



Sightline
INSTITUTE

Long Timber Harvest Rotations

**Methodology, Results, and Policy
Considerations**

Kate Anderson, Sightline Institute

**Oregon Board of Forestry – Public Meeting
March 8, 2023**



WHITEBARK PINE

OVERSIZE LOAD



Sequester in Oregon's natural and working lands and waters:

- By 2030: An additional 5 million metric tons CO₂e/year
- BY 2050: An additional 9.5 million metric tons CO₂e/year

(Compared to 21.7 million metric tons CO₂e/year baseline)

An aerial photograph of a forest landscape, showing a mix of green forest and brownish clear-cut areas. A white rectangular box is overlaid on the center of the image, containing text.

Long rotations:

Half as much clear-cutting

Half as much pesticides

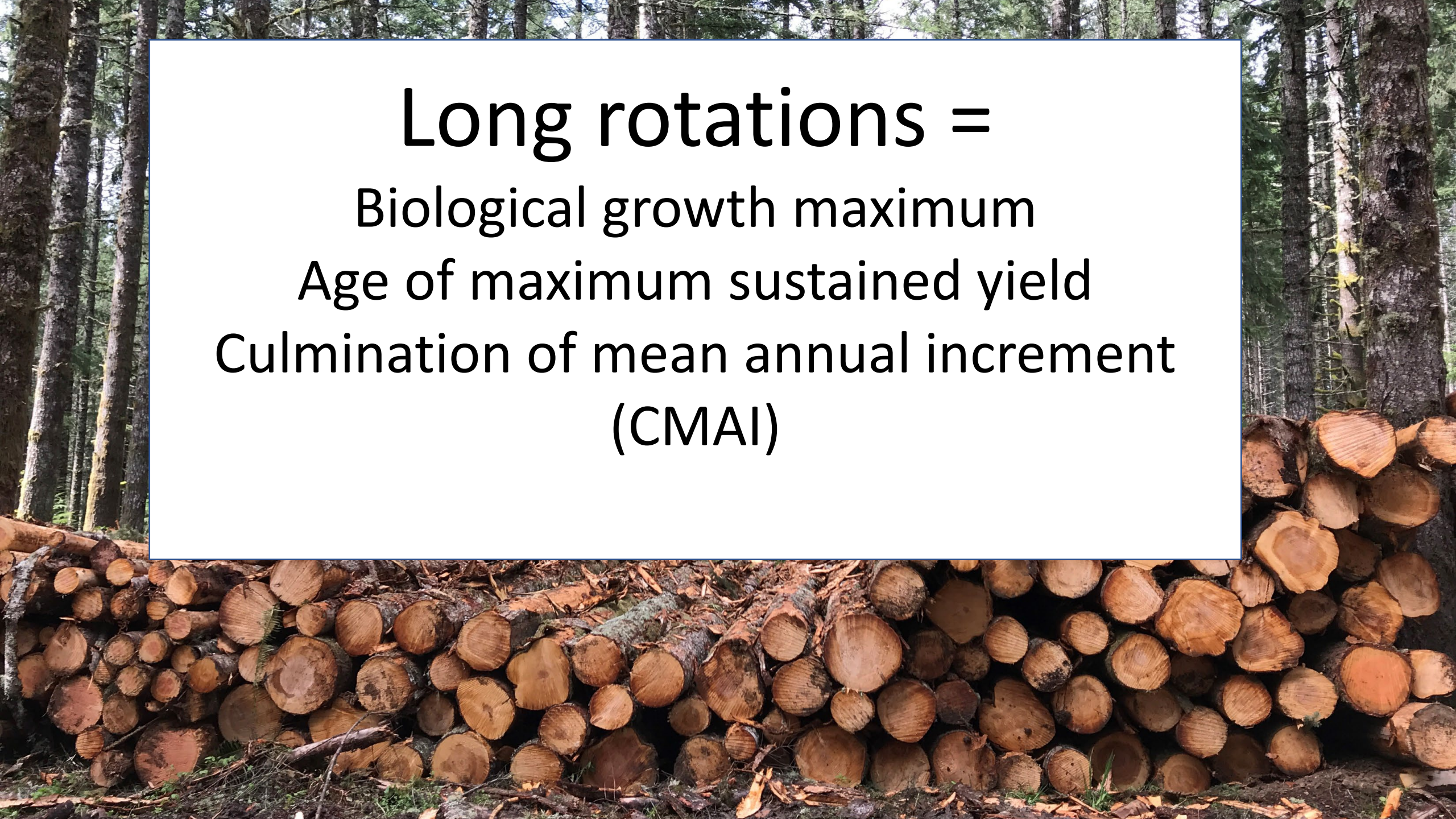
Twice as much habitat

Better water protection

More timber

More carbon storage

Lower net emissions



Long rotations =
Biological growth maximum
Age of maximum sustained yield
Culmination of mean annual increment
(CMAI)

Trees = photosynthetic factories.

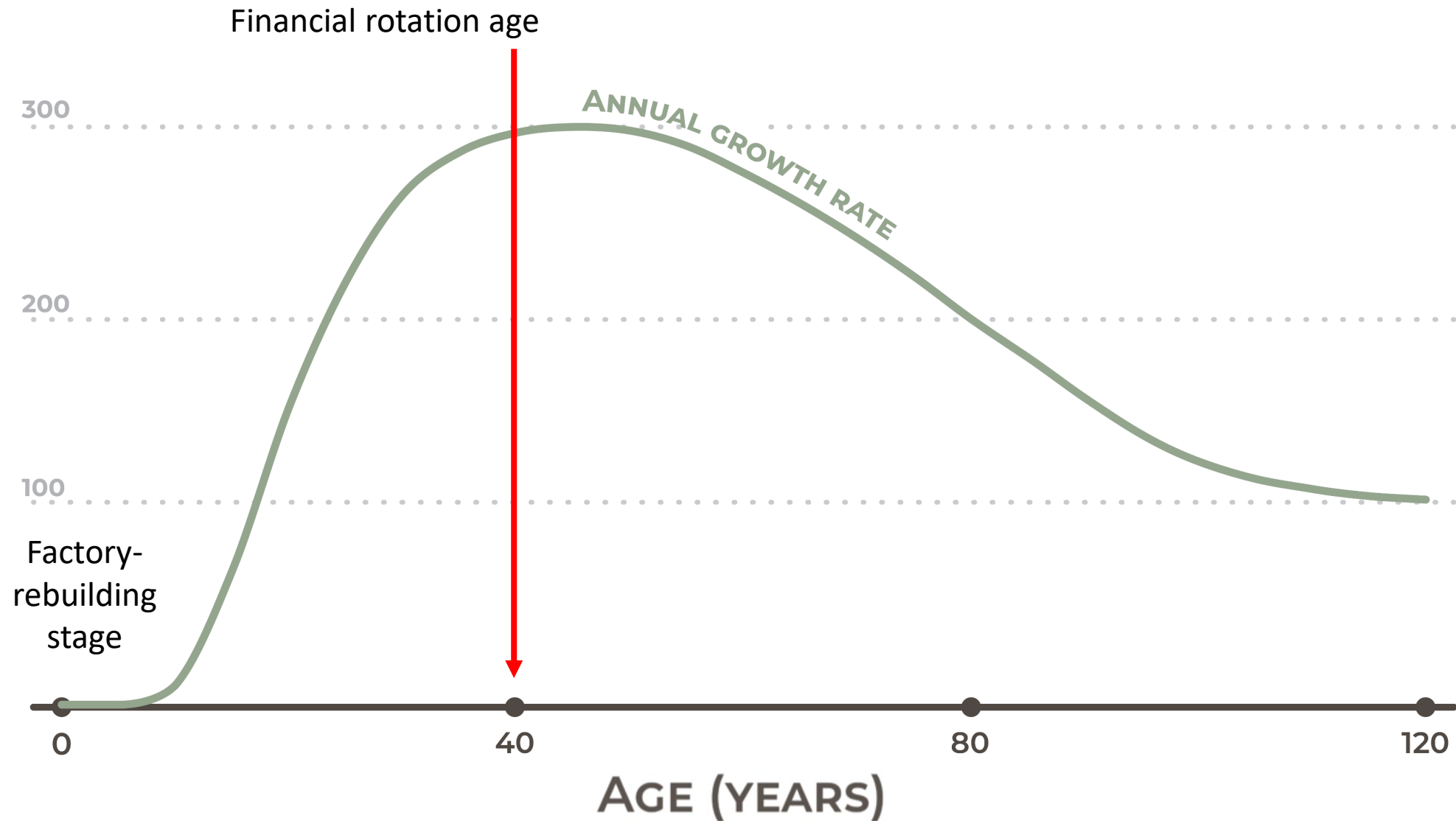
Green-up

Factory-
rebuilding
stage

Photo credit: Marcus Kauffman, ODF



Forest growth (ft³/acre/year)



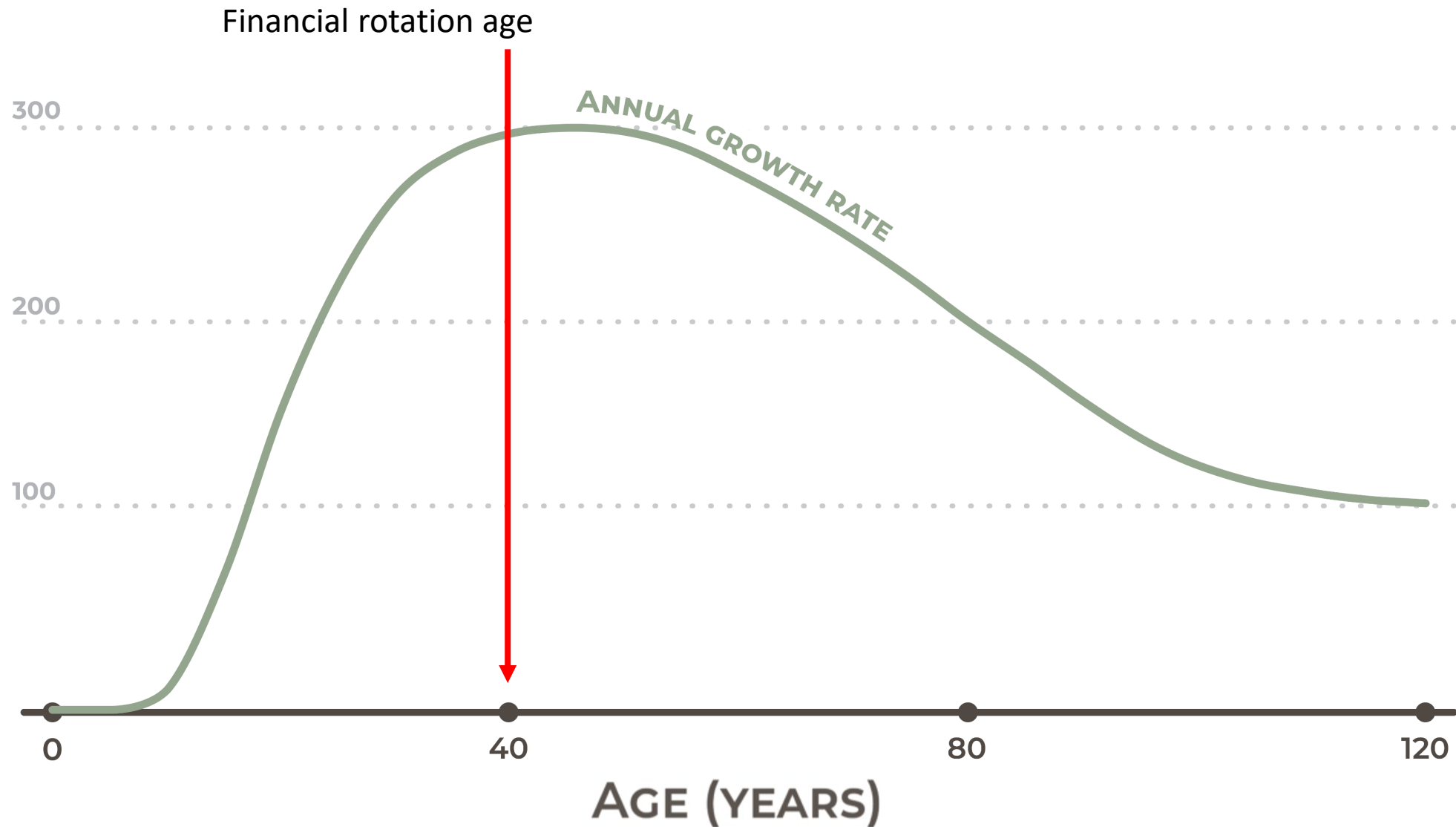
Forest growth (ft³/acre/year)



