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Fertilization Opportunities & Challenges

Presented at:

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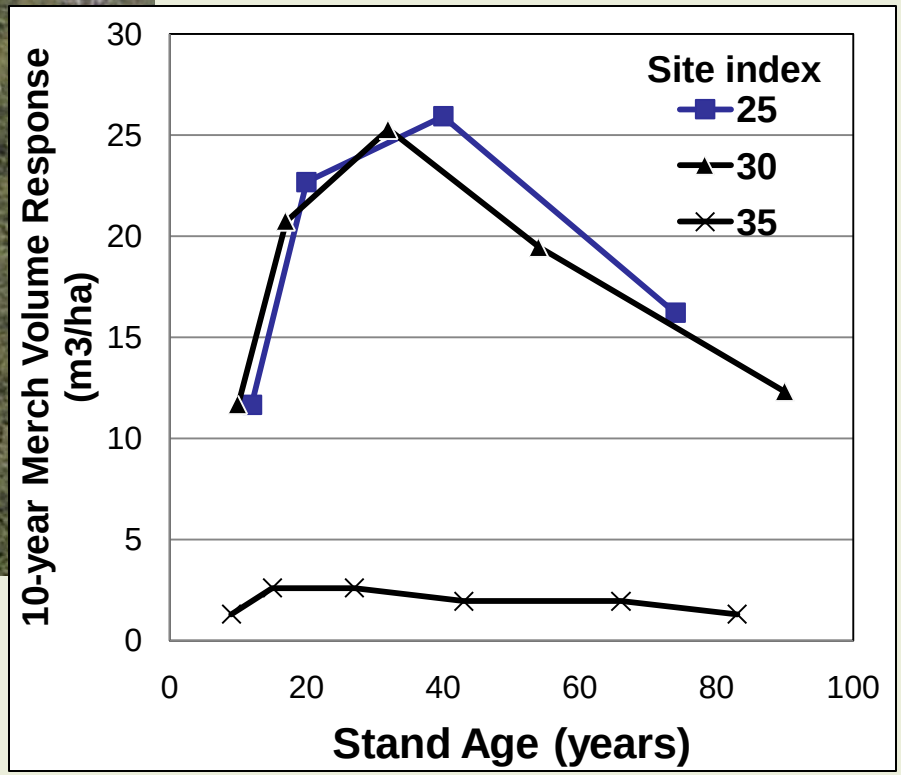

Jeff McWilliams, RPF

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Fertilization Opportunities & Challenges

Outline:

- Review of theory of fertilization response
- Research results; what we know and don't know
- Key issues for fertilization planning
- Opportunities for manual treatments
- Opportunities for treatment of Cw on non-SCHIRP sites
- Fertilization and carbon sequestration; is there a business case?
- Recommendations

Review of theory—Biological

- Site: Nutrient deficient (N) with no other significant limiting factors (moisture, growing season).
- Stand: Large crowns with room for expansion on healthy trees.
  - Physiology of Response (H. Brix, CFS):
    - Increased foliar N leads to increased photosynthesis.
    - Growth response peaks 3 to 5 years after treatment and is finished by 10 years.
  - Major Species:
    - Fd—Responds well and consistently
    - Hw—Inconsistent response (except SCHIRP sites)
    - Cw/Ss—Insufficient research data to support operational application (except SCHIRP or poor sites).

Review of theory—Financial

- Discounted increased value (quantity and quality) of wood must be sufficient to support the discounted treatment and incremental logging costs.
- Key Factors:
  - Desired rate of return on investment
  - Treatment costs
  - Assumed future product values
  - Risk of loss

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Summary of Fd Research History:

Huge amount of fert trials in US PNW and BC: foliar and volume response

Key trials/reports in BC are:

- Shawnigan Lake (CFS); physiology of response,
- EP703 (MoFR); used to calibrate TIPSY,
- FRDA Research Memo #224; Criteria for Site and Stand Selection of Coastal Fd (1995, E. McWilliams and R Carter)

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Key Results/Limitations of these Works are :

- Site index is the best site predictor of fert response but it is imperfect.
- Lower SI's have higher relative responses but medium (and some good) sites have the best absolute responses. **Absolute response and site productivity drive financial viability!**
- Research plots predominantly in CDF and CWHdm/xm/mm1. Other CWH variants are not, or poorly, represented.
- There has been no linkage of response to BEC site series.

