Western Forest Economists
Annual Meeting, Seattle, WA
May 15, 2025

Harvest or Set-Aside?
A Comparative Carbon Analysis Grounded in Real World Data

by

Elaine Oneil PhD

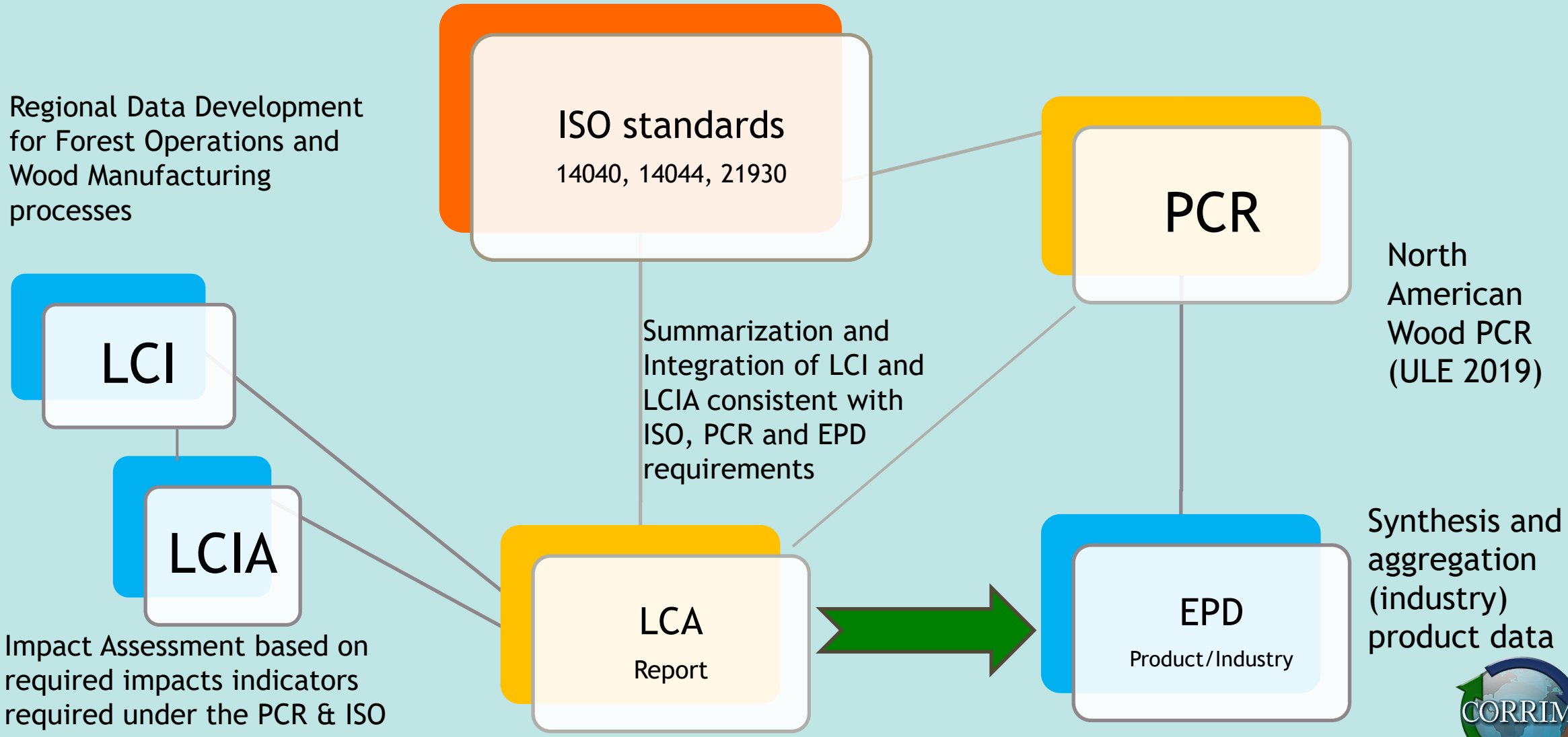
Director of Science, CORRIM

Consortium for Research on Renewable Industrial Materials

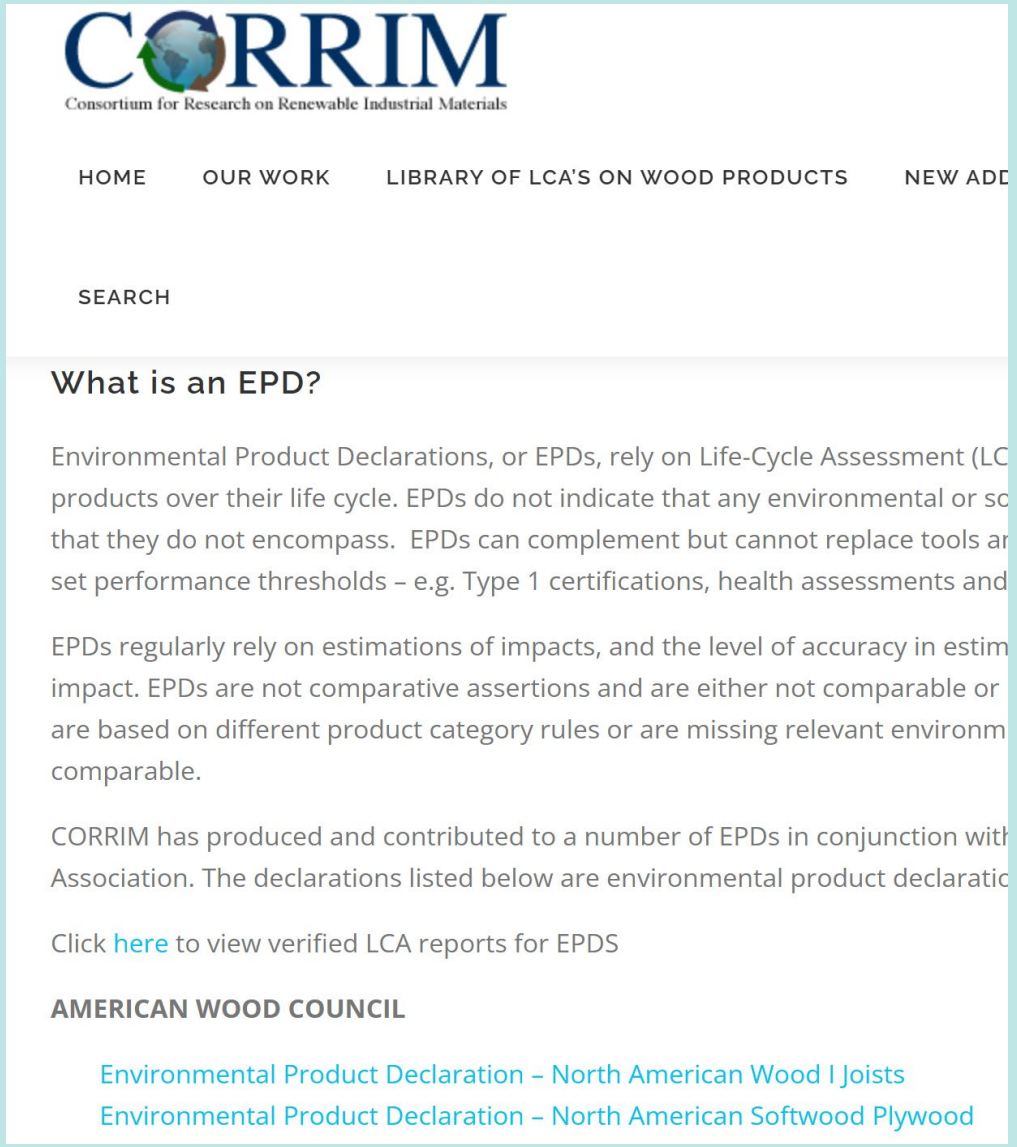
A non-profit corporation formed by 20 research institutions to conduct cradle to grave environmental studies of wood products