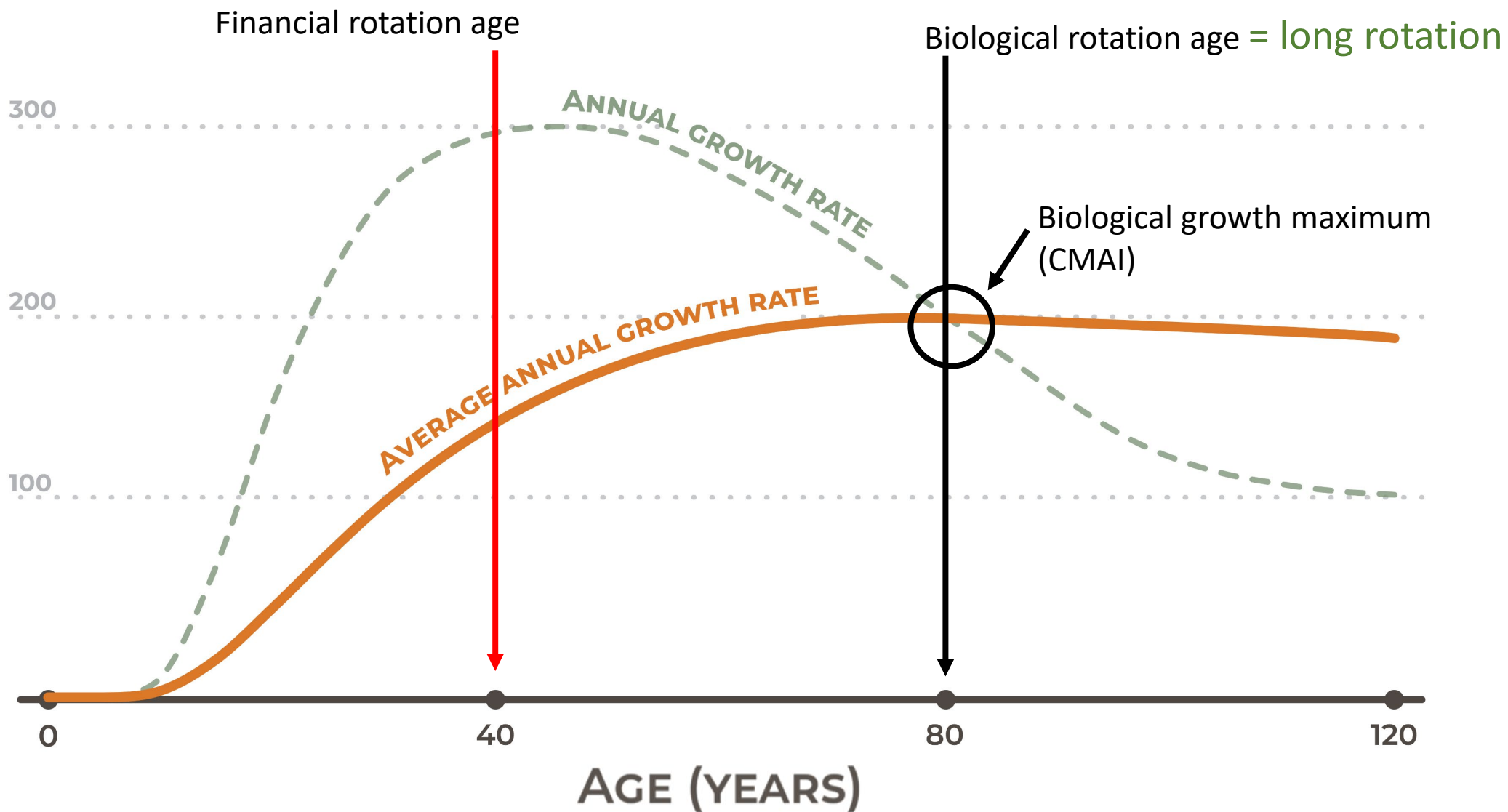
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Forest growth (ft³/acre/year)



Forest growth (ft³/acre/year)



What does an actively managed western Oregon forest on 80-year rotations actually look like?



