

Observe As You Hike: Forest Succession and "Old Growth"

BY: BOB MCLAUGHLIN



Graphic by Bob McLaughlin

I was hiking with friends in the Dix Mountain Wilderness area in New York's Adirondack Mountains when we were surprised to smell smoke and to hear the unusual sound of low flying planes and helicopters. When we reached the summit of Dix, we understood why. North of Dix we could see billowing smoke as an uncontained forest fire swept up the side of a mountain. Aircraft were dumping loads of water to try to control the fire but still it blazed on. Ultimately, the fire was brought under control and extinguished when the remnants of a hurricane swept through the mountains a week later effectively drenching the forest and extinguishing the fire.

The real point of this story became apparent a few years later when I was hiking in the fall in the forest north of Dix Mountain. The guidebook described the route as a trail through dense woodland that led to a cliff-face with a spectacular view, and that is how I remembered it from a previous hike. However, as I climbed, I discovered an open birch forest with spectacular golden light which was perfect joy except perhaps for the charred remains of the old forest beneath my feet.

It was the most dramatic example of forest succession that I can recall experiencing. However, I have seen other examples while hiking near logged forests, when I encountered large blow-downs, and while hiking on trails through old farmland returning to forest.

Forest Succession

This led to my interest in understanding the biology of forest succession. Essentially, the natural state of New England and New York is forest. After any event that destroys the existing forest, such as a fire, logging or a windstorm, the forest starts over. It is like healing a wound except that each step in the forest succession process introduces new beneficial elements that are lost as the process advances and other beneficial elements are added. Following a fire, the first stage in reestablishment of a forest is planting grasses and wildflowers which reintroduce organic ma-

Forest succession following a wild-fire in the White Mountains passes through distinct steps. First, following a fire or other event destroying a forest, the first pioneers are grasses, wild-flowers and other herbaceous plants. Second, bushes and sun loving plants follow. Third, First Stage trees such as paper birch, aspens and white pine dominate. Fourth, after another century, the mature forest establishes itself. Mature forests in the south of New Hampshire or on lower slopes are made up of beech, yellow birch and sugar maple, and in the north or on higher slopes, spruce, balsam and hemlock.

terial into soil that has burned. Once some vegetation is established, sun-loving bushes including raspberries and blackberries, wild grapes and staghorn sumac, establish themselves. When an area is logged or an old farm field is left to nature, the sun-loving bushes are the first step in forest succession. These plants further protect the soil from erosion and increase the volume of organics introduced to soil depleted by fire. They also provide habitat for many animals including rabbits, foxes and white-tailed deer and of course birds. Indeed, the habitat at the edge of these forest openings is the most densely occupied area in the forest.

Once the soil has recovered some organic material, and the soil has been stabilized by grasses and bushes, the fast-growing sun loving trees move in. In fire scarred areas, paper birch predominate because their seedlings prefer mineral soils. For the same reason, you may see paper birch stands on sandy and gravelly embankments at the base of cliffs. In other areas with somewhat richer organic soils, aspens and white pine may predominate. All of these first stage trees love light, grow fast and die off relatively quickly, in less than a hundred years. Essentially, these trees are engaged in a race to the light that white pine typically wins.

The first stage trees further enrich the soil by shedding their leaves year after year and create a cool shady environment at ground level. Ironically, the conditions they create leave them at a competitive disadvantage that ushers in the next stage of forest succession.

Trees that require more fertile soils and grow slowly and steadily in the shade next come to dominate the reestablishing forest. These trees vary across our region with beech-yellow birch-sugar maple in the south and spruce-balsam fir-hemlock in the north. Interestingly, you can climb through these different mature forests on mountain sides with the typical southern forests at the base of the mountains and the northern forests closer to the summit. In addition to the dominant trees, you will find paper birch, silver maple, eastern white cedar, white pine and even elms in this stage. This stage is frequently referred to as a

climax or mature forest. Some researchers divide this stage into two or more substages.

Once established, mature forests can continue without substantial species change until disturbed by fire or forest clearing. However, it is a mistake to think they are unchanging. In fact, forests like all living things are constantly changing even if they appear to be in a steady state. Any selective pressure can result in significant change. Climate change, introduced diseases, human activity and other factors may selectively cull one species and introduce significant change to a mature forest. For this reason, it seems better to refer to these forests as “mature forests” which suggests change is possible rather than “climax forests” which suggests an immutable state has been reached and change is ruled out.