Member Research Institutions
Consortium for Research on Renewable Industrial Materials - CORRIM

Well Established International Framework & Hierarchy

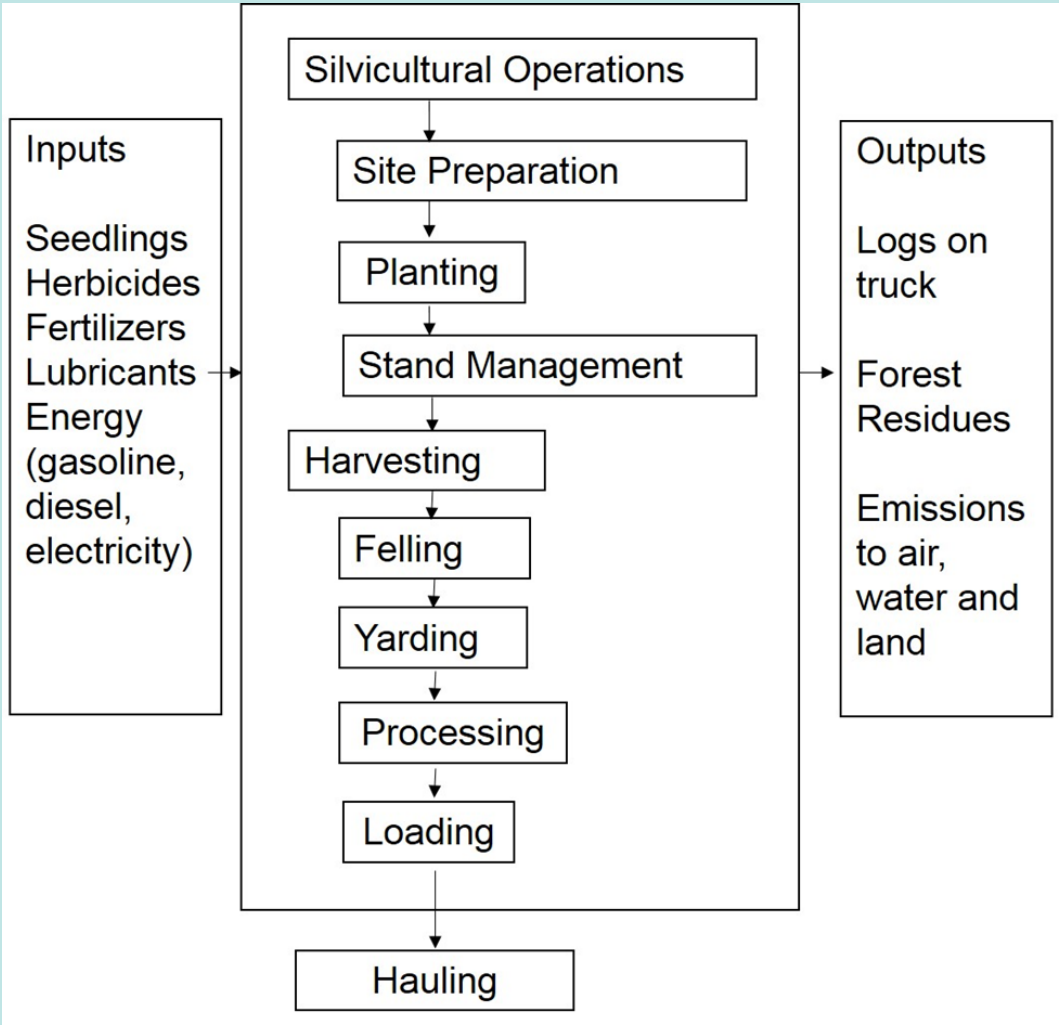


https://corrim.org/lcas-on-wood-products-library/

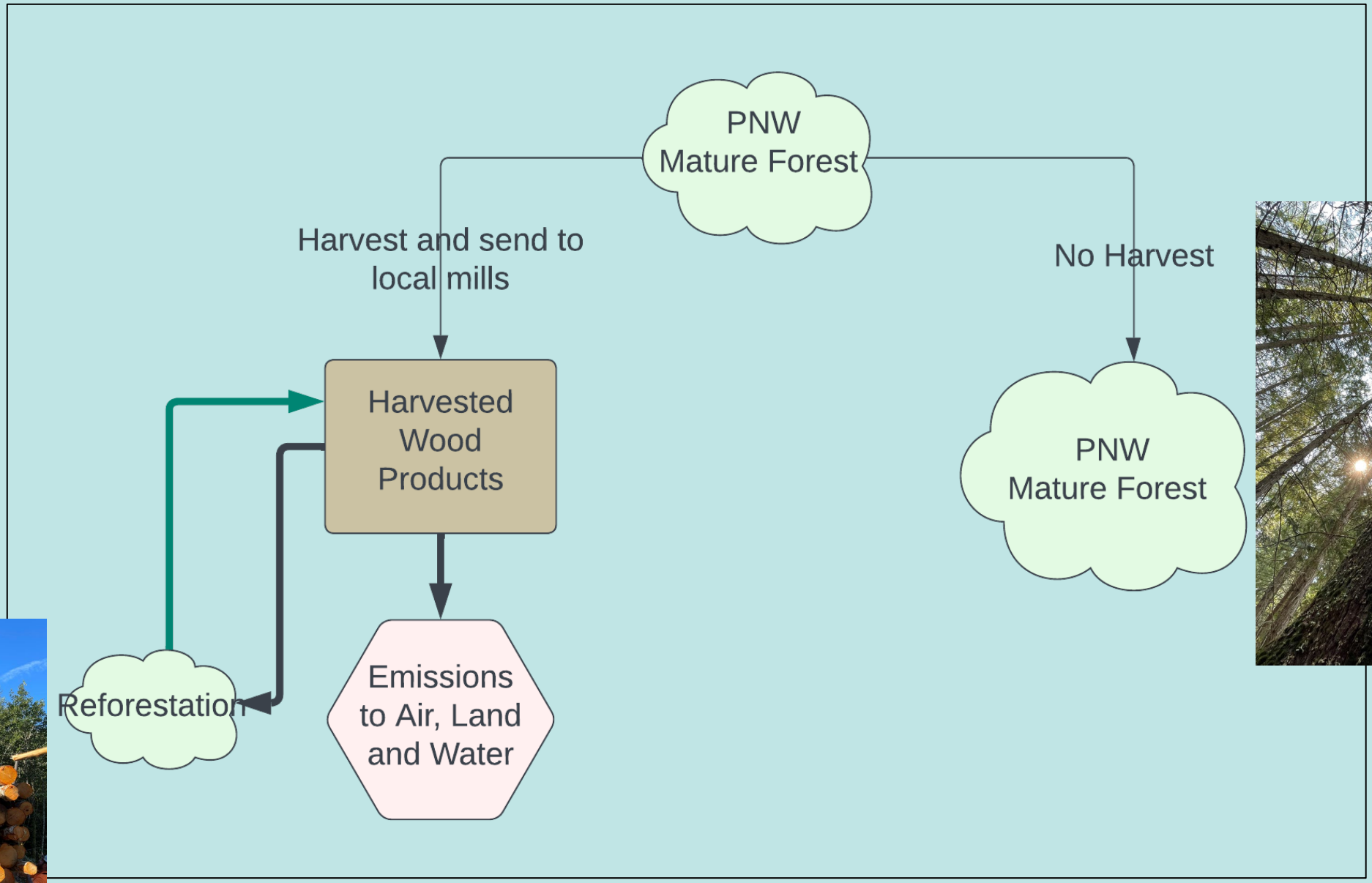


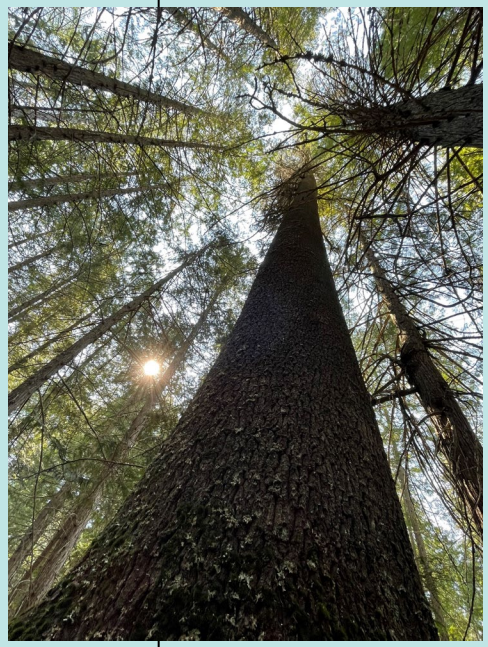
https://corrim.org/environmental-product-declarations/