Photo credit: Edie Dooley, MB&G

Cut-to-length thinning in ~30-year old stand

Photo credit: Edie Dooley, MB&G

54-year old stand, after cable thin



Photo credit: Edie Dooley, MB&G

Pole-thinning in a 72-year old stand



Photo credit: Edie Dooley, MB&G

72-year old stand, with downed carbon from WW2 old growth harvest

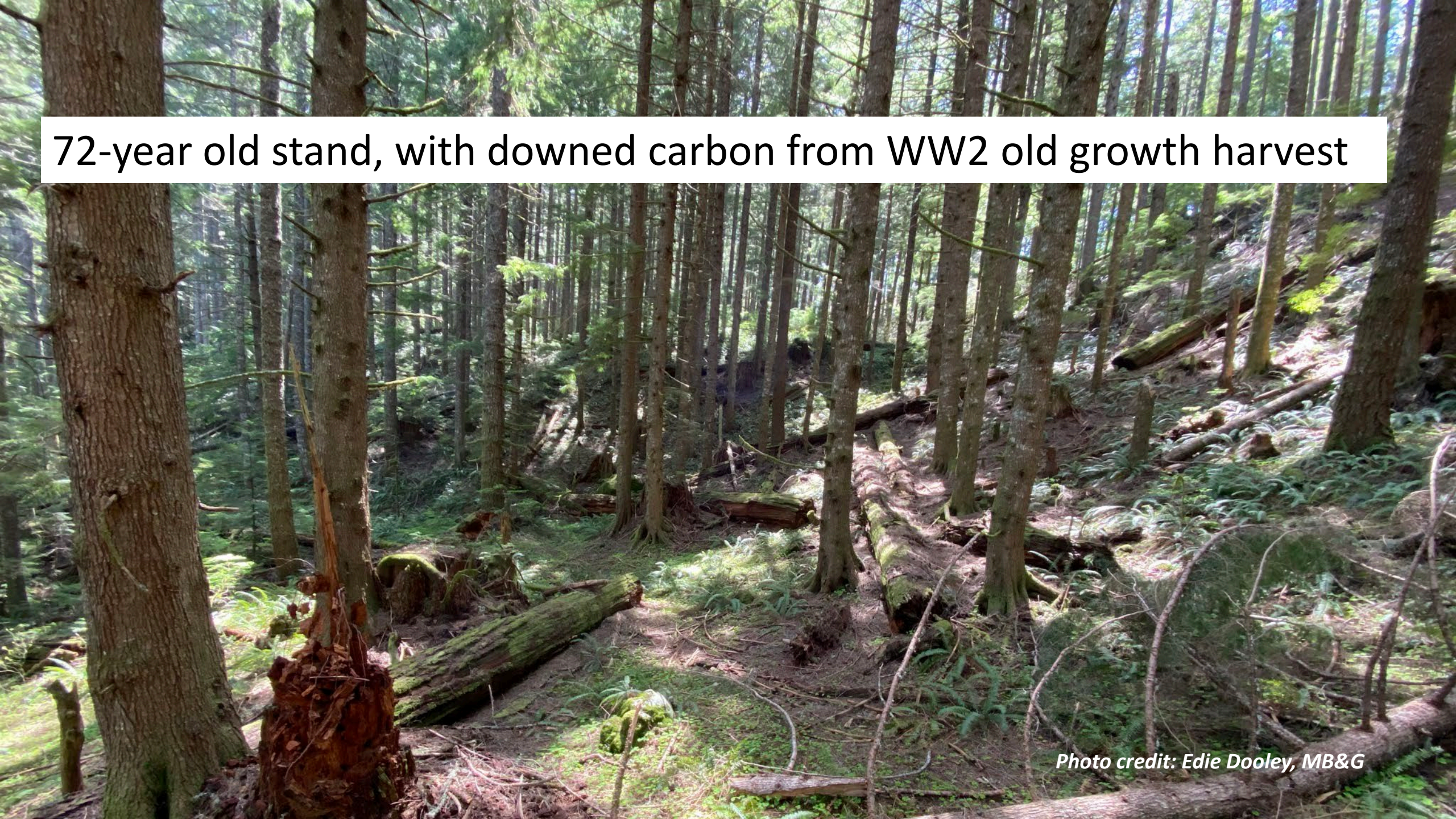
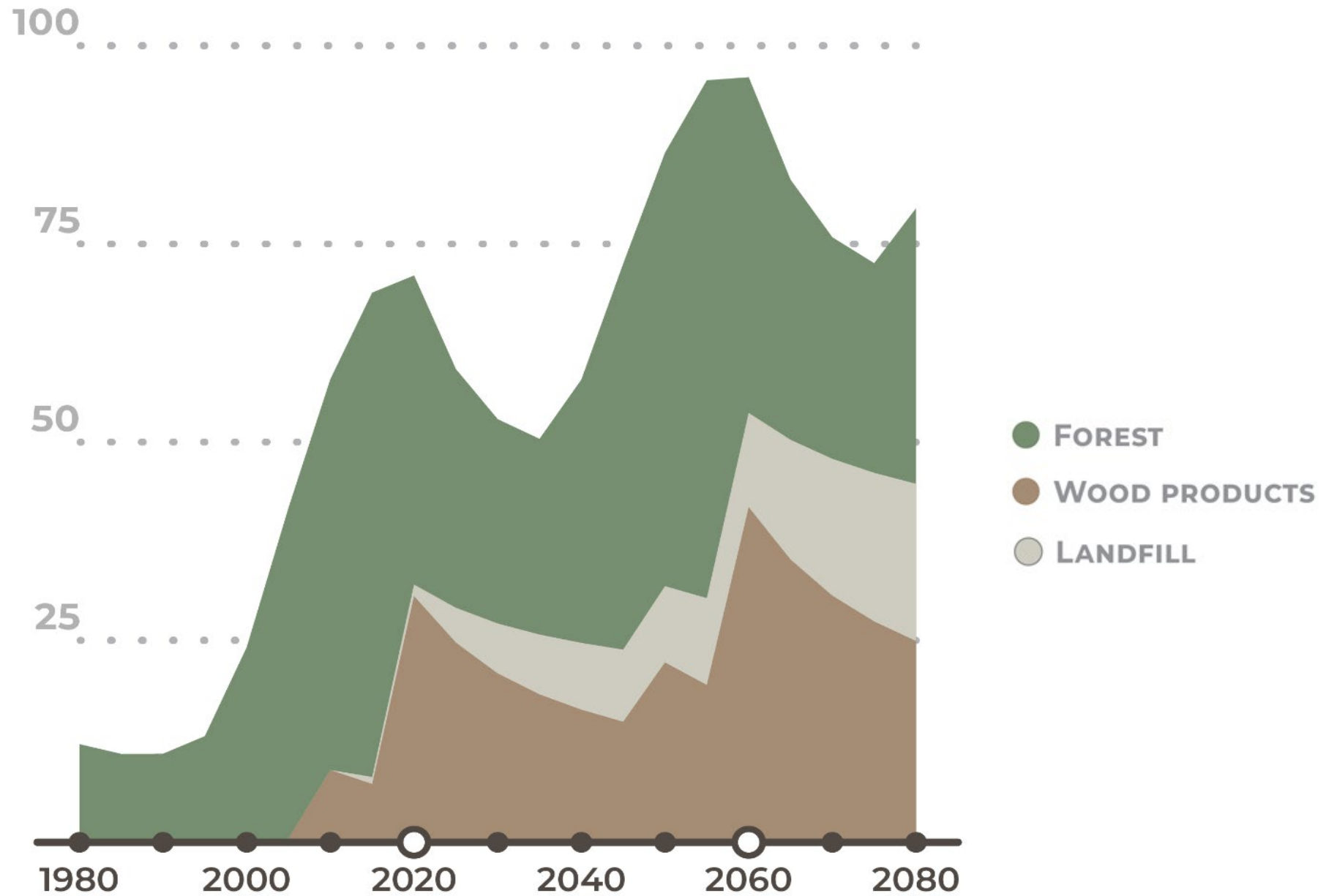
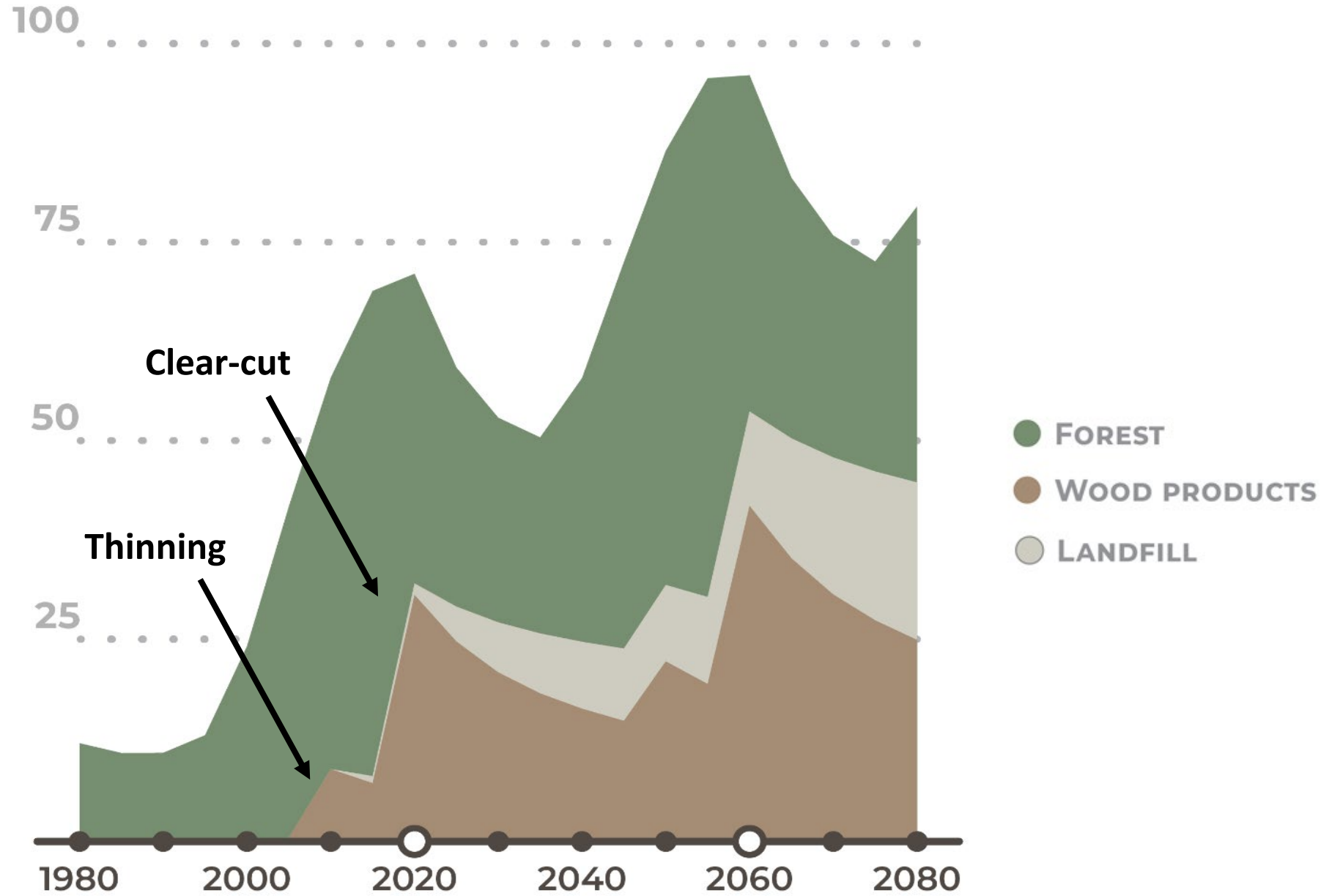
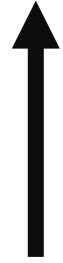


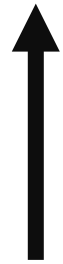
Photo credit: Edie Dooley, MB&G

Where is carbon stored as forests grow, become wood products, and grow again?



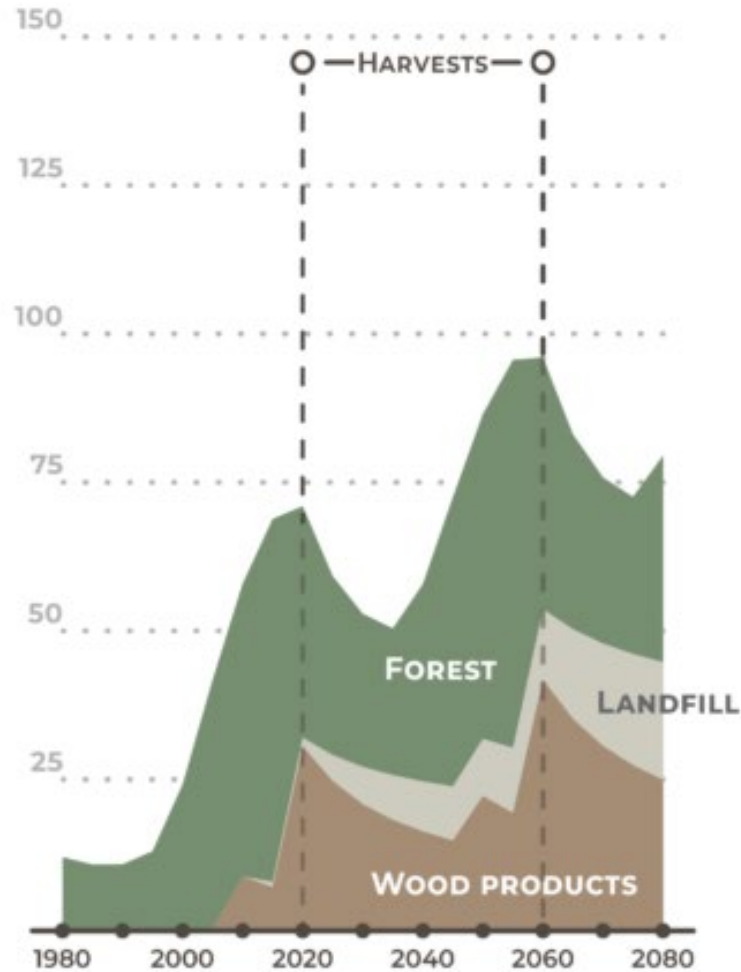
Tons of carbon stored per acre (1980-2080)



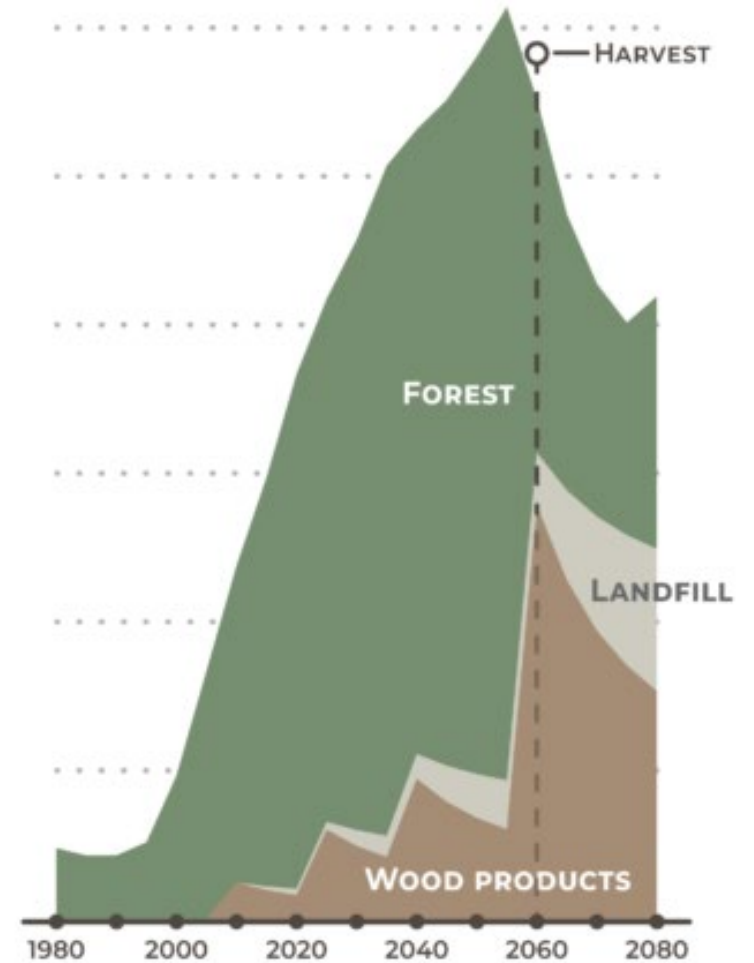


Tons of carbon stored per acre (1980-2080)

