IMAGE:
A recenently thinned forest outside of Seattle

AIA SEATTLE MASS TIMBER COMMITTEE

SUSTAINABLE FOREST TOUR

Learning from Three Different Forests

INTRODUCTION

Our AIA Seattle Mass Timber Committee had the opportunity to walk through three different forests areas outside Seattle. Lead by Seth Zuckerman, Executive Director at NW Natural Resource Group (NNRG), and Jaal Mann, Lead Forester at NNRG, the tour sought to daylight the connection between forest products, like mass timber, and forest management. What does sustainable forest management look like and what are the implications for mass timber and beyond?

FIRST FOREST

The first forest that we visited had trees around 35 years old. Many trees had been marked for harvest, but many more were not. Only the smaller trees – those that had been outcompeted for light by taller trees – were marked. This method of forest thinning leaves the fittest trees in place to continue growing and sequestering carbon. With dense undergrowth, thinning creates a more open forest structure that provides better habitat for native animals and shrubs, reduces risk of wildfire, lessens soil impacts, and improves water quality and retention. Quite a few standing dead trees, or snags, are left in place as prime habitat.

This first forest had a rich amount of diversity. Instead of a monoculture of trees, we saw vine maples, alder, ferns, salal, and a mix of conifers. A diverse mix of plants can support more biological diversity. After this patch of forest is thinned, the next harvest (also a thinning) will follow 15 to 20 years later. As these remaining trees approach 70-80 years old, they will have sequestered considerable amounts of carbon. This long rotation management approach varies from traditional forestry where trees are intensively managed and clearcut every 35-45 years.

While traditional forestry generates regular income for forest owners and wood fiber for forest products, we learned it also leaves something on the table. Commercial tree species in the Pacific Northwest (PNW) grow faster as they grow older. It's a bit counter intuitive, but we learned that softwood conifers add the most volume of wood year-by-year during the age of around 40-80 – and yet they are typically harvested right at the start of that time. As these trees rapidly add more volume, they also sequester more and more carbon. By letting trees grow older, the amount of harvestable board feet increases greatly (more than a linear relationship), and carbon sequestration likewise benefits.

A study done by NNRG found that an 80-year rotation stores about 50 percent more carbon than two 40-year rotations. A large part of this differences is that for the first ten years or so of a tree's life, they are small and their needles or leaves don't cover the entire forest area, so they miss out on their ability to photosynthesize and convert large amounts of CO2 into wood.

More mature trees have a higher capacity for photosynthesis, and this is a reason to let them grow longer (for additional information, see footnotes 1 and 2 below).

At the first forest plot we took core samples of two trees by boring into their trunk with a specialized tool – an increment borer. Consisting of an auger, handle and extractor tray, this procedure is surprisingly non-invasive and doesn't harm the tree.

With core samples in-hand, we examined the trees' growth rings and growth patterns. We found fast early growth and then tighter growth rings in later years, indicating that these trees were being out-competed and growing slower than many of their neighbors. Because these trees' growth had slowed, and with it their carbon-capturing potential, they were marked for harvest.

IMAGES:

The first forest area the group visited with trees around 35 years old marked for thinning. The group took core samples of trees and compared growth rings.

IMAGES:
The second forest area the tour group visited. Trees here, around 100-120 years old, are marked to be thinned.

SECOND FOREST

The second forest we visited was more mature – with trees around 100-120 years old. This lush forest looked healthy and resilient. Here again, we could see specific trees marked for selective harvest. After taking a set of core samples we saw a similar pattern - the smaller trees in this area had tight rings and were not competing well. The larger trees were doing better, though not growing as quickly as they had in the past, presumably due to competition from smaller trees.