System Boundaries – Attributional LCA of m^3 of wood (at roadside/landing)



Oneil & Puettmann 2018

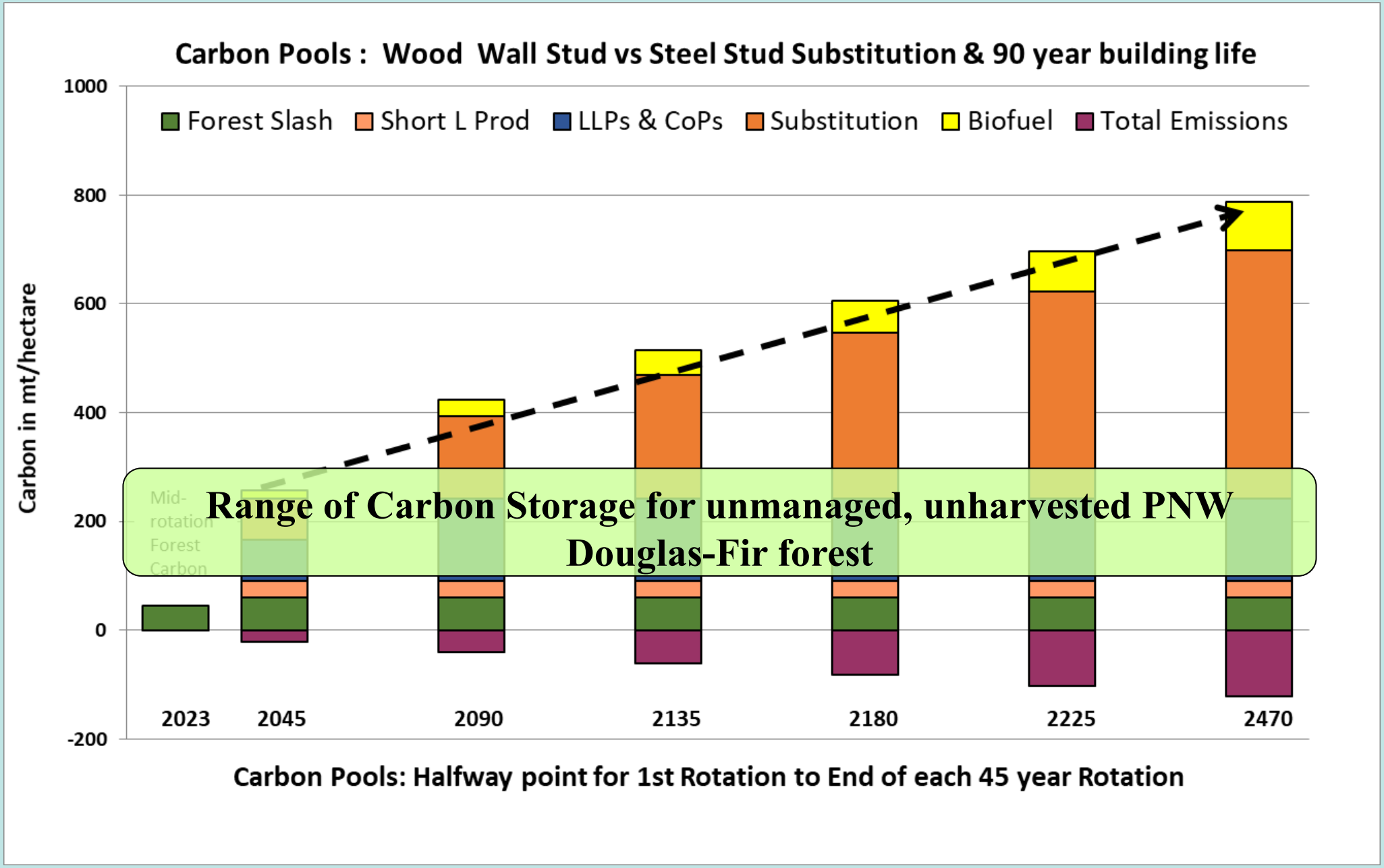




Oneil et al 2024

Expanding the System Boundary

- Substitution – how is the wood used?
- What about leakage?



- Sustained trend of 2.3 t C/ha/year
- 1.9 times the no-harvest maximum by year 135