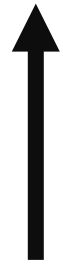
40-YEAR ROTATION



80-YEAR ROTATION

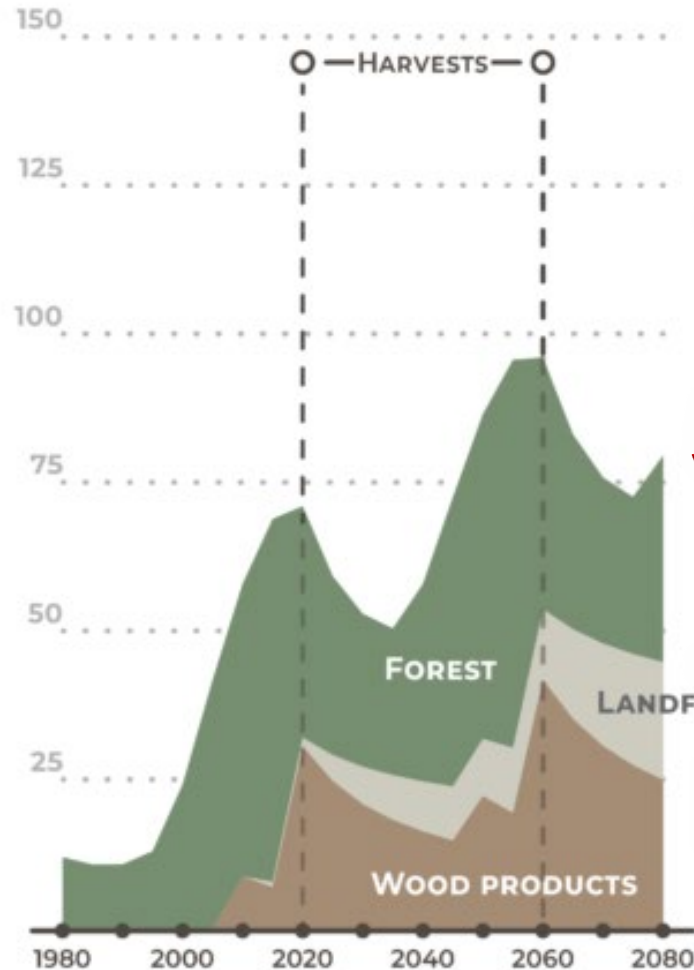


Modeling by Northwest Natural Resource Group



Tons of carbon stored per acre (1980-2080)

40-YEAR ROTATION



80-YEAR ROTATION



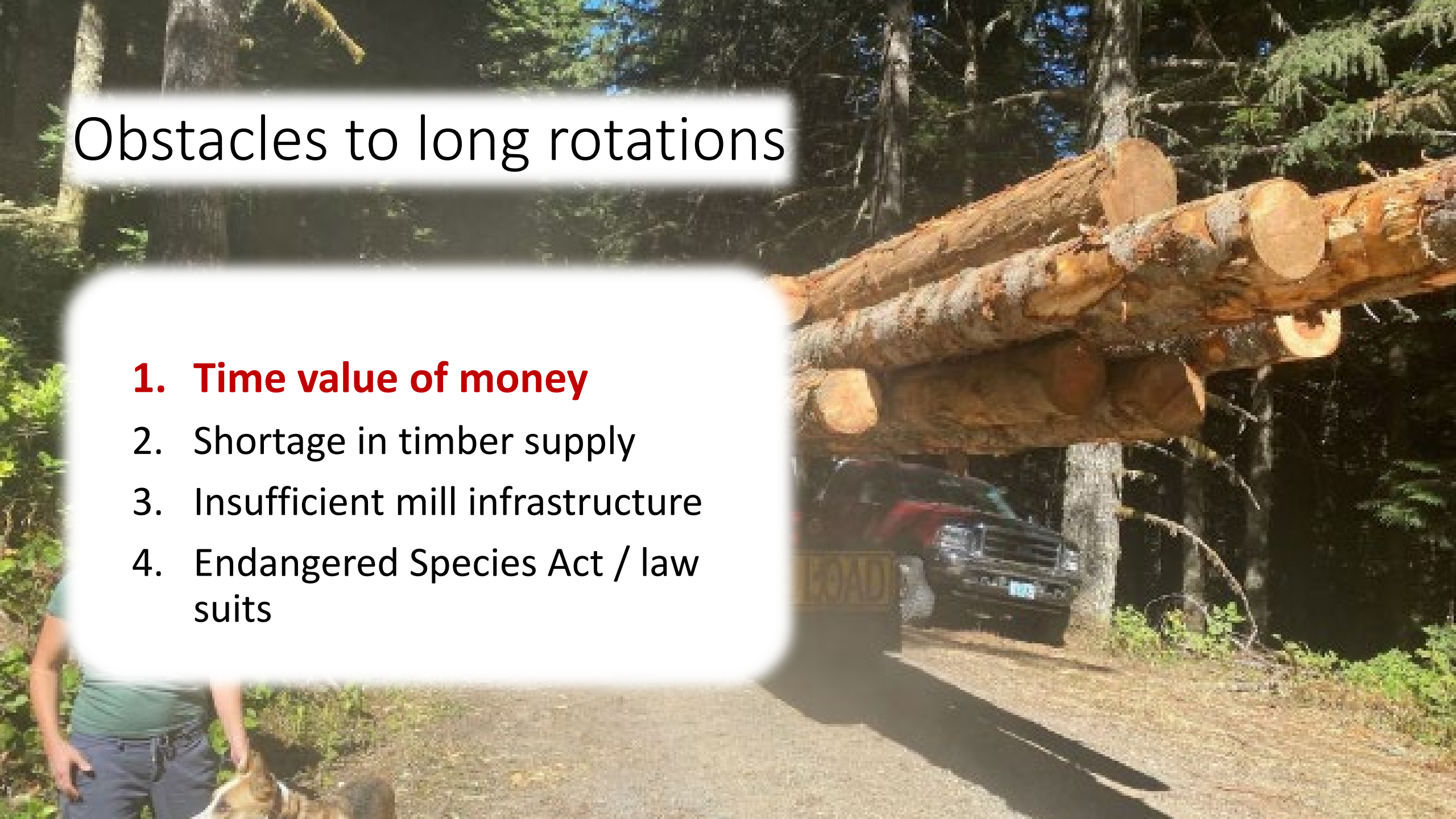
52% more timber

53% more carbon

13% more carbon in wood products

Obstacles to long rotations

- 1. Time value of money**
2. Shortage in timber supply
3. Insufficient mill infrastructure
4. Endangered Species Act / law suits



After Hours: \$28.65 (↑0.60)

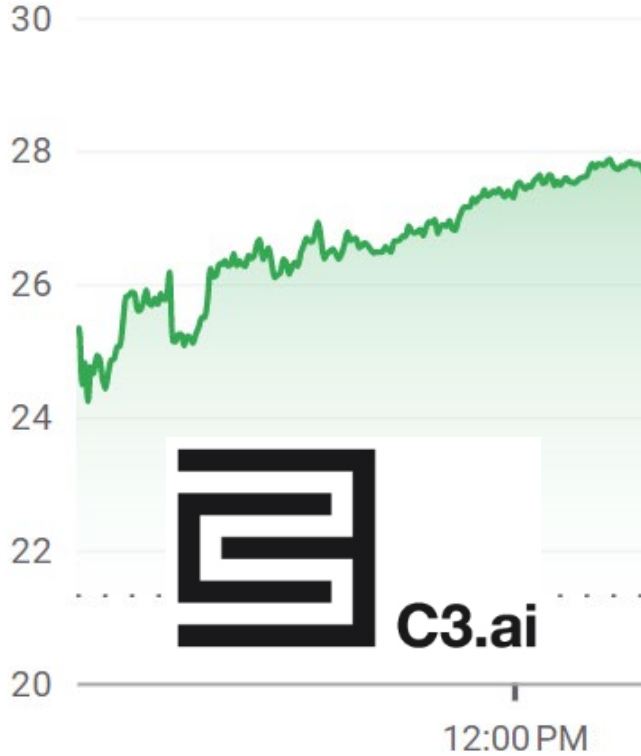
Closed: Mar 3, 7:59:59 PM UTC-

1D

5D

1M

6M



The “financial rotation age”

- Compounding growth
- Net present value
- Discount rate

Homepage > Equities > United States > Nyse > Weyerhaeuser Company > Summary [WY](#) [US9621661043](#)

WEYERHAEUSER COMPANY (WY)

• Delayed Nyse - 04:00:01 2023-03-03 pm EST

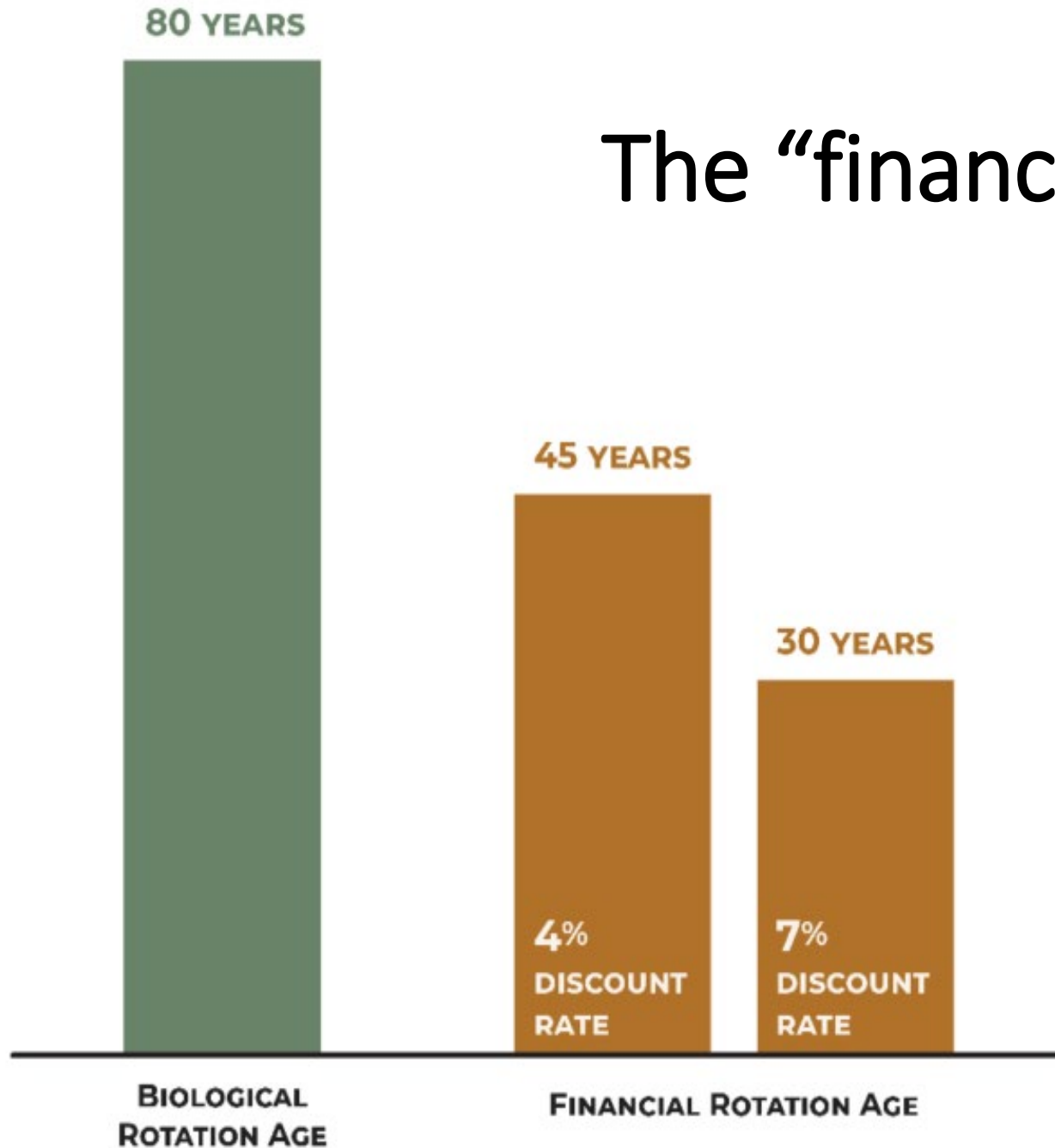
31.66 USD **+0.99%**



03/03 Weyerhaeuser Co : Regulation FD Disclosure
03/02 WEYERHAEUSER COMPANY : Ex-dividend
02/16 Stockfish to Represent Weyerhaeuser at I