Old Growth Forest

Another confusing term is “old growth” forests. These are mature forests which have not been disturbed for hundreds of years. Old Growth Forests are very rare but really not very different from other mature forests. The Forest Service has concluded that of the 4,691,524 acres of forest in New Hampshire less than 46,915 acres are considered Old Growth.

How do you identify Old Growth forests? First, when available, you can examine historical records of an area. Second, if the history is unavailable or ambiguous, look for trees that appear to be 150 years old or older. These trees have large trunk diameters but the only way to accurately determine their age is by boring into the trunk to age them by counting rings. Age-related damage to the core of the trees can prevent accurate dating. In addition, boring or cutting trees without a permit is not permitted in State parks or the National Forest. So, this is not an alternative for the casual observer. Third, examine the forest: large trees and lack of signs of human disturbance - snags and coarse woody debris and pit and mound topography on the forest floor - suggest old growth forest. Don't expect old growth forests to be filled exclusively with tall stately trees in a cathedral like setting. Rather, old growth forests are frequently chaotic with fallen tree trunks and dense undergrowth.

If you are interested in visiting an old growth forest, you will be in luck in the White Mountains. Probably, the most accessible old growth forest can be seen along the Franconia Notch bike path between the Basin and Lafayette Place. Another easily accessible example is the lower stretch of the Fallsway Trail near the Appalachia Trailhead in Randolph, NH. Finally, another accessible old growth forest is found on the north side of Greeley Pond which can be reached by trail from the Kancamagus Highway or in a longer but easier hike from Waterville Valley. The Greeley Pond Forest was saved from the railroad and axes of J.E. Henry by the Society for Protection of New Hampshire Forests only to be flattened by the hurricanes in 1938 and again in 1950. Nonetheless, since it has not been modified by the hand of man, it is considered an Old Growth Forest.

When you visit Old Growth Forests, please protect them. Stay on trails, do not gather souvenirs, and leave no trace. Old Growth is rare and precious. Do not love them to death. It is up to all of us to protect the remaining Old Growth Forests!

Learn More

There are many web-pages that discuss forest succession and old growth forests that you can find using your favorite search engine. If you are interested in reviewing a technical paper describing forest succession, I found Hibbs, David; Forty Years of Forest Succession in Central New England; 64-6 Ecology pp 1394-1401 (December 1983) (available at www.jstor.org/stable/1937493) particularly useful. This work is a scientific journal article describing observations in a research forest in central Massachusetts. Like most journal articles it gets “deep into the weeds” but provides useful discussion related to the general principles discussed in this article).

More easily accessible articles include:

- Succession: How a Forest Creates and Re-creates Itself by Joe Rankin at https://northernwoodlands.org/outside_story/article/succession-forest-creates-and-re-creates;
- An excellent two part series on the University of New Hampshire website also by Joe Rankin; Finding Old-Growth Forests in New Hampshire and Top Old-Growth Forests to Visit in New Hampshire. The first article in the series is available at <https://extension.unh.edu/blog/2021/04/top-old-growth-forests-visit-new-hampshire> and includes a link to the second article; and
- Old Growth Forest in Franconia Notch State Park, a publication of the New Hampshire Natural Heritage Bureau available at <https://www.nhstateparks.org/getmedia/c258104f-603d-455f-8b47-6d021992363e/Old-Forest-in-Franconia-Notch-State-Park.aspx>

This discussion has focused on the characteristics of New England forest succession, but the same process occurs everywhere forests exist, only the species change. As you travel, you may find it interesting to identify the stages of forest succession you can observe. It is easier than you think.

Bob McLaughlin is a frequent contributor to Mountain Passages and is cochair of the New Hampshire Chapter's Communications Committee. Until recently Bob has been the Editor in Chief of Mountain Passages. Bob holds a Masters Degree in Biology from the State University of New York in Buffalo and is a retired environmental lawyer. Bob is a permanent resident in the White Mountains and is an avid hiker and naturalist.