Forecasting Seed Demand Amongst Dynamic Instability

Jeff Mycock, RPF
Chief Forester, West Fraser – BC
President, Vernon Seed Orchard
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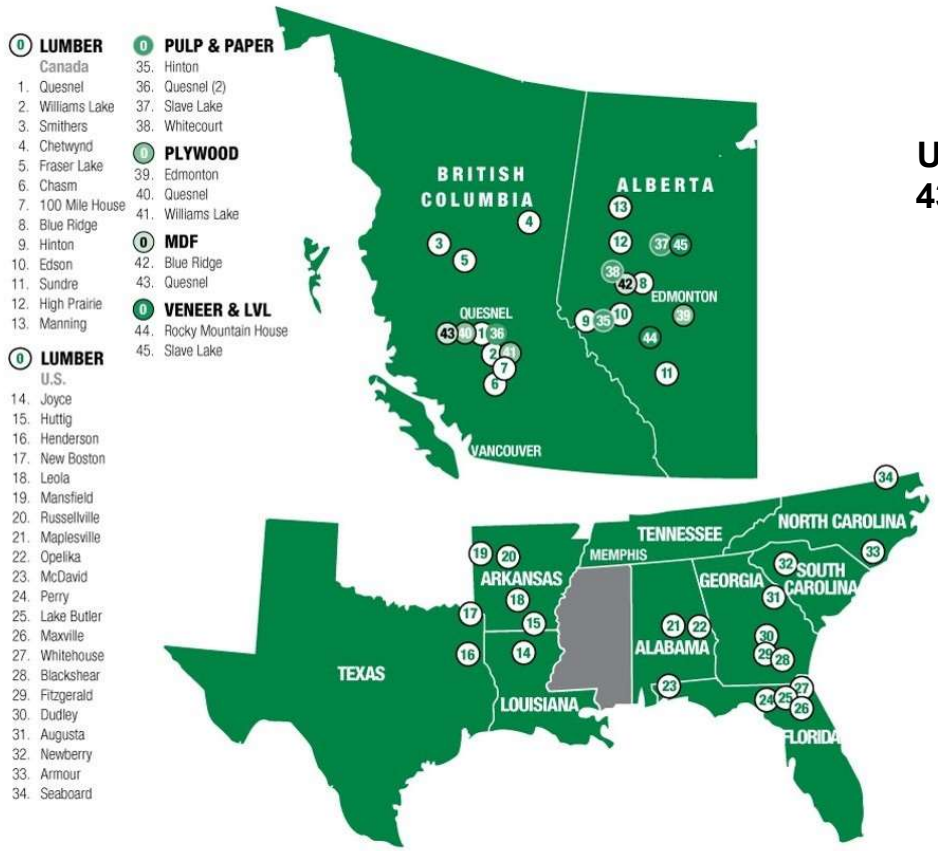
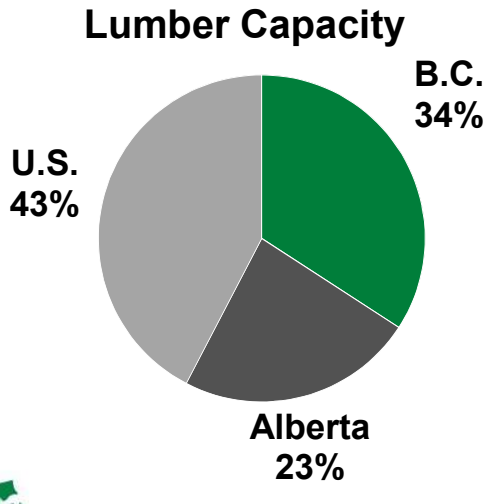
Overview

1. West Fraser Highlights
2. BC Landbase Today
   - Factors affecting rate and pattern of harvest
   - THLB Uncertainty
   - Natural Disturbance Trends and Impacts
3. Provincial Seedling Demand in the near term
4. Forecasting Orchard Investments for the long-term