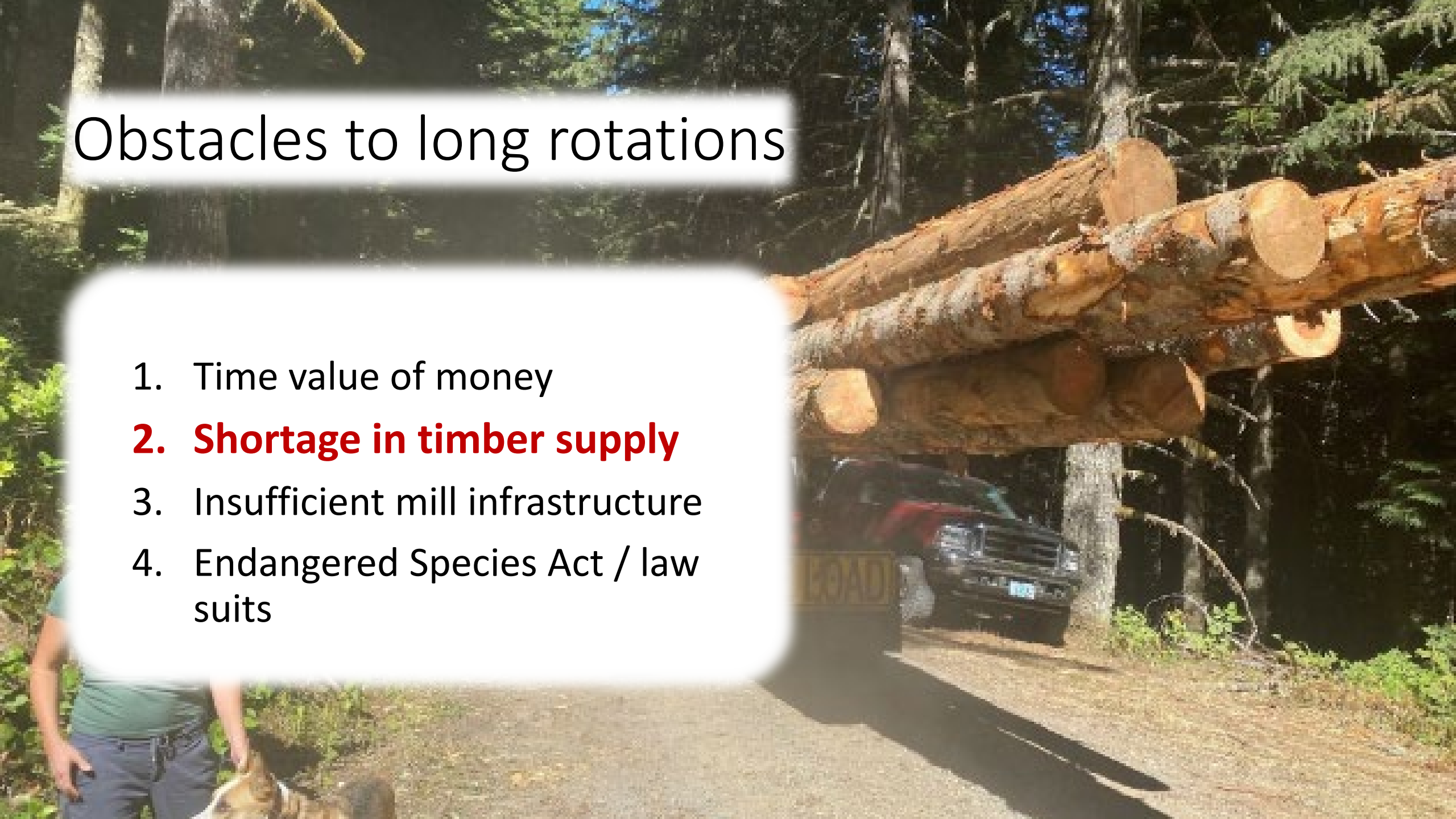


The “financial rotation age” (for whom?)