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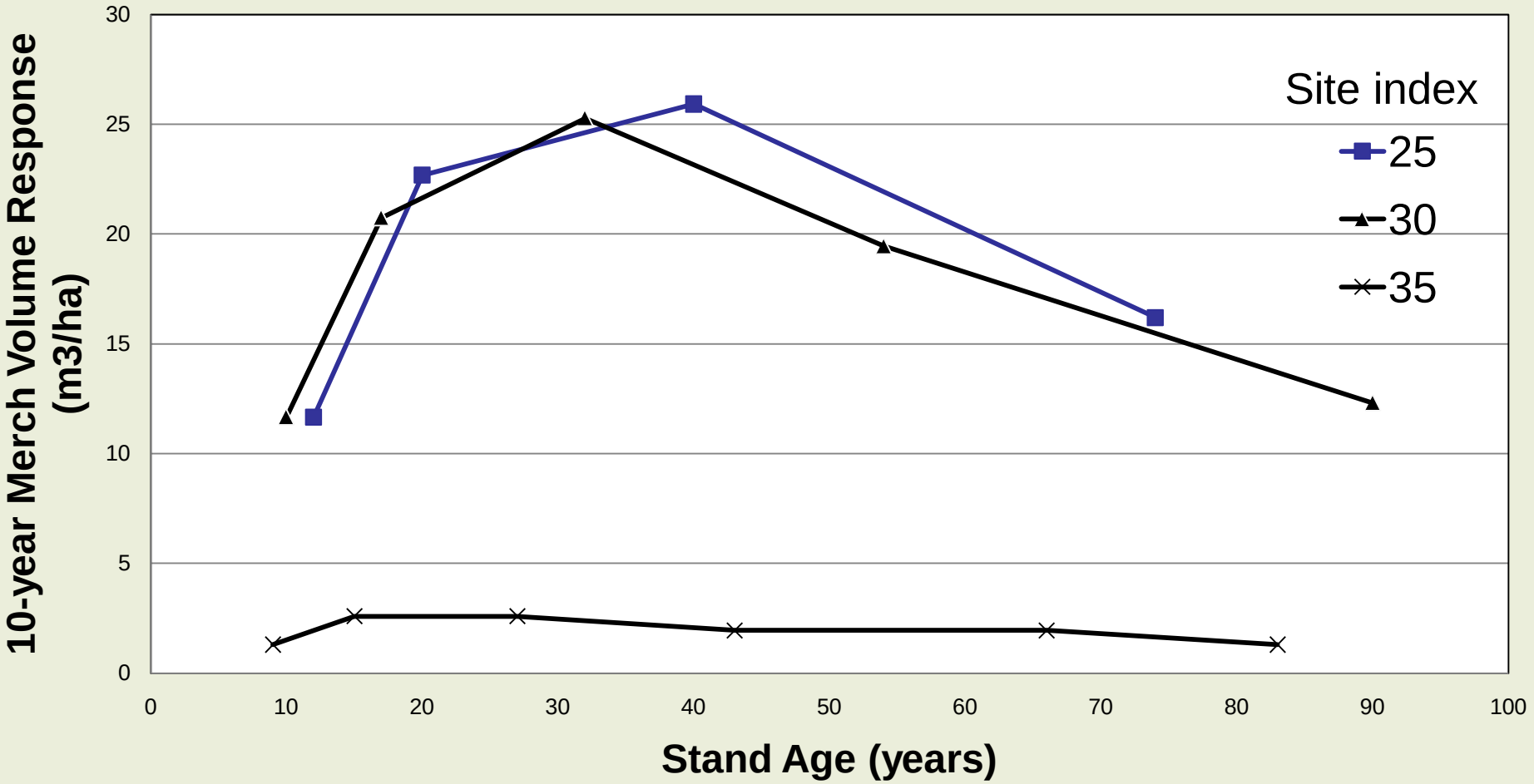
Tipsy Fert Response by Age and SI:



Values are MoFR Recommended Fd Responses multiplied by standard OAFs (OAF1=85% and OAF2=90%) and an 80% fertilization-specific operational efficiency factor

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Key Issues for Fertilization Planning:

- Fertilization costs have more than doubled since 1995:
  - Narrows criteria for stand viability
    - treatment age
    - required interval between treatment and harvest and re-treatment
    - Fd component of stand
    - Importance of wood quality
- Optimal fertilization ages are often not available due to conflicts with harvest planning.
- Access issues.
- Uncertain fert responses in some key BEC units.

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Opportunities for Manual Treatments:

- Can be economically viable or preferred to aerial treatments:
  - late rotation,
  - good access/operability,
  - available labour,
  - constrained areas
- Application costs are higher but fert costs are lower per m3 of treatment response

BAB Stand Selection Criteria for Manual Fert:

	Ranking Mature Forest (40-100yrs)		
	High	Medium	Low
Stand Characteristics			
Fd Composition (well distributed sph with >25% LC, room to expand)	101 to 150	51 to 100	25 to 50
Quality (branching, form, ROG)		Good to Medium	
Forest Health (Includes: root rots, blowdown, off-site symptoms, other)		<5%	
Site Characteristics			
BEC Variant	CWHxm,dm,vm1, mm1		CWHvm2, mm2
Elevation/Aspect		Any	<800m/SE to W
Dominant Site Series		ss01	
Site Index	xm, dm: 28-32m, mm1: 32-36m, vm1: 34-38m	SI outside the preferred ranges	mm2: 30-36m, vm2: 32-38m
Access/Slope	<100m from rd/ <30%	<150m from rd/ <40%	<200m from rd/ <50%

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Opportunities for Cw on non-SCHIRP Sites:

- Product values are high for second growth
- Cw is relatively scarce and BC can be a dominant producer
- Some fert research has been done which shows foliar and height responses. However there are no significant volume response results yet
- Not enough Cw being grown on medium (to rich) sites
- Lack of research and knowledge about growing and managing Cw

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Fertilization and Carbon: Is there a business case?:

- **Pros;**
  - **As part of an overall strategy to grow more wood for non-timber and timber uses, fertilization can have a positive impact**
- **Cons;**
  - **I do not see a future where carbon accounting along will support fertilization of sites/stands that are not otherwise viable for treatment**

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Recommendations:

Gold Medal:

- Good basic silviculture, which not only meets regulatory requirements, but develops stands of valuable species, grown at the appropriate densities are the foundation of a viable fertilization program.
- More research on sites/species not covered by existing research network (this is not the same as the fert monitoring being done now!).

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Recommendations Cont'd:

Silver Medal:

- Invest in good planning which incorporates education and get ahead of harvest scheduling.
- Need to localize stand selection criteria and keep them up to date as costs and knowledge change.

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Recommendations Con't:

Bronze Medal:

- Develop protocols to monitor and report back on "early harvest" of fertilized stands.
- Where suitable, consider manual fertilization as part of an overall forest management strategy