* stage. Growth is rapid and tree-to-tree competition may be severe, resulting in competition-caused mortality. Any intolerant individuals that drop behind may die and their growing space may be occupied by tolerant trees. As we move into a *mature stand*, competition-caused mortality continues. Both intolerant and tolerant trees may share the main canopy. Finally, the last plant community of forest succession is called the *climax* stage, which has a relatively stable plant community with a dominant plant population suited to the environment. Tolerant species dominate the site and the climax species will reproduce successfully under their own shade. Intolerant trees cannot reproduce under the shaded conditions of the mature canopy. However, it is important to note that even in a climax stand, the forest continues to change. Individual trees die and the gap created is quickly occupied by other tolerant species waiting for the gap and sunlight.

As the plant communities change during forest succession, the stand structure also changes. These changes are often described in four stages including stage 1: stand re-initiation, stage 2: stem exclusion, stage 3: understory re-initiation, and stage 4: old-growth. Under each of these stages, intolerant tree species are replaced by tolerant tree species. Anyone who has walked through the same aspen stand over time has seen one or more of these stand structural stages.

The rate of natural forest succession

is affected whenever a *disturbance* such as fire, a windstorm, pests or management activities occurs on the site. The more severe the disturbance, or the more often disturbances occur, the more slowly natural forest succession moves forward. Each disturbance can push back succession to an earlier stage. For example, after a major disturbance, pioneer species such as aspen

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or jack pine will become established in open areas under full sunlight. Eventually, in the absence of further disturbance, these pioneer species will be replaced by other species that will occupy the site through the successional stages, leading to a plant community of climax species, like the northern hardwood stands in Wisconsin.

Understanding forest succession, or how forests change, is very important when we make forest management prescriptions. In most cases, it is easier to work with the natural progression of forest success than to work against it. This is where tools like "Field Guide for Forest Habitat Types of Northern Wisconsin," written by John Kotar, can be very helpful. The climax forest type will be dictated by soil type,

moisture availability and other factors. If you are hoping to regenerate certain species naturally following a harvest, it is important to know what species would naturally occupy the site, and what type of harvest will generate the desired conditions for stand establishment.

Another common misperception is that an old growth climax forest is the best forest. It certainly has its place, but plant and animal communities need forests across all stages of forest succession to be successful. Pioneer tree species, like aspen, cannot exist in the shade of a climax forest. Animals, like the ruffed grouse and

yellow winged warbler, need early successional forest to survive and thrive.

Forests change. It is natural and the process continues all around us. It seems to me that the best forest is a range of forests across all stages of forest succession.



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