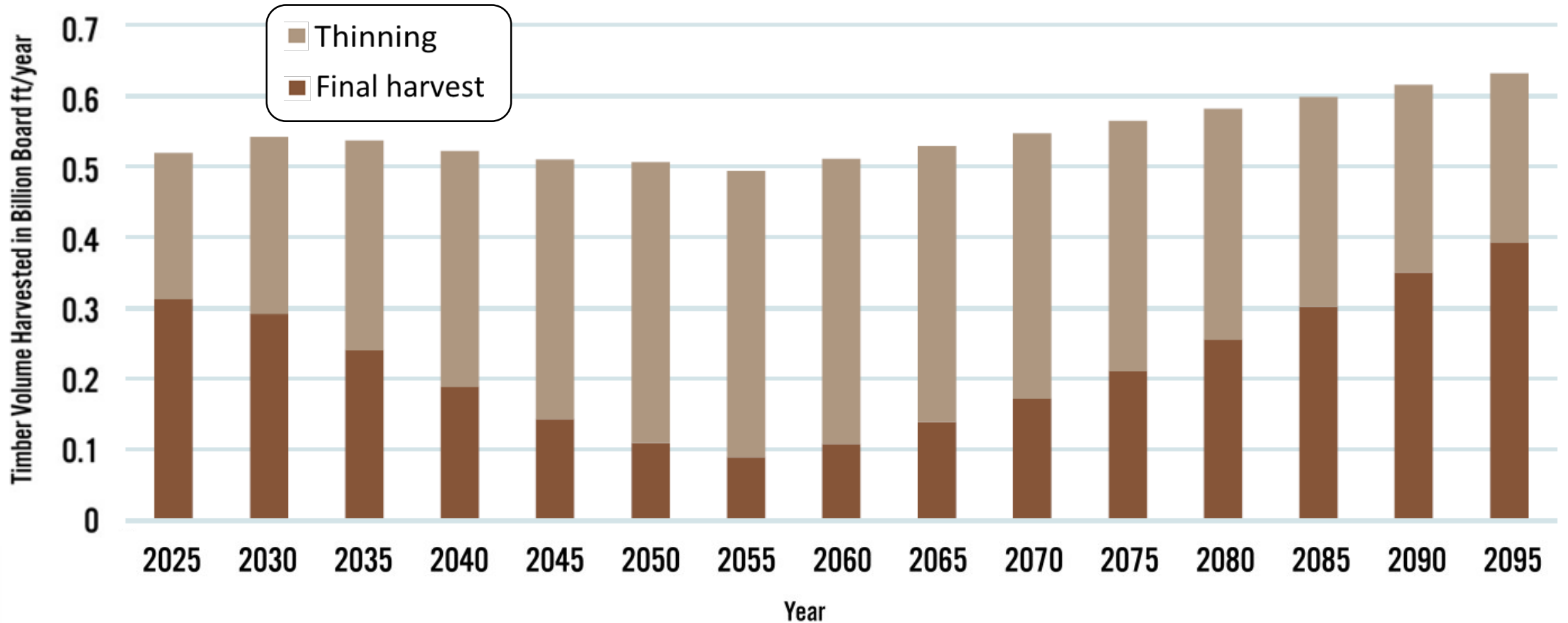


Obstacles to long rotations

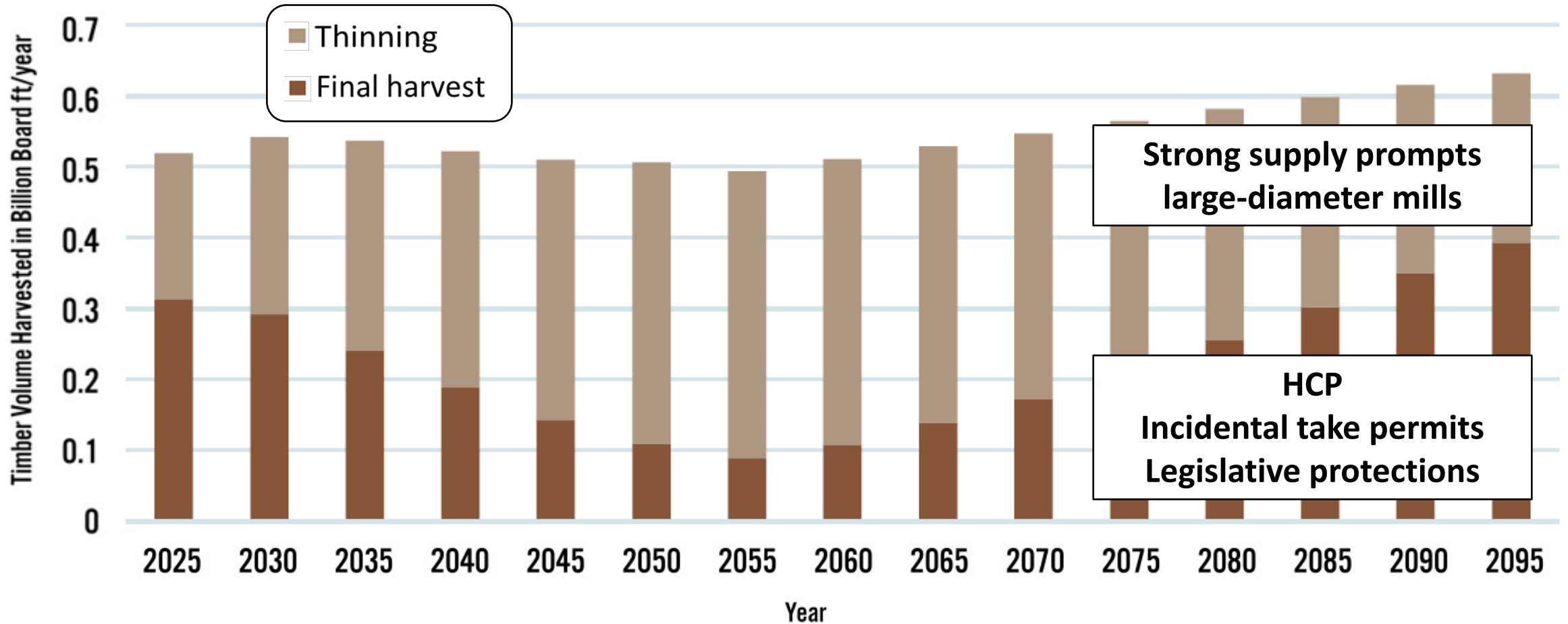
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- 2. Shortage in timber supply**
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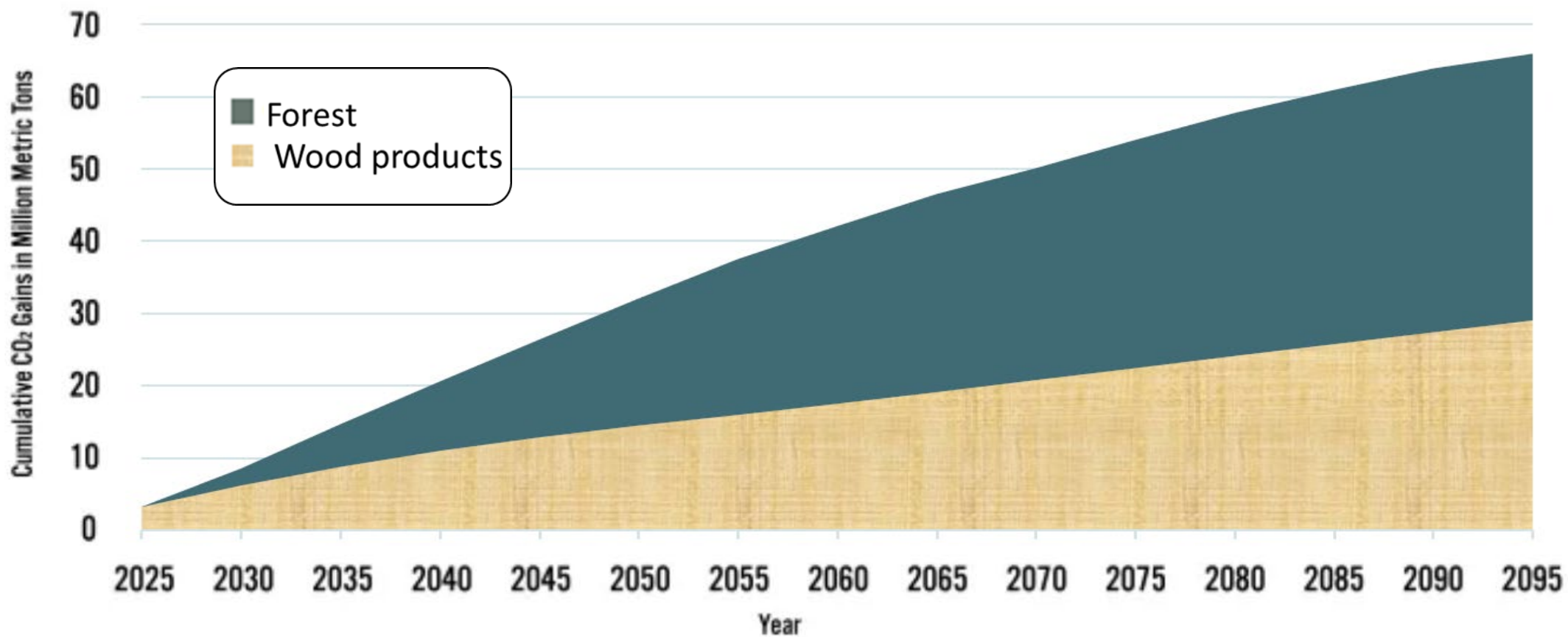
Annual Timber Volume Harvested During 70-year Transition from 40- to 80-year Rotations on Private Land in western Washington



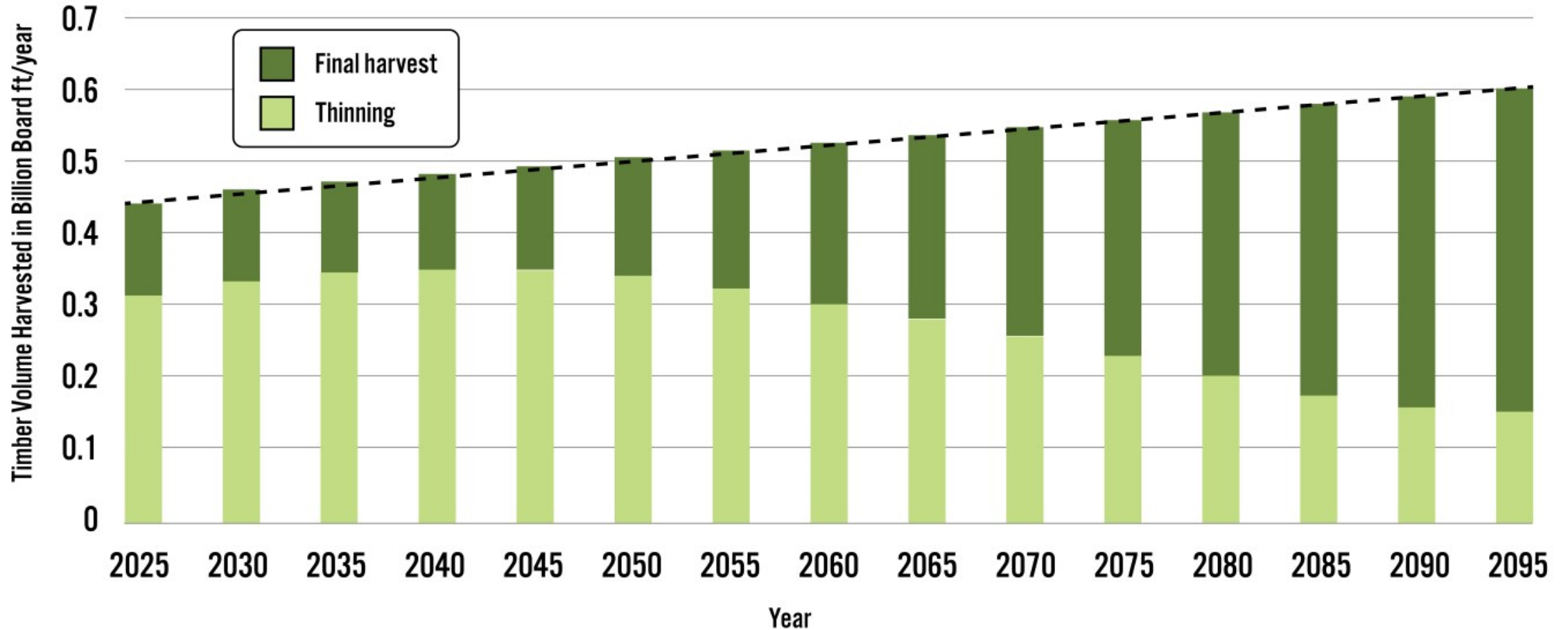
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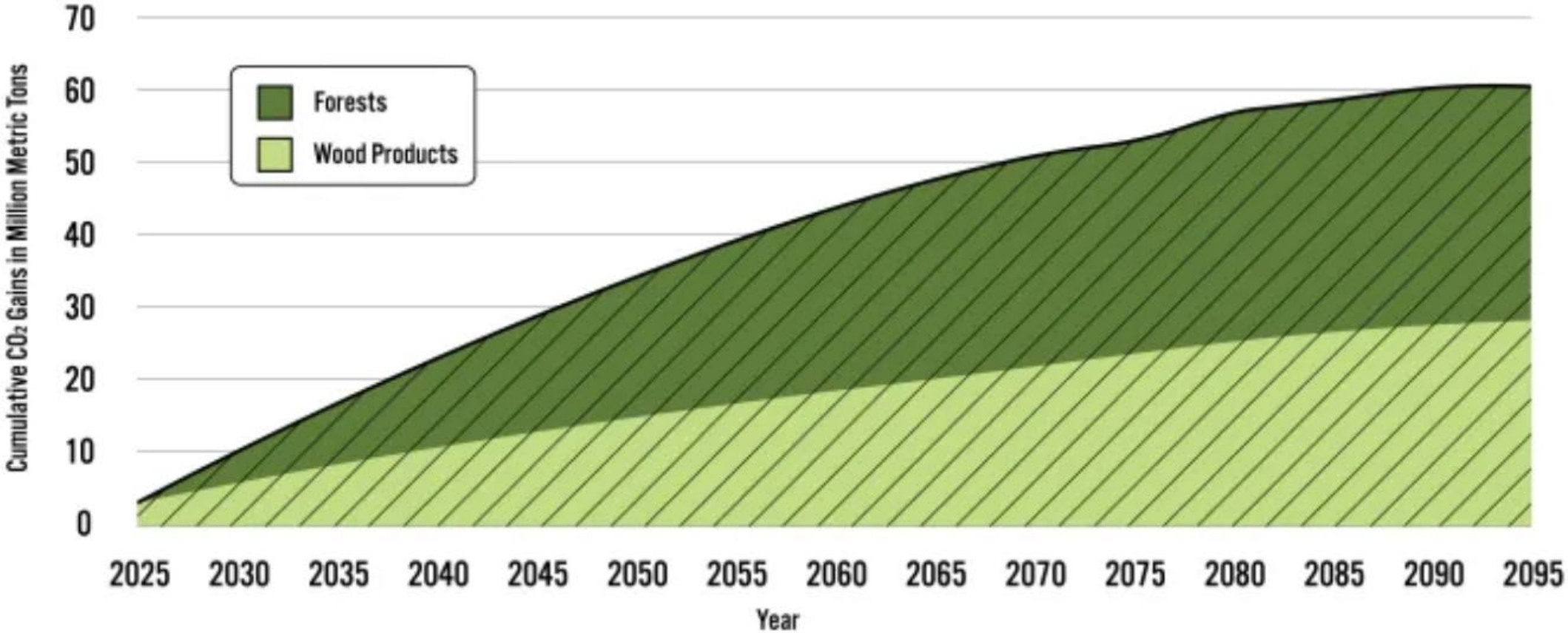
Cumulative CO2 Gains on Private Forest Land in Western Washington



