



PRE-COMMERCIAL THINNING FOR FOREST LANDOWNERS

Much of the information and photos included in this brochure came from the Montana Family Forest News Issue 48– Spring 2021. The referenced article was written by MSU Extension Forestry Specialist Peter Kolb.

Introduction

Pre-commercial thinning or PCT is quite simply the term used to describe the silviculture practice of reducing tree density by removing trees that are too small to sell for commercial products. Because the natural carrying capacity of any forest ecosystem is limited, the impacts of competition for resources among individual trees will reduce growth and vigor when they are too crowded. This competition often starts in the seedling phase.

We have all seen the carpets of lodgepole pine erupt after a wildfire or high densities of seedlings that establish on any soil disturbance such as near road construction or skid trails. Smaller disturbances also create fertile seedbeds for regeneration such as soil turned up by a wind-thrown tree or digging by wildlife. Whether a small or large disturbance, planned or unplanned, seedlings will take root and begin to compete with one another for water, nutrients and sunlight.

The higher the density of seedlings, the greater the potential for reduced growth and increased occurrence of foliage and stem diseases.

Why implement PCT?

There are many great reasons to implement PCT in your forest including improved tree growth and health, wildlife habitat, fire resilience or simply aesthetics. Sometimes it is a combination of one or all of these reasons. However, it all comes back to the basic question of "What do trees need to grow?"

Trees mainly need sunlight, nutrients, water and some room to grow. When any of these resources is limited, the growth of any organism...including trees is reduced. Trees that aren't growing well are often subject to insect and disease attacks and many times succumb to them because they lack the vigor or strength to defend themselves. To give trees more vigor they need more sunlight and more soil resources such as water and nutrients grow. Thinning an overly dense stand of trees gives each remaining tree more resources that can stimulate growth and defense. It also allows for the selection of the trees with the best form and genetics.



Above: Seedlings are some of the vegetation establishes after road construction. Peter Kolb photo.

Below: Dense regeneration following a wildfire that would benefit from a PCT. Zack Miller, Weyerhaeuser photo.



In Montana, it can take a long time to grow a tree, especially if your business is growing trees for wood products! PCT is some of the best investments we can make in our forests. PCT can give landowners a big 'bang for the buck' as younger trees show the greatest positive growth response when their surrounding conditions are improved.



These are photos of wood "cookies" from F.H. Stoltze Land & Lumber Company demonstrating the growth that can be experienced if trees are actively managed and thinned (left) vs. allowed to grow with no management (right). The difference is striking!

Photos courtesy of F.H. Stoltze Land & Lumber Company



Another great benefit to PCT is increased carbon sequestration. When trees are growing well, they are photosynthesizing more, fixing more carbon in their wood and expelling more oxygen. The wider the annual rings in a stem (see above), the faster and more carbon from the atmosphere is being locked into the stem. USDA Office of Sustainability & Climate data has shown that a managed forest actually sequesters far more carbon than a forest that is unmanaged and grown too dense. In addition to providing more sunlight to residual trees, a PCT generates woody debris that can be recycled into soil charcoal and nutrients by burning small piles, chipping or broadcast burning. The cut trees can also be left to naturally decay on the forest floor and fuel an important microbial community that recycles nutrients into the soil.



Left: A thinned stand with a consistent spacing that will promote growth in the residual stand (Lucas Townsend, GDRC photo)

Middle: A thinned stand with some 'clumps' or patches left to provide a diversity of wildlife habitat (Peter Kolb photo)

Right: A lodgepole pine stand that was thinned in the left and not thinned on the right. The thinned stand would be expected to have more vigor and less risk of damage from a wildfire than the unthinned stand. (Zack Miller, Weyerhaeuser photo)

Keeping trees healthy and growing vigorously supports wildlife habitat as well. An initial thinning exposes the forest floor to sunlight which allows more grasses and forbs to grow thereby increasing micro-habitat for ground nesting birds and amphibians, as well as food for ungulates. As improved tree growth occurs the canopy will grow denser--often in a patchy mosaic-- creating essential habitat for many mid-canopy nesting birds. The cones produced as trees mature provides seed for many small mammals. Selective, dense leave patches create hiding cover for small mammals and can be left within the thinning area to encourage diversity. Simply put, PCT is a great tool to help create and enhance wildlife habitat and landscape diversity.



Reducing the fuels across the landscape can certainly aid in lowering fire intensity. Although a temporary increase in fuels may occur immediately after PCT, treating the fuel by chipping, mastication or pile burning can reduce the wildfire potential. There are many examples where PCT treatments reduced crown fire intensity enough for fire suppression efforts to be very effective. Thinned stands of trees allow for broadcast burning, or hand piles to be burned by landowners and contractors when there is snow on the ground and thus minimizing the risk of an escaped fire.



Top Left: Hand piling can reduce fuel loads of trees removed during thinning operations. Keeping fuels low to the ground can also facilitate decomposition. Peter Kolb photo

Bottom Left: Grasses covering a PCT area after pile burning or debris treatment. Peter Kolb photo.

Right: Trees cut during thinning will decompose and return nutrients to the residual stand. Cameron Wohlschlegel photo.