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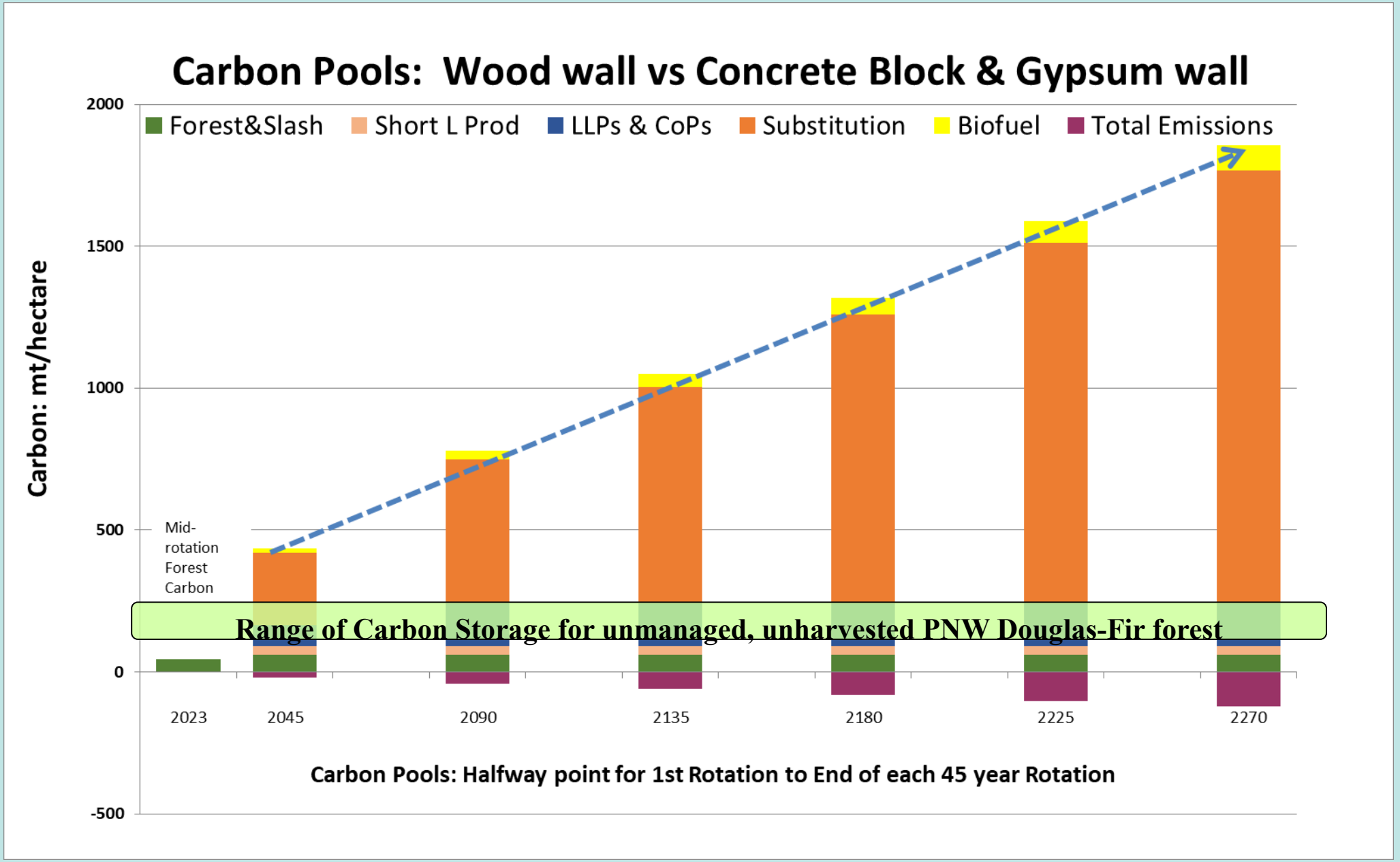
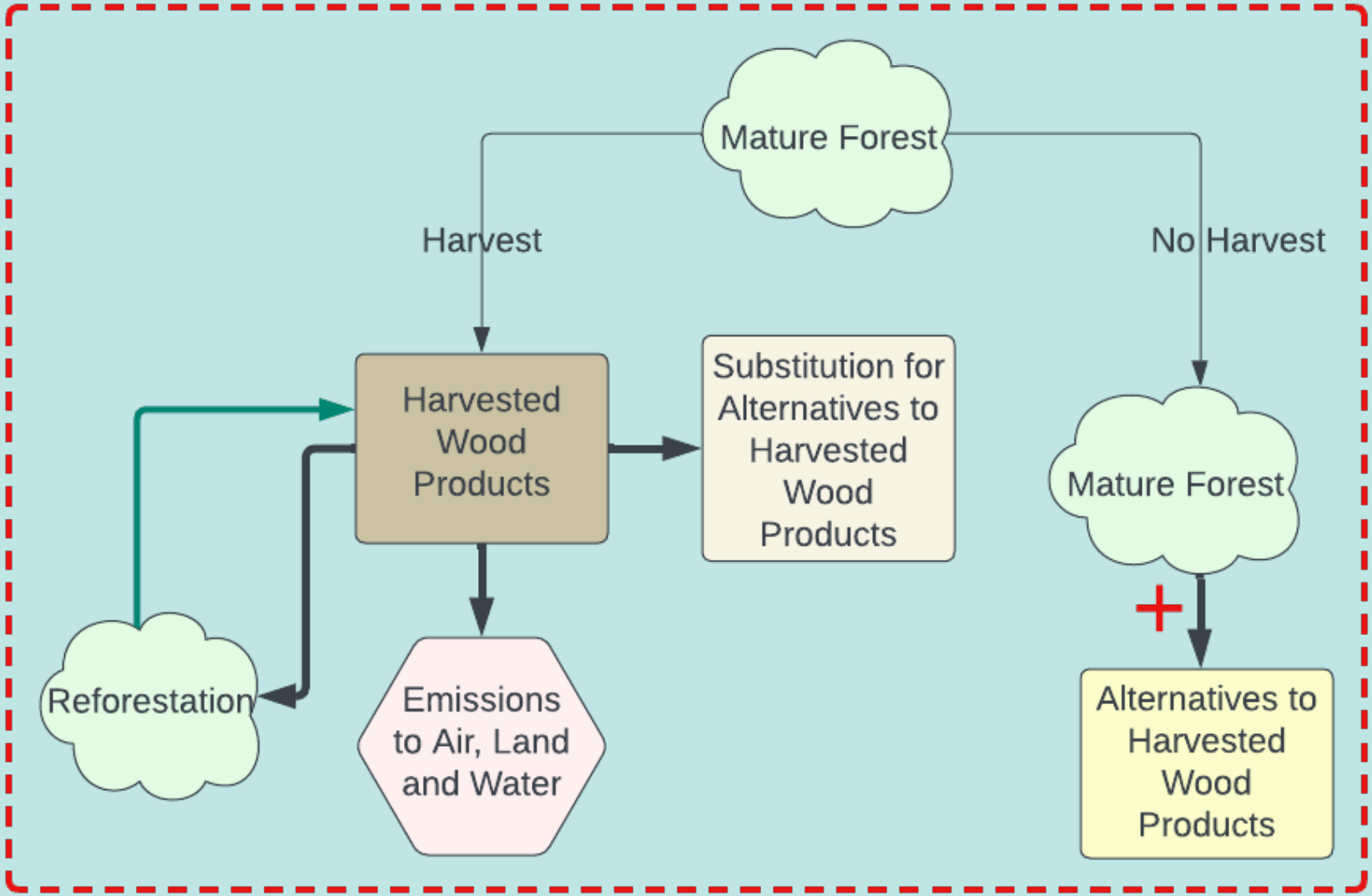
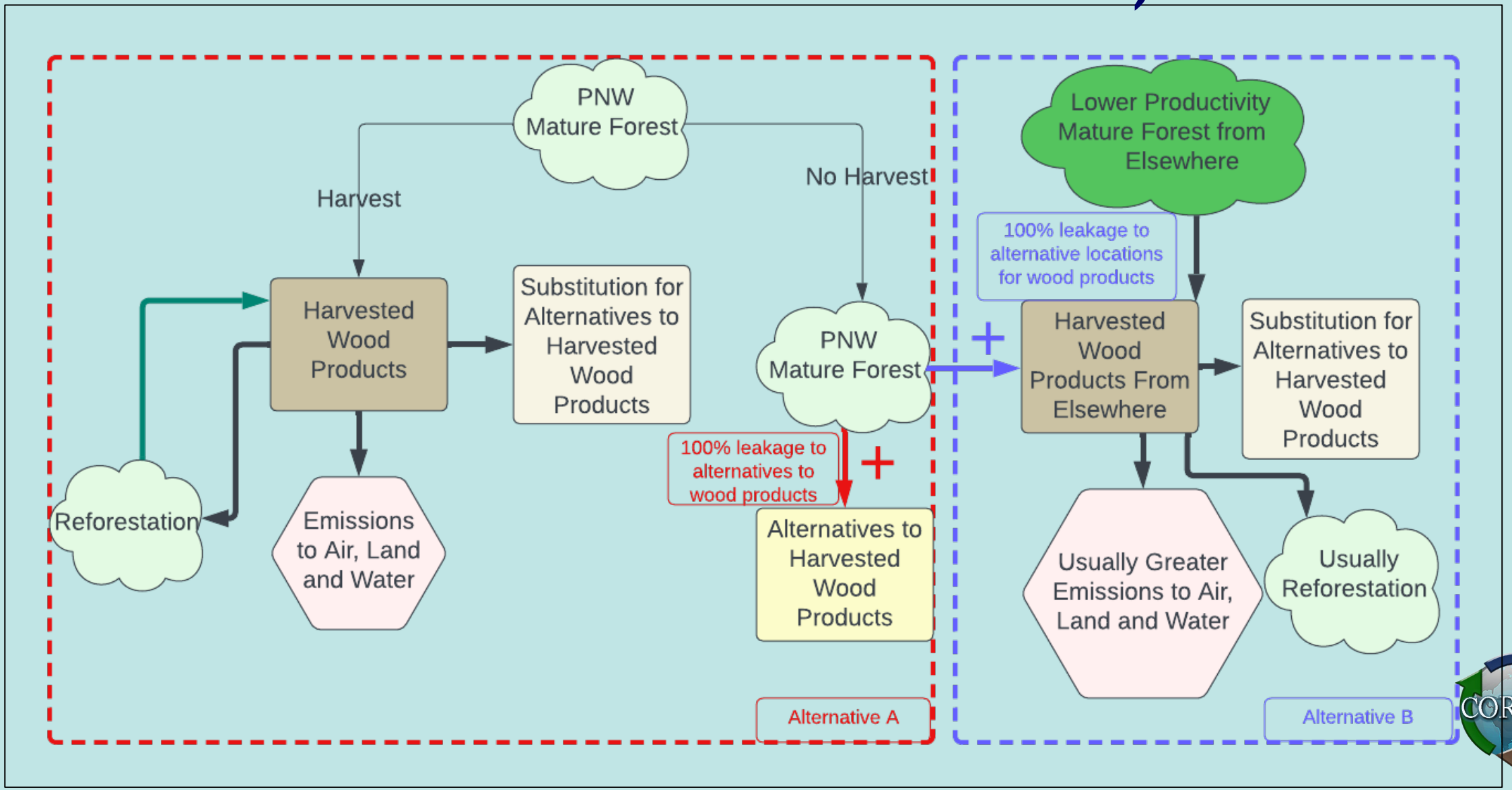