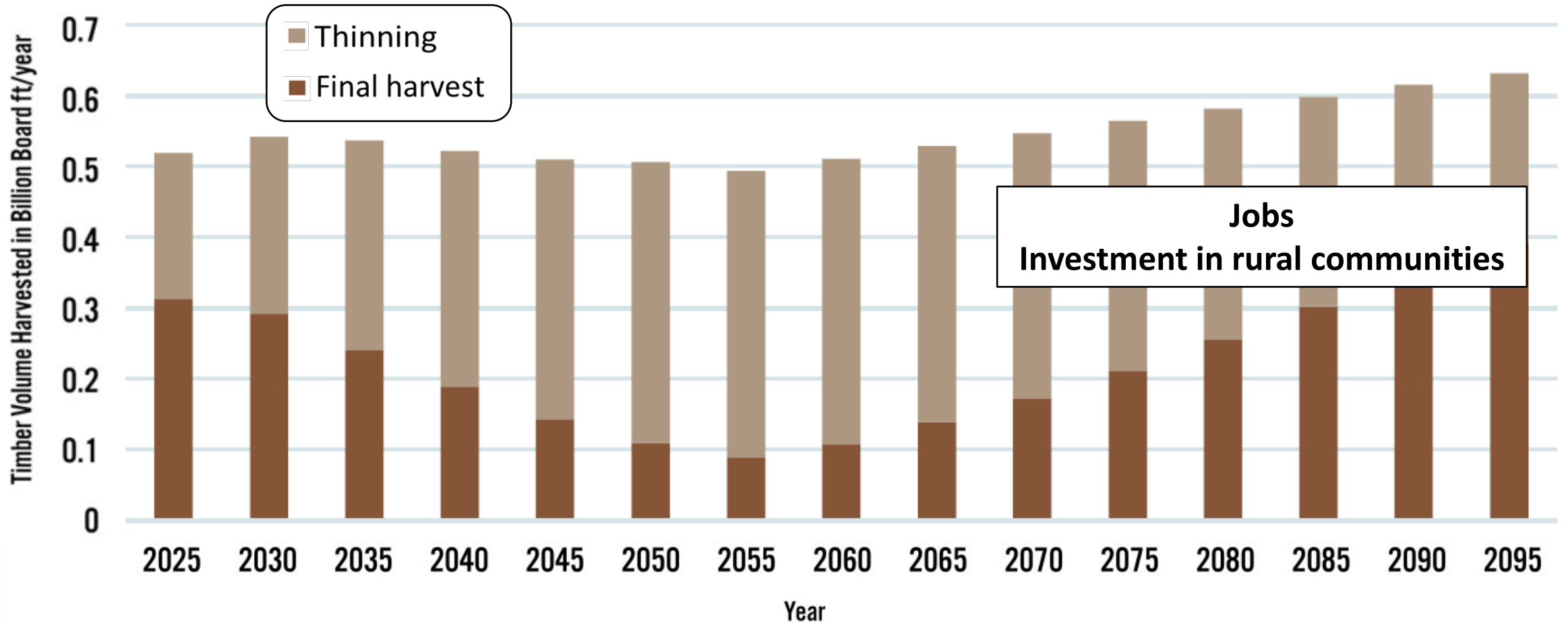
Annual Timber Volume Harvested During 70-year Transition from 40- to 80-year Rotations on 700,000 Acres of DNR Land in Western Washington



Cumulative CO2 Gains on DNR Forest Land in Western Washington



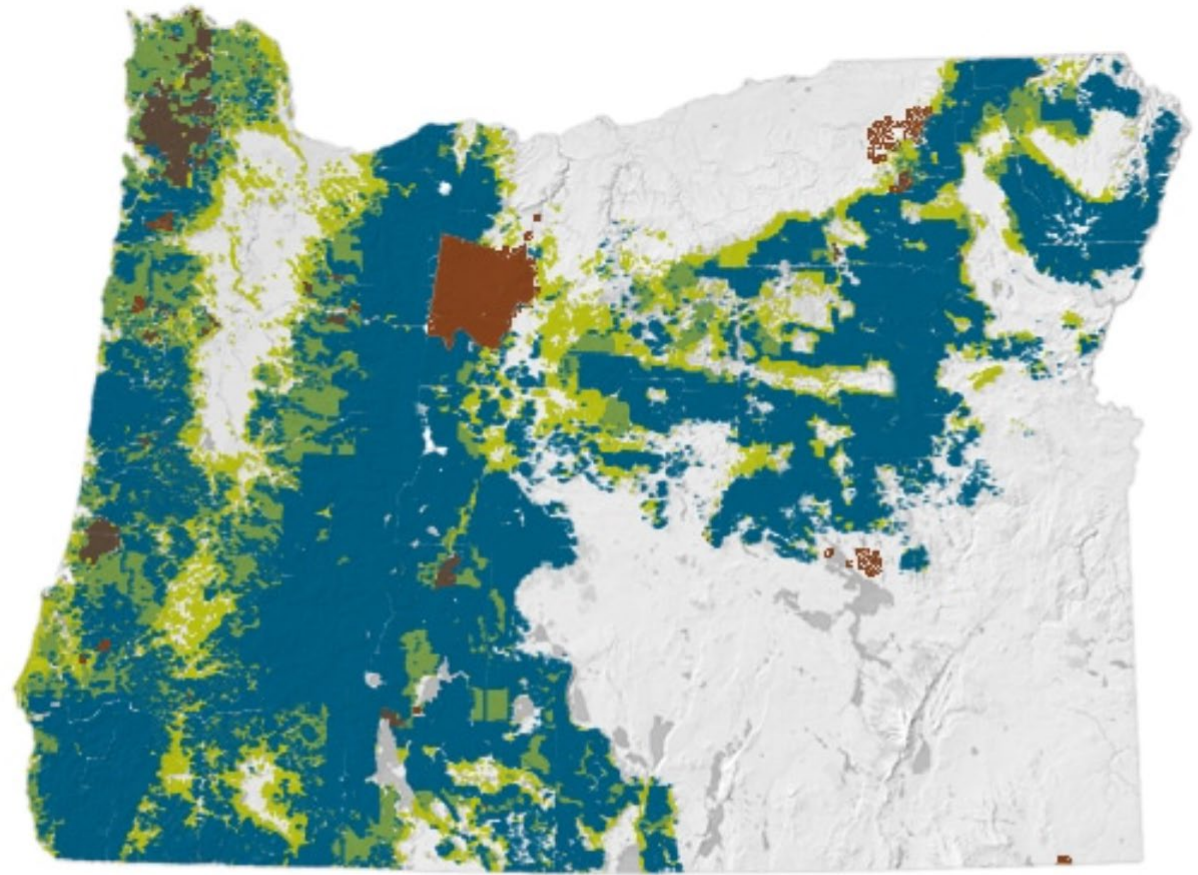
Annual Timber Volume Harvested During 70-year Transition from 40- to 80-year Rotations on Private Land in western Washington



**Jobs
Investment in rural communities**

Complementary transition strategy
(not a replacement):

What would an
All-Lands
approach look like?



Obstacles to long rotations

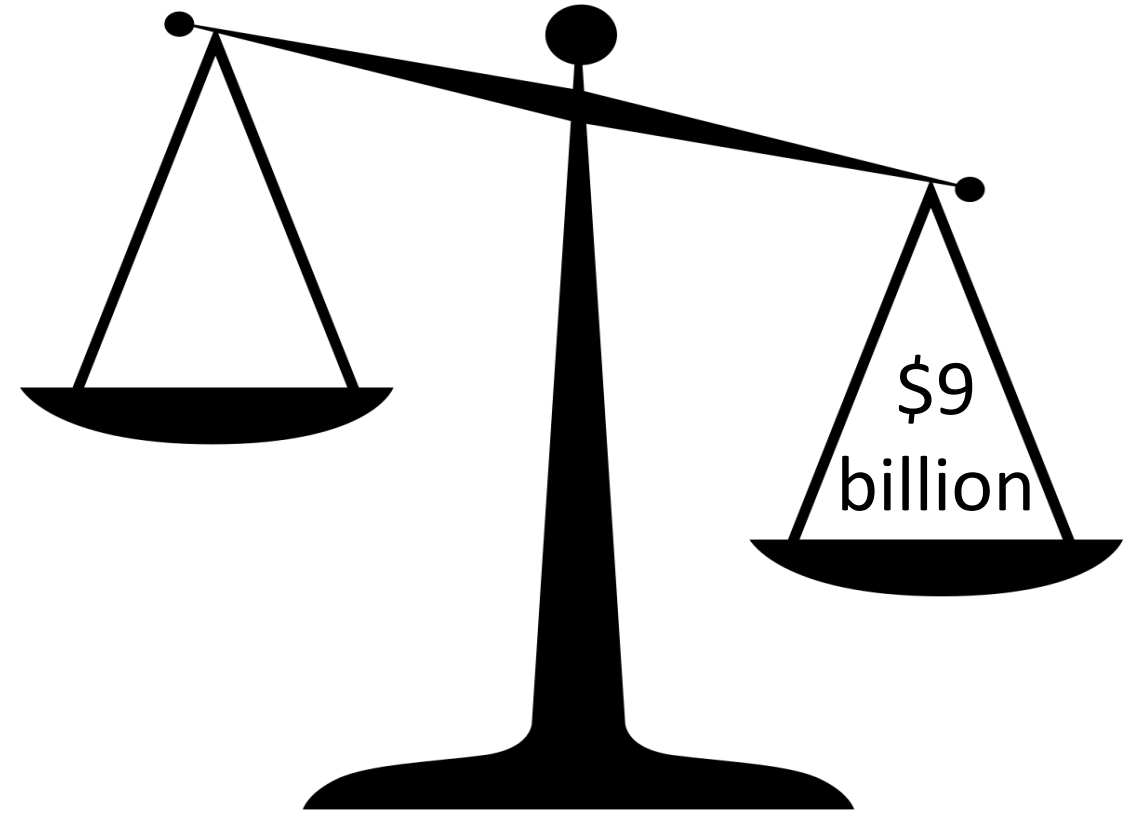
- 1. Time value of money**
- ~~2. Shortage in timber supply~~
- ~~3. Insufficient mill infrastructure~~
- ~~4. Endangered Species Act / law suits~~



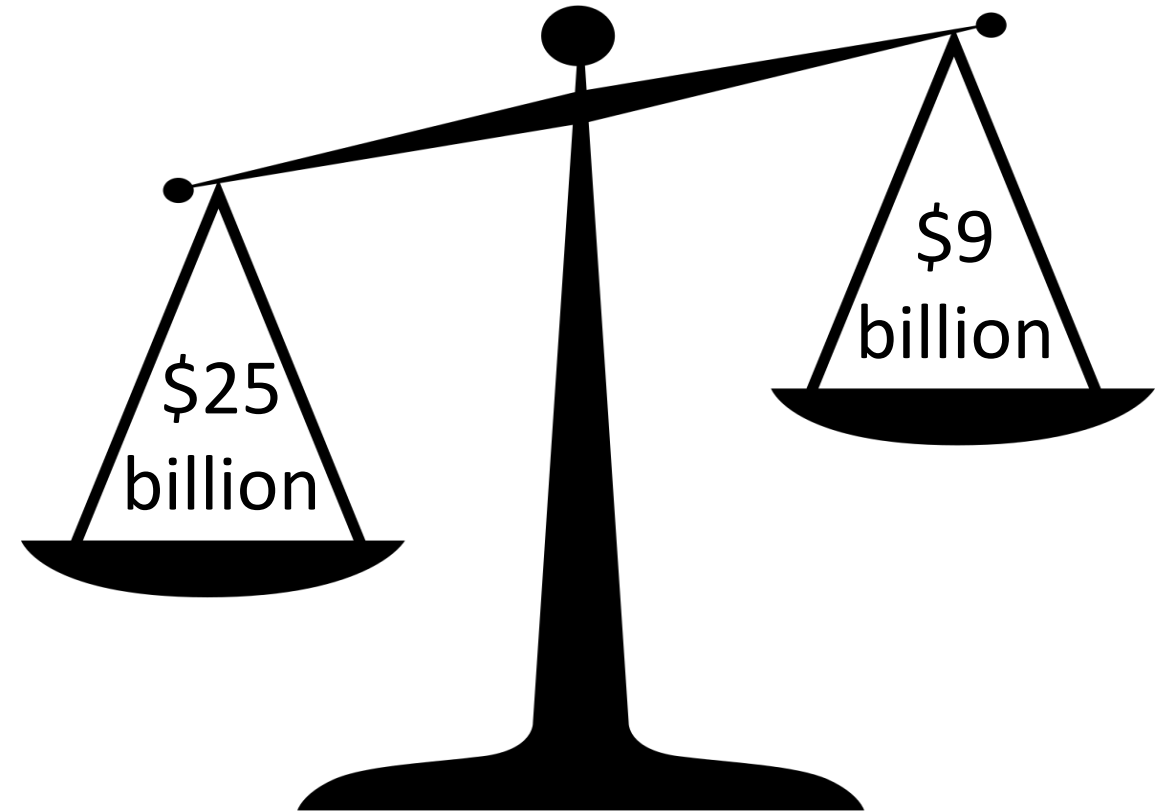
Can we escape the
financial rotation age?



