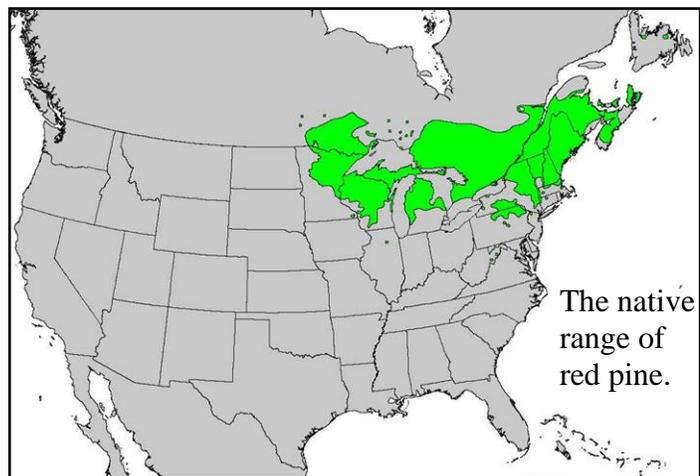


What to do with a 60⁺ year old unmanaged red pine stand?

Background

Red pine (*Pinus resinosa*) was extensively planted in the early parts of the 20th century on abandoned agricultural land to control soil erosion and aid in the protection of watersheds. Many plantations were established in the 1930s by Civilian Conservation Corps crews whose duties entailed among other things to reforest these abandoned fields and pastures. Red pine was chosen due to its uniformity, less damaging insects and diseases than other species and for its aesthetic properties. The prevalence of white pine weevil and blister rust also lead to red pine being used on sites that white pine would normally have been grown on. Red pine plantations on the more nutrient and moisture sites have resulted in some plantations sheltering the establishment of deciduous species. However, the red pine will prevent these deciduous species from fully reaching their potential.

In the Lake States, red pine grows most commonly on level or gently rolling sand plains or on low ridges adjacent to lakes and swamps. In the East it is found on outwash plains and on mountain slopes and hilltops. In parts of the northern Lake States red pine grows in large pure stands and in small pure stands in the Northeast. It is commonly found with jack pine, eastern white pine or both. Red pine grows best on well-drained sandy to loamy sand soils, but it is most common on sandy soils.



In many cases, these red pine plantations have been left alone and forgotten. Now, these red pines are at maturity, or are stagnating, and may be in need of some form of management. The close planting of seedlings, red pine's low genetic variability, and no early thinning, typically combine to negatively affect the height growth of these trees. In addition, these unthinned stands are more likely to have low amounts of understory vegetation, less biological diversity, and more stress from competition making them more susceptible to diseases than their thinned counterparts. Thinning these dense stands at this point in time may not result in a growth response, as their live crown ratios are so small. Red pine crowns develop upward and outward.

Thus, if a stand is thinned that is near its maximum potential height growth, and has a 10 percent live crown ratio, it will have a very little height growth response.

Watershed Management Perspective

Watershed management usually entails bringing greater structural and compositional diversity to a forest to maximize resistance from insect, disease outbreaks, ice storms, and other weather events while also maximizing resilience of the forest after such occurrences. This level of diversity brings differences in susceptibility of the component species to the disturbance. Greater structural and compositional diversity is typically accomplished through uneven-aged management that seeks to promote and maintain a multilayered forest cover of multi-cohorts and mixed species. Such a complex forest also provides a variety of habitats for associated plants and animals. Even compared to natural red pine ecosystems, managed red pine stands typically do not have the same level of complexity or variability.

It is difficult to give detailed watershed management guidelines that cover every situation that involves an unmanaged red pine plantation. Some of the considerations involved in the management decision will be the existing condition of the stand: age; size; health; size of crown; spacing; windfirmness; access; logging costs; and the effect of the harvesting equipment to name a few. Other criteria are the existence, or lack thereof, of advanced regeneration, site characteristics, aesthetics considerations, erosion potential, and any wildlife issues.

Silvicultural Options

Red pine exists both as a non-native species and native species in the 20-state northeastern area of the United States. One silvicultural practice in one location of the 20-state region may be disadvantageous to another location. It is hoped the following discussion adds to the watershed managers decisions with respect with dealing with a red pine plantation.



In traditional approaches, plantations are thinned uniformly to provide the crop trees with enough moisture, nutrients, and light. To bring the stand to more of a natural distribution, managers may need to apply varying degrees of thinning to bring about variable stand density

and greater structural diversity. Variable sized gaps left after the varying thinning prescription should promote both shade intolerant species and tolerant species that add to the compositional and structural diversity of the stand. Underplanting some species may be necessary where seed sources or advance regeneration is not sufficient. Silvicultural practices will depend on the specific site conditions, as stated above. With red pine haven been planted on a variety of sites, some may be conducive to continue with red pine: lower nutrient and moisture availability, and others will not: high water table, higher nutrients and moisture.

In places where red pine grows naturally, such as in the Lake States, one approach to adding structural diversity to a red pine plantation is to have areas with large aggregate patches, or retentions, of the intolerant red pine and small aggregate patches for the more tolerant species, such as eastern white pine, that would benefit from the light red pine overstory. This assumes appropriate conditions for seed establishment. To improve the stand for natural red pine regeneration and to reduce hardwood competition, fire will most likely be needed, as fire is the only natural agent capable of providing the conditions necessary for natural red pine reproduction.

Where red pine is non-native or growing on sites not conducive to growing red pine one approach may be to manage initially for a two-cohort structure and possibly for a multi-cohort structure in the future by retaining a residual overstory of red pine through the second rotation. Some of the red pine trees could also be left as reserve trees. In this scenario, the red pine can aid in sheltering the desired regeneration. On the lower nutrient and moisture sites for example, the red pine can shelter a more appropriate species, such as white pine if seed trees are in close proximity. Scheduling the timber harvest not during a frozen period will also help scarify the soil to create a better suited seedbed for the desired regeneration species, such as for oak and white pine. Stands with a well established understory of northern hardwood seedlings could be converted to a northern hardwood dominated stand. The multiple removal treatments will reduce harvesting damage to the hardwood regeneration, minimize the visual impact of the treatment and protect the understory with the residual red pine overstory.

Water Quality

One may feel compelled to completely clearcut the unthinned red pine plantation, but care must be taken in realizing not only the potential for erosion, but also for possible negative effects on water quality. Studies on experimental watersheds indicate that when 20 to 30% of a

forested area, or biomass reduction, is harvested, a measurable increase in water yield results. Increases in water yield can effect changes in sediment, nutrient, and organic matter output that can combine to adversely impact water quality and aquatic ecosystems.

As a side note, following the 1998 ice storm that swept through the northeastern United States, damage to red pine was seen to decrease as tree diameter increased, and also a stand density decreased. Unthinned stands were seen as being less resistance to ice-storm damage as less dense, thinned stands. One more reason to form a management plan for those forgotten red pine plantations.

To work towards restoring structural and compositional complexity to an unthinned red pine plantation will result in positioning the forest in a more protective and conducive atmosphere for water protection. By including red pine in forest management plans where it naturally grows, and slowing phasing it out in other places, will help in creating more healthy and disease resistant red pine stands.

For Further Reading

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Web Resources

Red Pine Management Guide

<http://ncrs.fs.fed.us/fmg/rp/index.html>

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