When should you PCT?

A main purpose of thinning is to promote the desired tree species, and individual trees for the site and helping them grow larger and healthier. Seedlings and saplings are by far the easiest and most cost effective to thin and result in minimal fuel buildup. Although small seedlings are easier to thin, a site might look very sparse following thinning and a natural tendency is to leave seedlings closer than they need to be. Smaller seedlings are more susceptible to potential damage from snow loads, fire, animal trampling and competing vegetation. As seedlings approach 3-4 ft in height they are more resistant to damage from these disturbances. At this height, leave trees may also be easier to select based on growth rates and crown characteristics.

Landowners must also consider that the longer tree regeneration is left in a crowded condition, the more difficult it might become to leave seedlings/saplings with quality crowns. Thinning dense regeneration of 6-16 ft tall saplings can result in whips with small crowns that are easily bent over by wind or heavy snow loads. In addition, as saplings get taller, they are more difficult to cut down and dispose of.

Ultimately, the decision of when to thin tree regeneration is usually made when thickets of trees become noticeable. In most cases, transitioning a dense patch of tree regeneration into healthy taller trees may optimally require at least two thinning treatments, one for smaller trees and once again as they approach a pole size (3-8 inch stem diameter). **Failing to thin will result in overstocked suppressed stands of regeneration that will continue to persist in that form for decades.**

Recommended tree spacing following a PCT will vary by species, site conditions and landowner objective. The table below created by MSU Extension Forestry from technical and scientific sources (see references), and applied forestry practitioners experience provides thinning guidelines for various tree species and forest types.

Species	LANDOWNER GOALS at 40-60 years				
	Growth Spacing at 12-18 years		Wildlife	Wildfire	Shade or Sun
	Dry Site	Wet Site			
Ponderosa Pine Mature goal: 20+” DBH 20-40 ft spacing 24-80 trees per acre	Spacing: 10-16 ft 160 – 420 tpa	Spacing: 8-14 ft 230 – 660 tpa	Variable spacing 4-16 ft with denser and more open patches, minimum patch size 1/20 th acre	Increasing fire tolerance with size and age. 14-20 ft spacing with lower branch pruning	Preferred species in full sun and dry sites, poor species for understory or shaded sites
Douglas-fir/Spruce Mature goal: 24+” DBH 24-29 ft spacing 51-76 trees per acre	Spacing: 10-15 ft 200 – 412 tpa	Spacing: 8-12 ft 286 – 618 tpa	Variable spacing 4-15 ft, leaving some dense patches with a minimum patch size of 1/100 th acre	Low to moderate fire tolerance, keeps highly flammable dead twigs and lichens. Must prune up! 16-30 ft spacing.	Prefers partial shaded sites, grows poorly in full shade, can grow well in full sun, through sunscalds if converted from full shade to full sun quickly
Lodgepole Pine Mature goal: 18+” DBH 27-34 ft spacing 40-60 trees per acre	Spacing: 15 ft 200 tpa	Spacing: 11 ft 350 tpa	Even spacing is pretty natural for this species 6-18 ft. Wider spacing promotes wider limbed wildlife trees.	Younger trees are not very flammable. 14-20 ft spacing if trees have good crowns. Pitchy stems and beetle kill an issue	Needs full sun—gaps need to be as wide as surrounding trees are tall for regeneration. Damp areas prone to gall rust when too dense.
Western Larch Mature goal: 20+” DBH 22-27 ft spacing 62-93 trees per acre	Spacing: 9-15 ft 227 - 550 tpa	Spacing: 7-11 ft 249 - 825 tpa	Develops in dense clumps with tall whips, prone to snow breakage. Bears may peel bark for cambium in spring.	Fire tolerant; not flammable until very old and decayed. Maintain spacing to promote full crowns	Needs full sun or will develop into tall thin whips that bend over with heavy snow. Thin early, not much need to prune
Grand fir Mature goal: 20+” DBH 22-25 ft spacing 68-103 trees per acre	Spacing: 9-14 ft 227 - 550 tpa	Spacing: 7-11 ft 249 – 825 tpa	Dense clumps used for bird nesting, tolerates very dense clumps, leave some 1/100-acre clumps	Very fire sensitive and flammable. Holds onto dead twigs and has high bark and needle pitch content that easily flames. 16+ ft spacing.	Prefers shaded sites, North and East aspects. Not suitable for most full sun sites on South and West aspects. Easily sun scalds when overstory removed. Prone to stem and root decay.
Western Red Cedar	Spacing: 8-16 ft Only thin when very young		8-14 ft makes for dense hiding cover	Fire sensitive. A poor species to leave if planning any fire.	Full shade to partial shade; riparian areas. Not well-suited for south and west aspects.

References:

“Carbon.” US Forest Service, USDA Office of Sustainability & Climate, Mar. 2020, www.fs.usda.gov/managing-land/sc/carbon.

Ecology and Management of Eastern Oregon Forests. Manual 12. 2005. Emmingham, Oester, Fitzgerald, Filip and Edge. Oregon State University Extension Service. 208 pages.