Can we escape the
financial rotation age?



Can we escape the
financial rotation age?





Sequester in Oregon's natural and working lands and waters:

- By 2030: An additional 5 million metric tons CO₂e/year
- BY 2050: An additional 9.5 million metric tons CO₂e/year

(Compared to 21.7 million metric tons CO₂e/year baseline)

- LRs on 4.4 million large private forest acres
= An additional ~400 million metric tons CO₂e

Paying for long rotations

- Working forest conservation easements – with ecological prescriptions
- Carbon credits
- Long rotation certified
- USDA Forest Legacy Program
- USDA Healthy Forest Reserve Program
- State and federal climate funding

Next steps

Get shovel-ready

- Planning: cohesive strategy, workforce, landowner engagement, WFCE contracts, legal institutions, equipment
- Research: Refine transition supply modeling
- Research: Workforce needs, rural community benefits
- Regional-scale experiments



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March 15, 2023

Oregon Board of Forestry
2600 State Street
Salem, Oregon 97310

Submitted via E-mail: boardofforestry@odf.oregon.gov

RE: Agenda Item #6 (Sightline Institute) at March 8 Board of Forestry Meeting

Board of Forestry Members,

I am writing on behalf of the Oregon Forest Industries Council to express concern with an item that was on the agenda for the March 8, 2023 meeting of the Board of Forestry (the “Board”). The presentation in question, Item 6, “Sightline Institute: Long Rotational Forestry Discussion,” was made by Dr. Kate Anderson from the Sightline Institute (“Sightline”) wherein she presented a narrative regarding the putative climate benefits of extending harvest rotation periods in the working forests of the Pacific Northwest and made a case for why such a proposal is economically and socially feasible. After listening to the presentation to the Board and reviewing Dr. Anderson’s published articles, we have numerous concerns about certain assertions that Sightline makes, factual omissions from their materials, and what we perceive as flawed reasoning used to arrive at the ultimate conclusions Sightline does about both the desirability and feasibility of lengthening rotations.

First, Sightline asserts that the biological growth maximum (“CMAI”) for Pacific Northwest forests west of the Cascade crest is between 80-100 years. This is an over-generalization that is not true in many circumstances. Various factors such as species mix, site index, and management regime lead to widely varied ages of CMAI from forest to forest and even acre to acre. For example, intensively managing Douglas-fir forests using ideal stocking levels and periodic thinning can reduce CMAI for such forests from ~95 years to approximately 55 years.¹ Therefore, extending the harvest rotation period to 80 years in these forests would actually result in *less* carbon sequestered and stored over multiple forest life-cycles. It must also be noted that Sightline uses the USFS Forest Vegetation Simulator for its growth and yield model, which has been noted for not accurately projecting growth of Douglas-fir plantations.² Other, more accurate models would almost certainly yield a different CMAI estimate.

Second, adopting a strategy which requires stopping, reducing, or delaying harvest in order to increase the climate benefits of the forest invariably ignores the measurable climate benefits attributable to the use of wood products derived from harvested trees. Dr. Anderson at times gives a nod to substitution effects, but then dismisses them with a wave of the hand. However, substitution effects have been demonstrated, time and again, to be both real *and* necessary to a complete analysis of the closed loop forest carbon cycle.³ Any analysis that ignores substitution and does not consider the net effects of a growth and harvest strategy on wood production or fiber availability in the short and mid-term is fundamentally flawed and is likely to overestimate the benefits of extending rotation ages.

¹ Smith, J.E., et al. *Methods for calculating forest ecosystem and harvested carbon, with standard estimates for forest types of the United States*. General Technical Report NE-343. Newtown Square, PA: United States Department of Agriculture Forest Service, Northeastern Research Station. 2006.

² Dias, D.D., et al. *Tradeoffs in Timber, Carbon, and Cash Flow under Alternative Management Systems for Douglas-Fir in the Pacific Northwest*. Forests. 2018. Available at, <https://doi.org/10.3390/f9080447>.

³ See, NCASI. 2020. *NCASI Review of Carbon Implications of Proforestation*. Review and Response. December 2020. Available at, <https://tinyurl.com/yettneimm>.

Sightline also fails to address leakage, which occurs when a reduction in fiber supply in one region or market is simply replaced by increased supply in another. The California Air Resources Board (“CARB”), in reviewing California’s forest offset protocols, recently determined that the true leakage factor from reduced harvests in California was at least 80%.⁴ Other studies have determined that leakage may even come close to 100%.⁵ This means that any carbon savings realized by delaying harvest by growing trees longer here in Oregon would simply be offset by harvests in another jurisdiction – and likely one with less robust environmental laws and protections.

Sightline also neglects to fully discuss the concomitant risks to landowners from extending rotation ages. Nowhere do they mention that CMAI calculations do *not* account for the risk of loss from stochastic events, like wildfire or blowdown, insect outbreaks, or disease. And this notwithstanding the fact that, with more carbon stored on the landscape, such events are likely to actually *increase* in frequency. Not only does ignoring such realities skew the alleged benefits in Sightline’s analysis, but it risks the pursuit of management approaches that turn some forests that once acted as carbon sinks turn into carbon sources, as we are seeing on USFS lands in the Intermountain West.⁶

We would also note that Sightline’s claims about what a “typical” rotation period is in the PNW is both unfounded and even contradicted by the very case studies that they cite. Some landowners may indeed harvest on a 40-year rotation schedule, but many do not. We can say this without equivocation, as many of those that harvest at 55, 60, or even 80 years and beyond are our members!

Sightline appears to assert that an 80-100 year harvest rotation would more closely approximate a “natural” forest ecosystem in the western forests of the PNW and would therefore be biologically healthier. There is good reason to question even this overly simplistic narrative. In 1902, over one third of the forested acres west of the Cascade crest were completely burned over.⁷ However, it was such regular, periodic disturbances that led to our state’s sunlight-loving state tree, *pseudotsuga menziesii*, becoming the dominant species in many of these forests.⁸ This is true of other early and mid-seral species, as well. In fact, in productive forests, biodiversity is often negatively correlated with older even-age conifer forests. Regular disturbance, whether by fire, mortality, or harvesting, seems to be the rule for these forests rather than an “unnatural” modern convention.

Finally, though Sightline attempts to show that extending rotation ages is economically feasible, they only focus on the economic impacts to the landowner, not to the manufacturing industry that relies on a regular supply of fiber from the forest. Most of the “solutions” Sightline proposes amount to direct financial incentives for private landowners to extend rotations in order to store more carbon on the landscape. Indeed, a landowner may be “made whole” by such subsidies. However, the wood products industry will not benefit from such policies, and adopting a statewide approach that reduces supply of fiber could well

⁴ Haya, B. *Policy Brief: The California Air Resources Board’s U.S. Forest offset protocol underestimates leakage*. Center for Environmental Public Policy, University of California, Berkeley.

⁵ *Do Carbon Offsets Work? The Role of Forest Management in Greenhouse Gas Mitigation*. USFS Pacific Northwest Research Station. Science Findings, Issue 155, Aug. 2013.

⁶ *Assessment of the Influence of Disturbance, Management Activities, and Environmental Factors on Carbon Stocks of U.S. National Forests*. National Forest System Office of Sustainability and Climate. General Technical Report RMRS-GR-402. Appendix 7: Intermountain Region, Individual Forests. Nov. 2019.

⁷ Gannet, H. *The Forests of Oregon*. U.S. Geological Survey, U.S. Dep’t of the Interior. Professional Paper No. 4, Series H, Forestry, 1. 1902. Available at: <https://pubs.usgs.gov/pp/0004/report.pdf>.

⁸ See, *Natural Vegetation of Oregon and Washington*. USFS Pacific Southwest Research Station. 1973. p. 70-71 (noting that the seral forests in the *Tsuga heterophylla* Zone in western Washington, Oregon, and British Columbia has come to be dominated by *Pseudotsuga menziesii* as a result of stand-clearing fires and logging). Available at: https://www.fs.usda.gov/pnw/pubs/pnw_gtr008.pdf.



result in multi-decadal declines in the industry.⁹ Even if payments were made directly to manufacturers, this would not save jobs, nor would it address the local decrease in sustainable building materials that would have to be backfilled with exported products or substitutionary products with a larger carbon footprint.

It is concerning to us that this is now the second presentation that the Board has heard in its last three meetings that has focused on increasing rotation ages as the *sine qua non* of climate smart forestry. The unabashed advocacy displayed by the presenters is also concerning. For example, Ms. Anderson's statement to the effect that those who have questions and concerns about the viability or desirability of converting to longer rotations will in time be shown to be no different than climate-change skeptics¹⁰ evinces an ideological conceit that discounts countervailing scientific, economic, and practical considerations. For example, equating extended rotation "skepticism" to climate skepticism ignores the fact that many of the objections to longer rotations accept the premise that forests can be a valuable tool in the effort to address climate change, but question whether mandating harvests at CMAI is actually the best way to maximize the mitigative potential of forests. In other words, arguments for increasing rotation ages as a matter of policy not only ignore the negative real-world effects that such policies would have (on jobs, supply of sustainable building materials, forest health, etc.), but also cast aside accepted tenants of forest science and carbon accounting (such as substitution and leakage) in order to arrive at a pre-determined conclusion.

We implore the Board to listen to other voices in the scientific community that are working to understand the entirety of these complex sets of interactions and interlocking effects in order to arrive at policy recommendations that leave room for landowners to manage their lands for a variety of objectives rather than adopting a crude, one-size fits all approach. It is our belief that a more nuanced and holistic approach is the one most likely to enhance the climate benefits of the forest by looking beyond the edge of the forest to the entire life cycle of the products that we derive from our abundant forest resources. To that end, we would recommend that the committee consider inviting Steve Prisley from the National Council on Air and Stream Improvement (NCASI) to present on this topic at a future board meeting to hear an alternative scientific perspective to that shared by Sightline.

Sincerely,

Tyler Ernst
Policy Counsel, Manufacturing & Resources
Oregon Forest Industries Council

⁹ Conversion from a hypothetical 40-year, even-aged stand management paradigm to 80-year harvest rotations would require a 50% harvest area reduction for a period of 40 years.

¹⁰ Granted, this comment was made in response to a leading question from one of the members of the Board.