- Sustained trend of 5.9 t C/ha/year
- Exceeds no-harvest maximum at year 45
- Seismic code standards

What the atmosphere sees without leakage



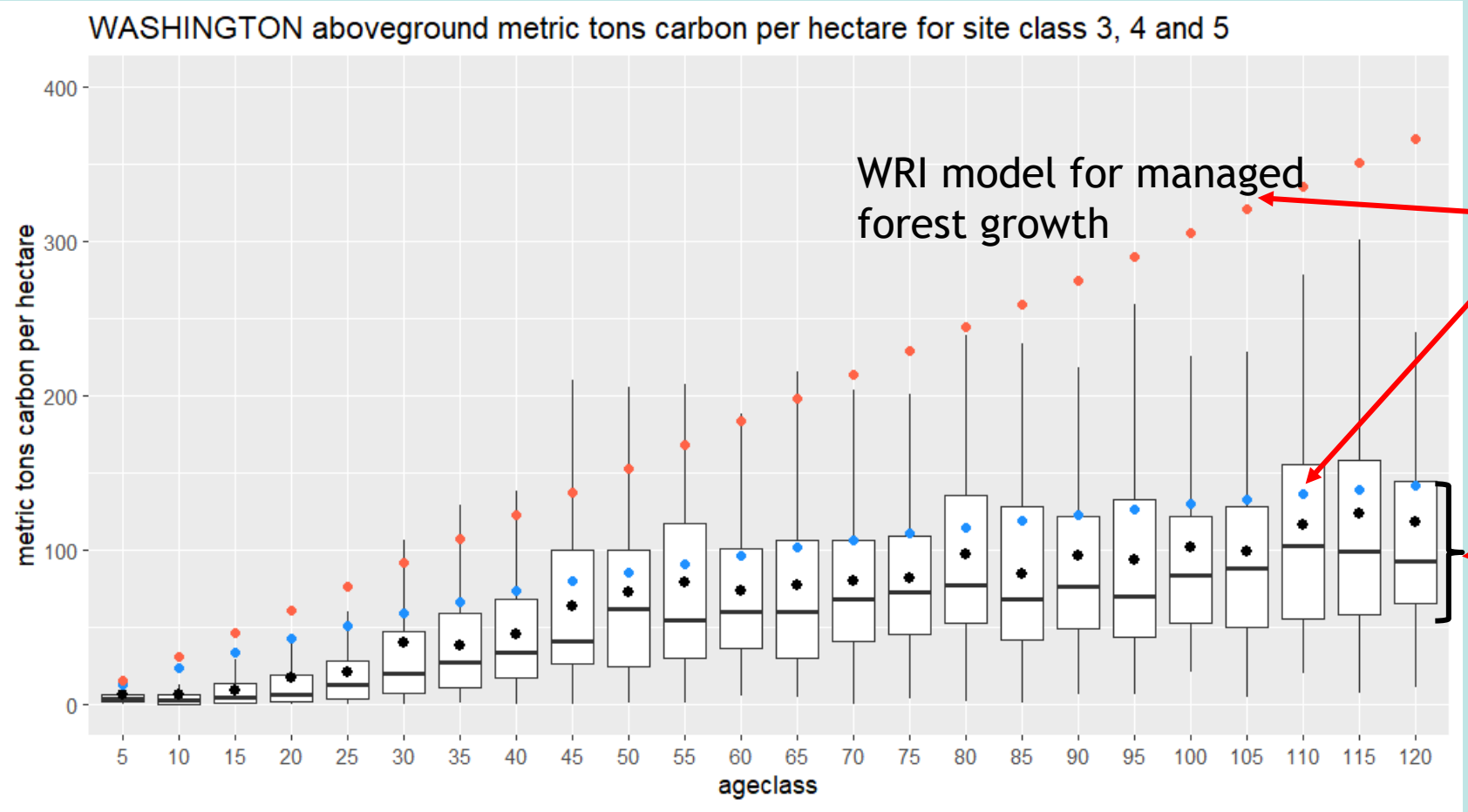
Alternatives if there is leakage (wood harvested elsewhere)



