

The Outside Story



Succession: How a Forest Creates and Re-creates Itself

By: Joe Rankin

A few years ago, I started an observational experiment in forest succession on a couple of acres where we once pastured sheep and goats. Rocky and wet, without livestock it was hard to keep cleared. So, I let the forest recreate itself and just watched the process unfold.

It's a process that has taken place across much of the Northeast since the mid-1800s.

Forest succession is, simply, a "sequence of tree species, over time," the "replacement of plant species due to differences in competitiveness due to different environmental conditions," explained Kevin Smith, the supervisory plant physiologist at the US Forest Service's Northern Research Station in Durham, New Hampshire. "The previous mix of tree species that came in, the depth of soil and its characteristics, the drainage, the temperature and the availability of seed sources all influence it."

In northern New England, it starts with grasses, weeds and tough wildflowers, followed by raspberries and blackberries and staghorn sumac. The earliest colonizers protect the soil from erosion. Most of the first tree species to follow are light lovers and quick growers. They include white pine, virtually pure stands of which sprouted in abandoned fields when farmers moved on to the black earth country of the Midwest. "Before European settlement white pines were much more scattered on the landscape," said Smith.

Farther south in New England, the role of white pine as an early successional species might be played by red cedar; farther north it might be white spruce. Other important early species in our area are the trembling and bigtooth aspens; red maple; paper and gray birches; and pin and black cherries.

Early stage succession species adopt the "live quick, die young" approach, putting energy into rapid vertical growth rather than spending it making the chemicals that would allow them to enjoy a life measured in centuries rather than decades.

On our experimental parcel, the grasses came in strong. Asters and goldenrod multiplied. Virginia creeper and wild grapes blanketed the rock piles. A thicket of baby white pines cropped up next to an old "pasture pine" at the edge of the woods. Aspens marched in from one end, growing as fast as teenage boys. Interestingly, wild apple trees sprouted throughout.

A mature birch was one of few older trees in the field, but little birches didn't come up. Paper birch seeds don't germinate well unless they land on mineral soil. "If you had had a fire go through to burn off the organic matter

above the mineral soil, then you would be setting up a situation for birches,” Smith said.

Other early succession species have their own needs, and strengths. Pin cherry seeds can last for years in the soil, and germinate if fire comes through. Thus their other name — fire cherry. Red maples are vigorous stump sprouters, so if there were relict red maples mowed down by livestock or a mower, they might come back strong once the mowing stopped.

The weeds and grasses, the wildflowers, shrubs and fast-growing trees work together to create a new forest on bare ground and thus pave the way for a future forest of longer-lived species, the so-called climax forest. The crowns of early successionists create annual layers of leaf litter, building up humus and looser, richer soil. Their shade keeps soil moisture from evaporating.

All that creates conditions where shade-tolerant middle and late succession species, like sugar maples, American beech, or eastern hemlock, can grow, since they tend to need more fertile soils, said Smith. Some of these trees are happy to grow slowly year after year, in the shade, until a disturbance or death takes out earlier trees and grants them more light. Then they can shoot upward.

The succession process in a forest is messy. And, essentially, unending. Eventually a so-called “climax” forest could emerge. In northern New England, there are, broadly, two types — beech-birch-sugar maple and red spruce-balsam fir-eastern hemlock. Climax forest isn’t necessarily the ultimate end product we might see it as. It “just represents a dynamic equilibrium that is stable over a land area for multiple centuries,” Smith said.

As long as there is disturbance — fire, windstorms, insect infestations, disease outbreaks, logging or development — there will always be change. And where there is change there will be succession. And, sometimes, starting over. Grasses and wildflowers, anyone?

Joe Rankin writes forestry and nature stories. The illustration for this column was drawn by Adelaide Tyrol. The Outside Story is assigned and edited by Northern Woodlands magazine, www.northernwoodlands.org, and sponsored by the Wellborn Ecology Fund of New Hampshire Charitable Foundation: wellborn@nhcf.org.

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