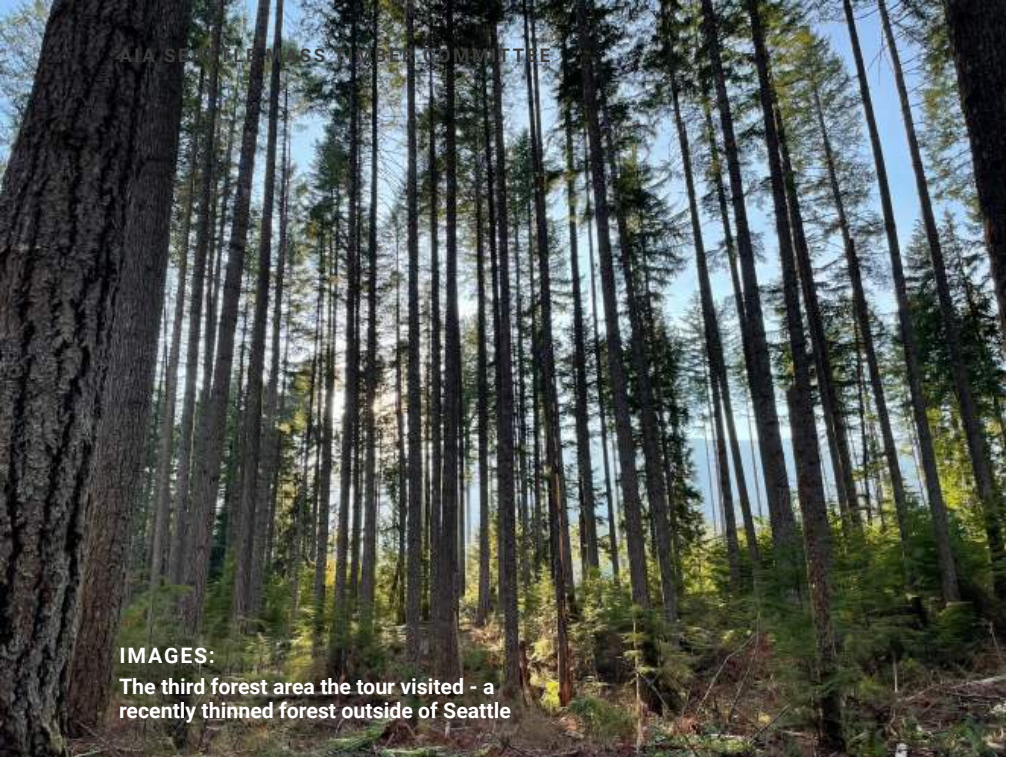
THIRD FOREST

The third forest had been harvested during the past spring. This was also a selective harvest, leaving the biggest trees in place to completely fill out their canopy and capture as much sunlight as possible. This maximizes their future growth potential. Even after the spring harvest, the forest felt vibrant and healthy. Everyone on the tour was pleasantly surprised by how beautiful and serene this area felt – not like a harvest zone, but like a vital functioning forest. This forest is about 90 years old and will be thinned again a later date.

CONCLUSION

Trees removed by thinning can be transformed into long-lived forest products, like mass timber. These wood-based products continue to store carbon, serving as a carbon sink and creating a new carbon pool that can help mitigate climate change. Thinning then has a double benefit - it sequesters carbon in building products while also allowing the remaining trees to capture carbon faster than without the thinning. It is estimated that forests in Washington State sequester around 12 percent of the State's emissions (see footnote 3). The UN's body on climate change, the IPCC, has called for net zero carbon emissions by 2050. With a different mix of management practices, how much additional carbon can our state's forests and buildings sequester and play a bigger role in reaching this decarbonization goal?

From an economic perspective, forest thinning does generate net revenue, especially for larger trees. Selective harvests take more time to log fewer trees, and therefore won't have the same income potential as a clearcut. However, NNRG told us that the income from thinning is spread out more evenly and regularly, benefiting forest owners.



IMAGES:
The third forest area the tour visited - a recently thinned forest outside of Seattle

The trees harvested at the third area along this tour, for example, yielded high quality wood that could easily be used for large beams or columns exposed for architectural purposes, or even laminated into exposed components like cross-laminated timber (CLT).

There is a tradeoff, at least in the short term, for income generation between typical clear-cutting operations and less intrusive measures. Theoretically, letting the trees grow longer and larger means a bigger pay-day at the end of this harvest cycle as well as income generated through thinning. This approach creates more wood volume, and the wood can be of a higher quality.

Longer rotations are not without their challenges. Washington's milling infrastructure is tuned for tree trunk sizes generated from short rotations. Milling trees larger than around 24" in diameter can be difficult or require long transportation distances between forest and mill. Another issue is ensuring that our local mills have enough log volume to stay in business. If all forests moved to longer rotations, this could hit mills hard and potentially create unintended harvests elsewhere. Some have also noted that a 55-year rotation could provide an optimal balance between carbon sequestration, tree volume, and income generation (see footnote 4).

Forests are an economic engine in the Pacific Northwest, but they are also home to a diversity of other plants, animals, and insects. In addition to wildlife, recreation, and economic opportunity, forests sequester large amounts of carbon and thereby play a key role in mitigating climate change. In the Pacific Northwest, forests are all around us and we are interconnected to them if we know it or not. Therefore, understanding our forests so we can better protect them and take best advantage of all the benefits they offer should be a priority.

Our state's Forestry Board creates rules, such as mandates for replanting and salmon protection, to manage these vital forest resources (footnote 5). In addition to state regulations, emerging research from the Climate Smart Wood Group (footnote 6) and others are providing more tools and resources to help us understand sustainable wood sourcing. For many of us, this tour was an early step along the path of better understanding our forests and implications for wood use. We learned that forest management goals have a big impact on how a forest functions, its resilience, and how they benefit other species, including us!

APPENDIX

ADDITIONAL RESOURCES

> Seth's blog about the carbon-sequestering and timber-growing benefits of growing older trees.

> This 4-minute video NNRG produced about another forest where they work with, the Nisqually Community Forest outside of Ashford, talking about the many benefits of ecological forestry.

> This 3-minute video about the reasons to thin a forest. It has good shots of logging equipment at work!

> A link to this search tool from the Forest Stewardship Council (FSC) that can provide a starting point in sourcing FSC, although many relevant suppliers are not listed (especially mills).

Footnotes:

1. https://www.nnrg.org/longer-rotations-and-carbon/

2. https://www.sightline.org/2022/03/17/yes-long-rotations-can-yield-real-climate-gains-for-cascadia/

3. https://www.nnrg.org/longer-rotations-and-carbon/, https://www.sightline.org/2022/03/17/yes-long-rotations-can-yield-real-climate-gains-for-cascadia/

4. https://www.threetreesforestry.com/post/thoughts-on-the-longer-rotation-climate-solution-for-washington-state-is-it-a-sure-bet

5. www.dnr.wa.gov/about/boards-and-councils/forest-practices-board

6. https://www.climatesmartwood.net/

For questions, please email Joe Mayo (jmayo @ mahlum.com), Eloise Allsop (eallsop @ fastepp.com), and/or Seth Zuckerman (seth @ nnrg.org). If you are not already on the AIA Mass Timber Committee email list, please send a message to masstimber @ aiaseattle.org.

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