Expanding the System Boundary

- Substitution – how is the wood used?
- What about leakage?
- **What happens to the unharvested stand?**

Center for Responsible Forestry touts “latest science” by WRI to support “lock it up” narrative



WRI model for managed forest growth

Modeled growth from World Resources Institute (Peng et al 2023)

WRI model for natural forest growth

Reality Check: average and +/- 25% measured growth on sample plots by age in regional USFS inventory

Analysis courtesy of Lieke Drooge, UW CINTRAFOR, 2024

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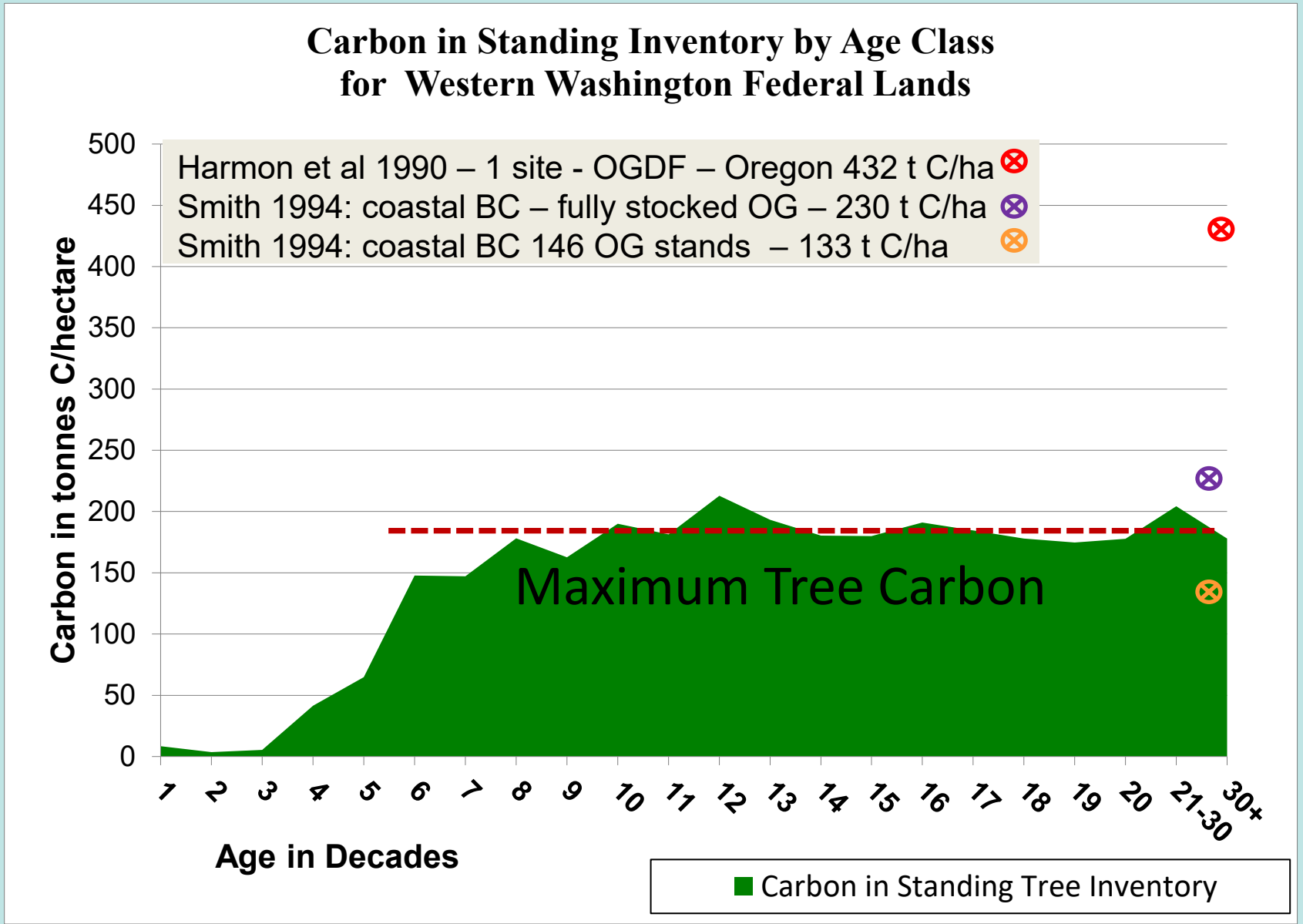
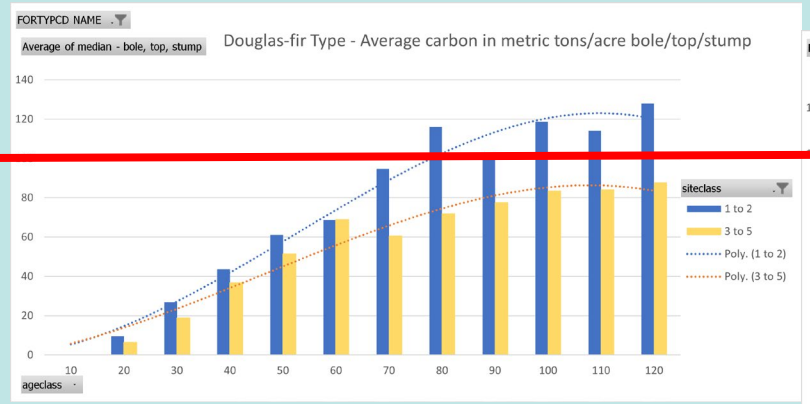
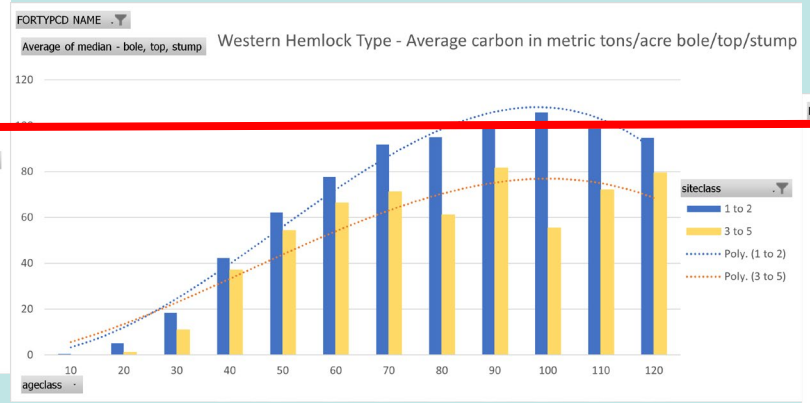
Carbon Carrying Capacity PNW Douglas-fir Forests

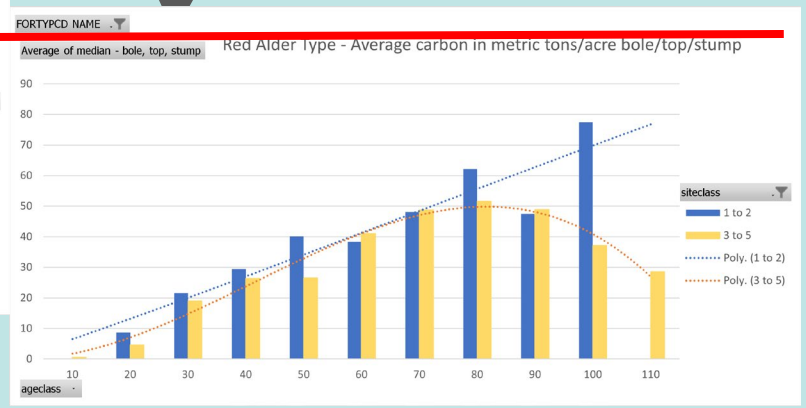


Forest inventory shows the variability and limits to average growth by site class

