School of Environmental and Forest Sciences

UNIVERSITY of WASHINGTON

College of the Environment

# Sustainable Forest Management in Western Washington:

# The Need for a Dynamic and Adaptive Approach

By Matthew Grund

School of Environmental and Forest Sciences

University of Washington

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## Is variable density thinning a better silvicultural approach for sustainable forestry in Western Washington than clearcut harvest practices?

When I first read the topic for this year's essay contest, I couldn't wait to get started on my entry. As a student of ecological forestry, the question is extremely relevant to my interests. *I'm going to knock this one out of the park,* I thought. *I can list off the advantages of variable density thinning over clearcuts in my sleep!* I started organizing my arguments about how variable density thinning is more responsible and sustainable than clearcutting, and at the same time can still turn a profit.

Then, in the middle of outlining my essay, I realized something important. I had been so excited about describing the benefits of variable density thinning that I'd overlooked the simple but essential truth: no silvicultural approach based solely on thinning can sustainably meet the forestry needs of Western Washington. For that matter, nor can an approach based solely on clearcut practices. The truth is that no single silvicultural technique, used exclusively, is an effective way to assure sustainable forestry in Western Washington.

With these facts clearly in my mind, I started over. This essay will provide insight into the demands on the forests in Western Washington, describe the role of variable density thinning in a holistic approach to forest management , and offer other solutions for long-term timber production that are ecologically, socially, and economically responsible.

Forestry has played an important role in the history of the Pacific Northwest. For centuries, local Native Americans have used trees for a multitude of purposes. For example, the wood of the Sitka spruce is lightweight yet strong, and was used to construct sea-worthy vessels. Western red cedar was so valued it was referred to as the "tree of life." The wood and bark were used to make everything from longhouses to tools to medicine.

Westerners continued harvesting timber upon their arrival to the Northwest, albeit in a much less responsible fashion. The decades following World War II saw particularly intensive harvesting practices, when clearcutting old growth forests became the main objective. *Clearcutting* is a technique that simply removes every tree in a stand, 'slicking off' entire forests and not leaving much behind. Not only was most of the landscape clearcut during this period, but it was largely abandoned afterward to avoid paying taxes while waiting for another rotation. The US Forest Service even made it an official policy to 'convert' old growth forests to more 'productive' Douglas-fir plantations.

These actions had an extremely significant effect on the Northwest's ecosystems. One consequence is that much of our modern landscape is dominated by even-aged Douglas fir in a mature stage of stand development, while there is a much smaller percentage of early seral and old growth than existed historically. This imbalance could prove detrimental in the future. Not only do homogenous forests limit biodiversity, but they are not as resilient to disease, pests, or climate change.

Inevitably, people eventually realized that forests were not in endless supply, and clearcutting policies began to improve. Currently forest practice laws for clearcuts mandate replanting, establishing riparian buffers, and leaving a few trees and snags behind. Some people argue that when these mandates are followed, clearcutting mimics natural stand-replacing disturbances. There are several reasons, however, why this argument does not hold up. For example, unlike natural disturbances, the practice of clearcutting does not leave behind any significant amount of coarse wood for habitat or nutrients. Furthermore clearcuts have been shown to cause a vast array of negative impacts to the land, including soil erosion, decreased snow-holding and water-regulation capacity, loss of habitat, increased risk of windthrow and landslides, and decreased aesthetic value.

In fact, most of the benefits of clearcuts fall into the economic realm. Maximizing timber production maximizes jobs as well as income in Northwest communities. As a result, clearcuts are still

the primary silvicultural system employed in production forestry. It is, however, no longer practiced here at all on federal land. Instead, federal forests are managed using more ecologically friendly techniques like variable density thins.

As the name implies, *variable density thinning* is a method that removes differing amounts of timber from an area. Compared to more traditional thinning methods, variable density gives the forester more options and leeway to retain or promote ecologically important characteristics. For example, unique features such as particular clusters of trees or hardwood components can be completely skipped and left intact. Gaps can be cut out in order to open up the canopy, allowing other species to be established in the opening. Removing individual overstory dominants can release suppressed shade tolerant trees, promote growth of large co-dominants, and cover the cost of the operation. Overall variable density thinning helps create a more heterogeneous (or variable) stand, in composition and structure, from an originally homogenized state. This is a great treatment for many of our pure, even-aged stands. In addition to improving the ecology of the site, it also creates jobs for the local industry and pays for the cost of the operation with the timber sales.

So if variable density thinning has proven to be ecologically, socially, and economically sound, what are the arguments against using it to manage forests in Western Washington? A somewhat obvious one is that variable density thinning, used as the sole method of forestry management, simply does not generate enough timber or revenue to replace regeneration harvests in Western Washington. An even more fundamental flaw of using *only* thinning methods is that eventually, we will run out of places to thin. Due to these limitations, variable density thinning as the chief silvicultural approach is not sustainable in the long run.