Red line is 100 metric tons/acre of above ground carbon stores







Takeaways

- Douglas-fir outperforms other species on higher quality sites
- Western hemlock and Douglas-fir have nearly identical performance on average quality sites
- Red alder outperforms conifers until about 30 years; with rapid growth decline after age 60-80 and no alder dominated sites by 120 years

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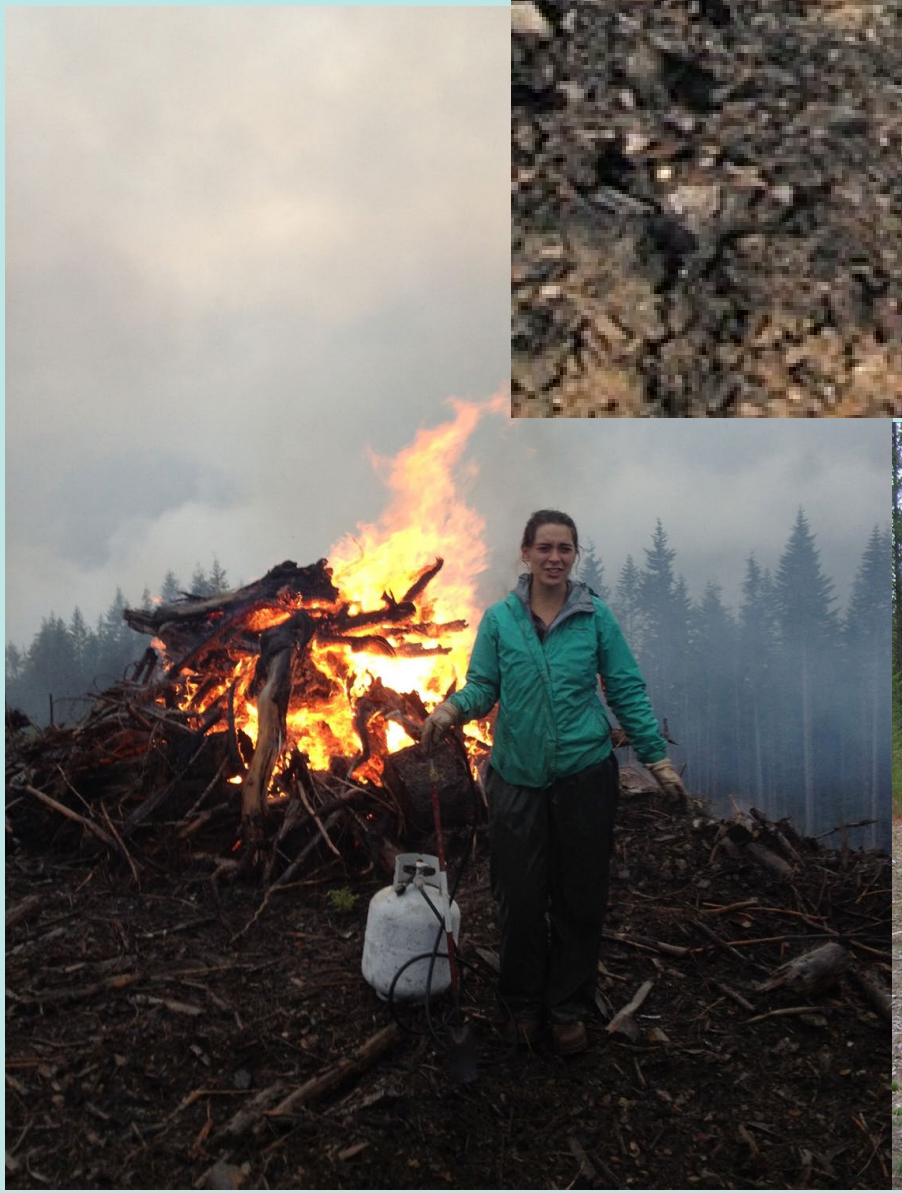
Expanding the System Boundary

- Substitution – how is the wood used?
- What about leakage?
- What happens to the unharvested stand?
- **What happens to residuals?**

Burn, Rot, or Stay?



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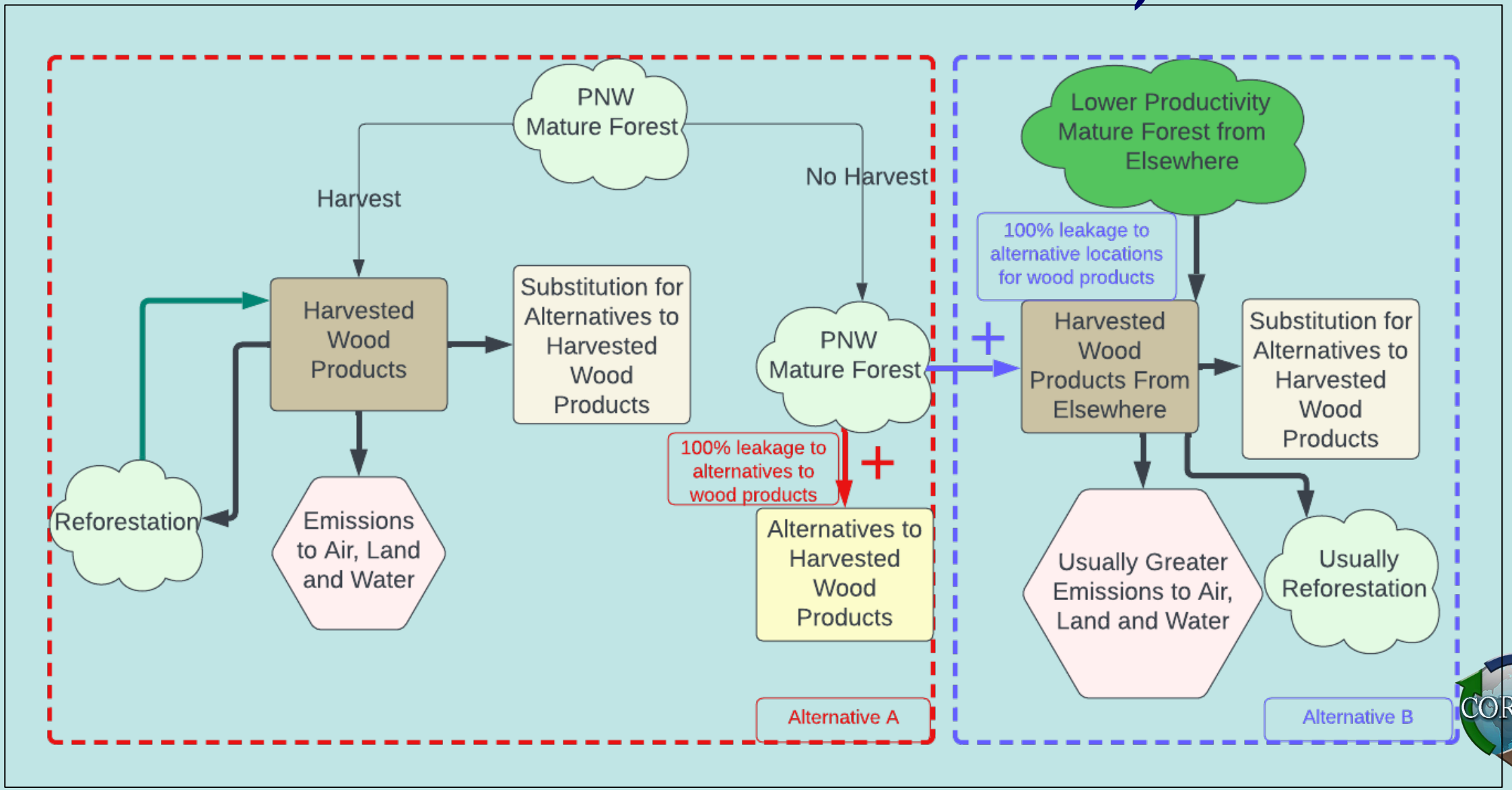
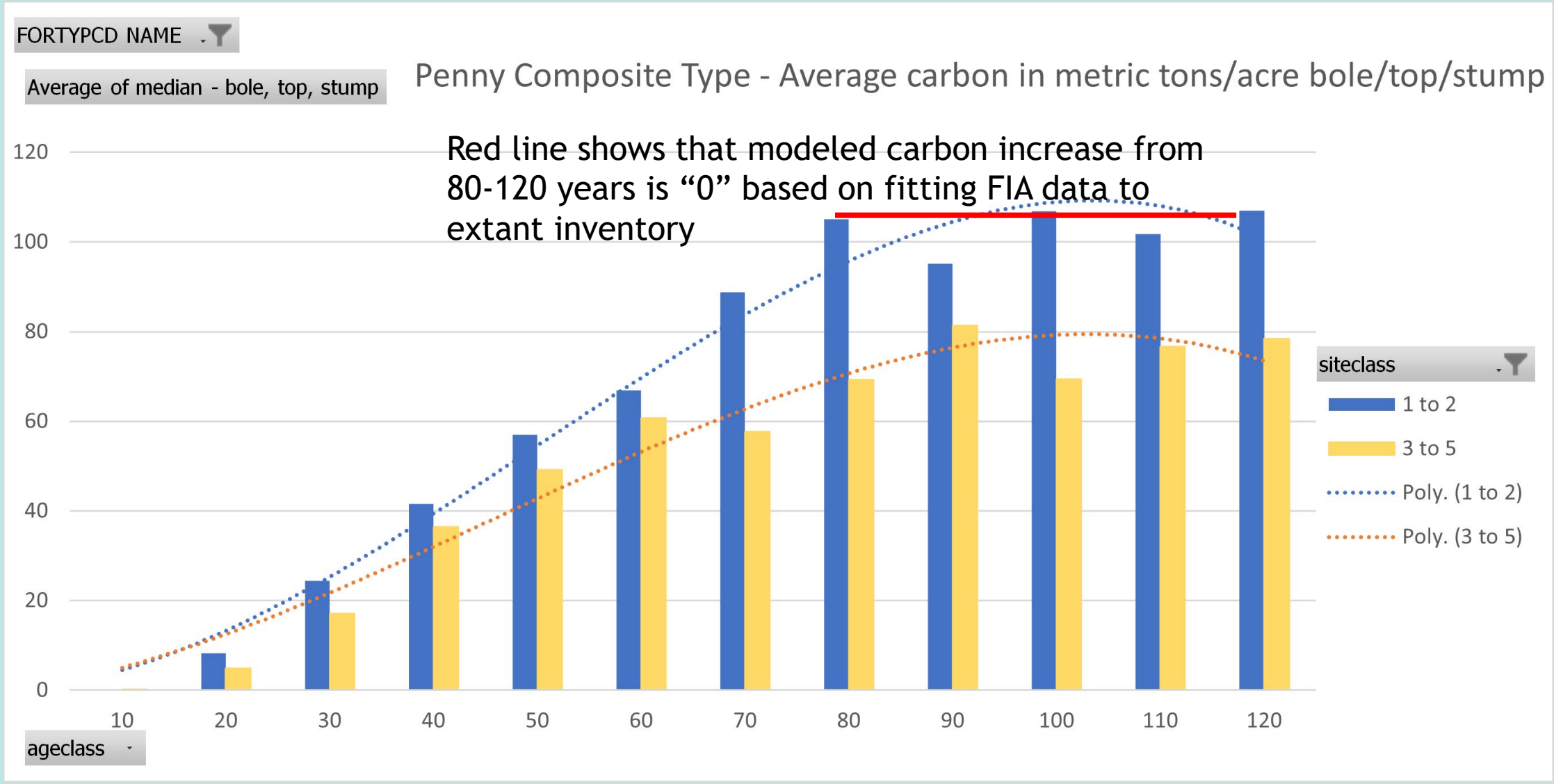


Inner Workings….

- Calculate expected growth of reserved (82 year old) stand based on extant inventory
- Use component ratio method to estimate below and above ground residuals
- Apply management preferences for residuals

Forest inventory and analysis (FIA) data on westside PNW species by age class



Inner Workings….

- Calculate life cycle of harvesting, hauling, and reforestation
- Calculate life cycle of milling by log sort
- Identify alternatives for major products (lumber, poles, plywood, doors)
- Compare alternatives to harvested wood for carbon storage and life cycle emissions

Case Study Analysis of Alternative "A"

Comparison of Alternatives to Harvest - PNW Case Study					
Year since harvest	**0**	**10**	**20**	**30**	**40**
	Metric Tons of Carbon per Acre				
Harvested forest: roots and slash remaining; decayed at 2%/decade)	30.81	30.2	29.59	29	28.42
Regenerating forest roots		0.36	2.29	5.43	10.04
Regenerating forest boles/tops/stump		0	7.46	21.76	42.32
Embodied carbon emissions from harvest/ reforestation/ haul/manufacturing	-3.45	0	0	0	0
Primary products	24.57	24.57	24.57	24.57	24.57
Substitution benefit of primary products	18.87	18.87	18.87	18.87	18.87
Hogfuel and wood fuel burned	-12.87				
Manufacturing co-products (leave system boundary); decayed at 5% per decade	31.84	30.24	28.73	27.3	25.93
Carbon outcomes of harvest (sum of above)	**89.76**	**104.24**	**111.52**	**126.93**	**150.15**
Alternative to harvest					
Unharvested 80-year-old forest (trees including roots)	99.14	99.14	99.14	99.14	99.14
Substitution benefit foregone	-21.08	-21.08	-21.08	-21.08	-21.08
Carbon consequences of no harvest alternative	**78.06**	**78.06**	**78.06**	**78.06**	**78.06**
Comparative Outcomes – difference between no harvest and harvest scenarios	**-11.71**	**-26.19**	**-33.46**	**-48.87**	**-72.1**

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Take Aways

- There is no ‘carbon debt’ when considering this expanded system boundary
- Sensitive to the expected growth of stand if left unharvested
- Sensitive to the quantity and quality of products produced and their common substitutes

Thank You

For More Information

www.corrim.org

Elaine Oneil, PhD

Director of Science

elaine@corrim.org