It's clear to me that in order to avoid the mistakes made in the past, we must not think of making an "either/or" decision. No single approach of management (i.e., *either* variable density thinning

*or* clearcuts) can achieve sustainability. Our forests are varied and dynamic across the landscape, so our management of them needs to be as well. Consequently a sustainable approach requires an adaptive, holistic, and dynamic strategy. The forests on the Olympic Peninsula, for example, are completely different than the forests in the west Cascades. How could one single management technique be effective for both? It is necessary to develop silvicultural systems that match specific stand conditions, always keeping in mind how that particular stand connects into the landscape as a whole.

Considering the fact that we will and should continue to apply regeneration harvests in some areas, these harvests need to be done in a responsible fashion. Given our current scientific understanding, however, it should be obvious that clearcuts should not be the preferred method. Instead I argue that we have a moral obligation to employ less destructive alternatives, allowing for harvests to be done in a less impactful fashion.

A relatively recent regeneration technique, called *variable retention harvesting*, is one possible alternative for managing the western Cascades. This method more accurately mimics natural disturbances because it doesn't remove all organic matter. Anywhere from 15-30% of the stand is left behind in order to provide valuable functions to the ecology of the area. Variable retention harvests allow the freedom to incorporate site specific characteristics when writing the silvicultural prescription. In other words, foresters choose what to leave, how much to leave, and whether to leave the trees spatially dispersed or aggregated. Trees that are left behind after a harvest can be thought of as 'biological legacies' that provide continuity of function, structure, and composition through generations. By providing habitat, structure, and dead organic material, they serve as a kind of 'lifeboat' for living organisms, from birds to mycorrhizae.

Another advantage to variable retention harvesting is the opportunity to choose whether trees should be left spatially dispersed or aggregated. Dispersed retention is beneficial when trying to

influence the microclimate evenly across the area; for example, to regulate snow pack and melt or prevent soil erosion on a slope. Aggregated retention helps maximize biodiversity, leaves areas of undisturbed soil and understory, and allows smaller trees to be left. In addition to generating significant revenue, variable retention harvests clearly provide a variety of other benefits that clearcuts do not. In a day and age when it is absolutely necessary to manage for social and ecological benefits as well as economic objectives, ideas like variable retention harvesting are worth investigating.

While I believe that variable retention harvesting would work well on western Cascade slopes, I feel just as strongly that it shouldn't be used on the Olympic Peninsula. I've measured western hemlock regeneration following a clearcut on the peninsula, and found that the seedlings establish in numbers of thousands per acre. This experience tells me that it's foolish to create large openings. It makes no sense that we are still trying to force Douglas-fir plantations there. For one thing, we already have plenty of Douglas-fir in Western Washington. It is extremely time-consuming and expensive to try and establish it in areas that have historically been dominated by western hemlock, western red cedar, and Sitka spruce. Secondly, it doesn't make sense to cut such large openings and then have to thin every ten years because of the dense regeneration.

In forests on the Olympic Peninsula, I think it would be beneficial to employ more of a strip shelterwood system, or a series of cuttings to promote the shade tolerant species. In this method, only 15%-20% of the stand is removed at a time, with the cuttings confined to a narrow strip. The remaining adjacent overstory trees would be effective at limiting regeneration and protecting the stand from windthrow. I would also encourage the idea of leaving more wood on the ground than has been our practice in the past. This would create an uneven growing surface, allowing some trees an immediate advantage. This uneven surface would help avoid the phenomenon of a sea of small diameter trees all packed in and racing for the sky. While it does not generate large profits all at once, a strip shelterwood

system does provide relatively continuous revenue. It also results in reduced maintenance costs, preserves ecological function, and maintains aesthetic value.

For me, the bottom line is this: we do need regeneration harvests in order to meet the societal demand on our forests, but it is absolutely necessary to manage forests for social and ecological benefits as well as economic ones. Trees are a clean and renewable product, and it's beneficial to the planet when we grow them. Western Washington is blessed with this resource and we need to keep our local timber industry functioning.

As long as people continue to consume wood and paper products, we will need regeneration techniques that help meet these demands while at the same time protecting this resource. Instead of maximizing any one aspect of our forests, e.g., diameter increment, we must successfully manage for multiple objectives. It will take a variety of adaptive management techniques to truly achieve sustainable forestry.

Although this is a more complex answer than simply making a choice between variable density thinning and clearcutting, I believe that a combination of methods is the only approach that makes sense. Only by managing for heterogeneity of species and stages of stand development across the landscape can we avoid the mistakes of the past. Our management must sustain timber yield—providing local jobs and supporting infrastructure—while at the same time protecting the ecological function of our forests. In my mind, this is the very definition of 'sustainable'. By adjusting silvicultural prescriptions to different site characteristics, it is possible to manage for timber while maintaining natural composition, function, and structure of our forests. With careful management, we can meet our responsibility to create diverse, resilient forests that leave options for future objectives and conditions.