Operations diversified by geography





Strong presence in key lumber producing regions

Sustainable Forest Management

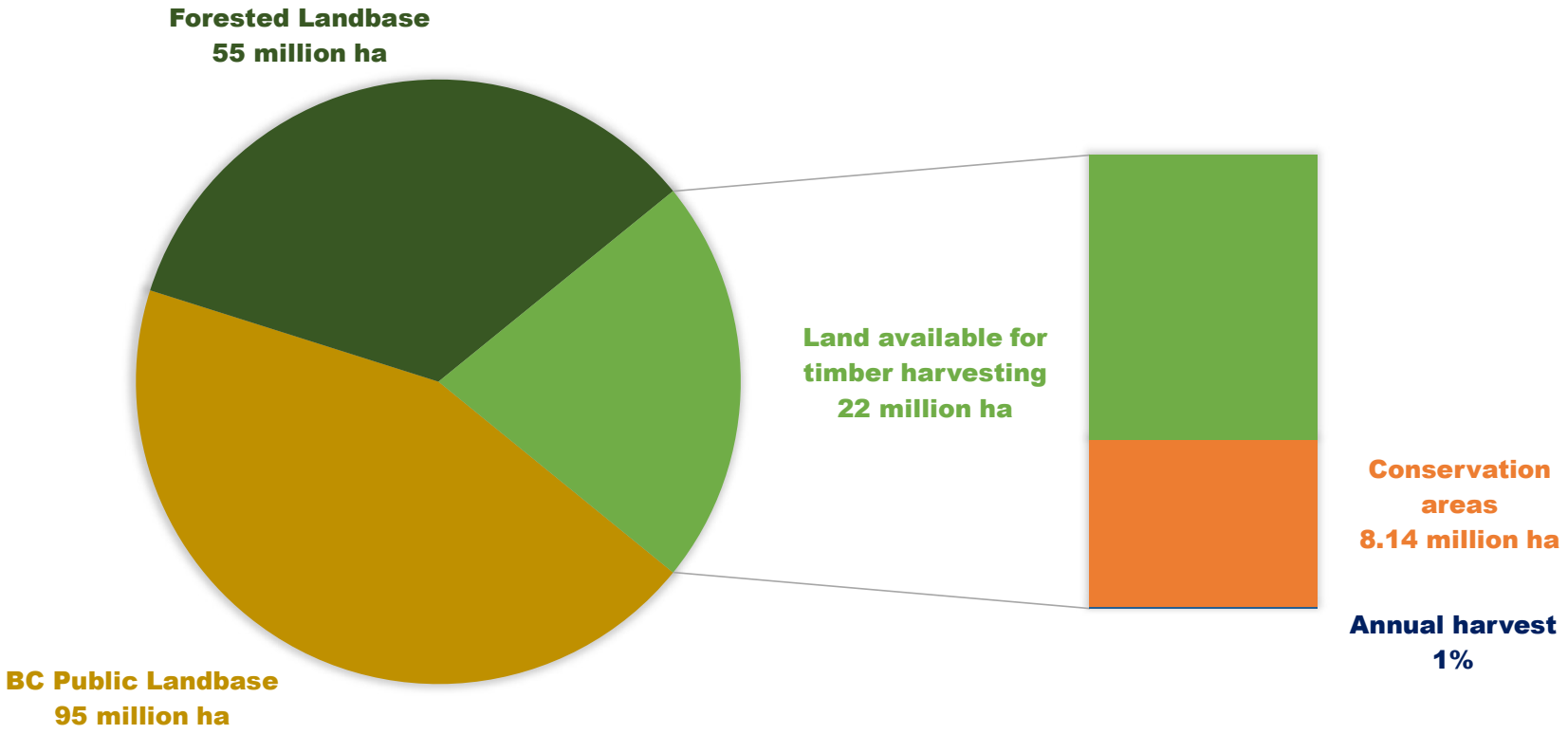
- In the last 3 years we've planted more than **182 million trees**
  - **63 million** seedlings planted in 2017
- West Fraser manages **7 million** hectares of certified forest
- We've planted more than **1.7 billion trees** since 1955

43% of our Core Business in the Southern US

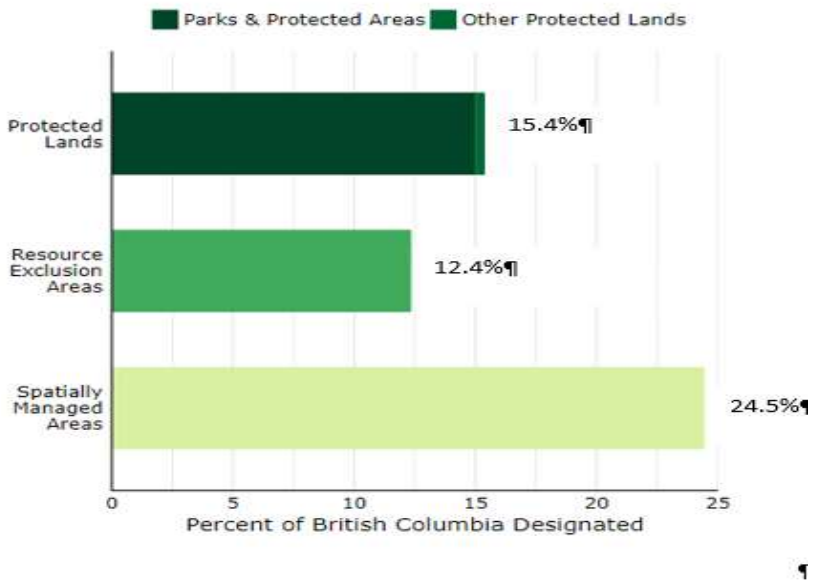
- Southern Yellow Pine Forest – Plantations
- Robust Timber Supply
- Predictable and Stable
  - Short Rotation Forest Management (30-35 yrs)
- Private Forest Land base Intensively Managed
- Supply Exceeds Consumption Capacity
- Known and Reliable log sources
  - 100% Purchased wood

BC Landbase

AREA AVAILABLE FOR TIMBER HARVESTING



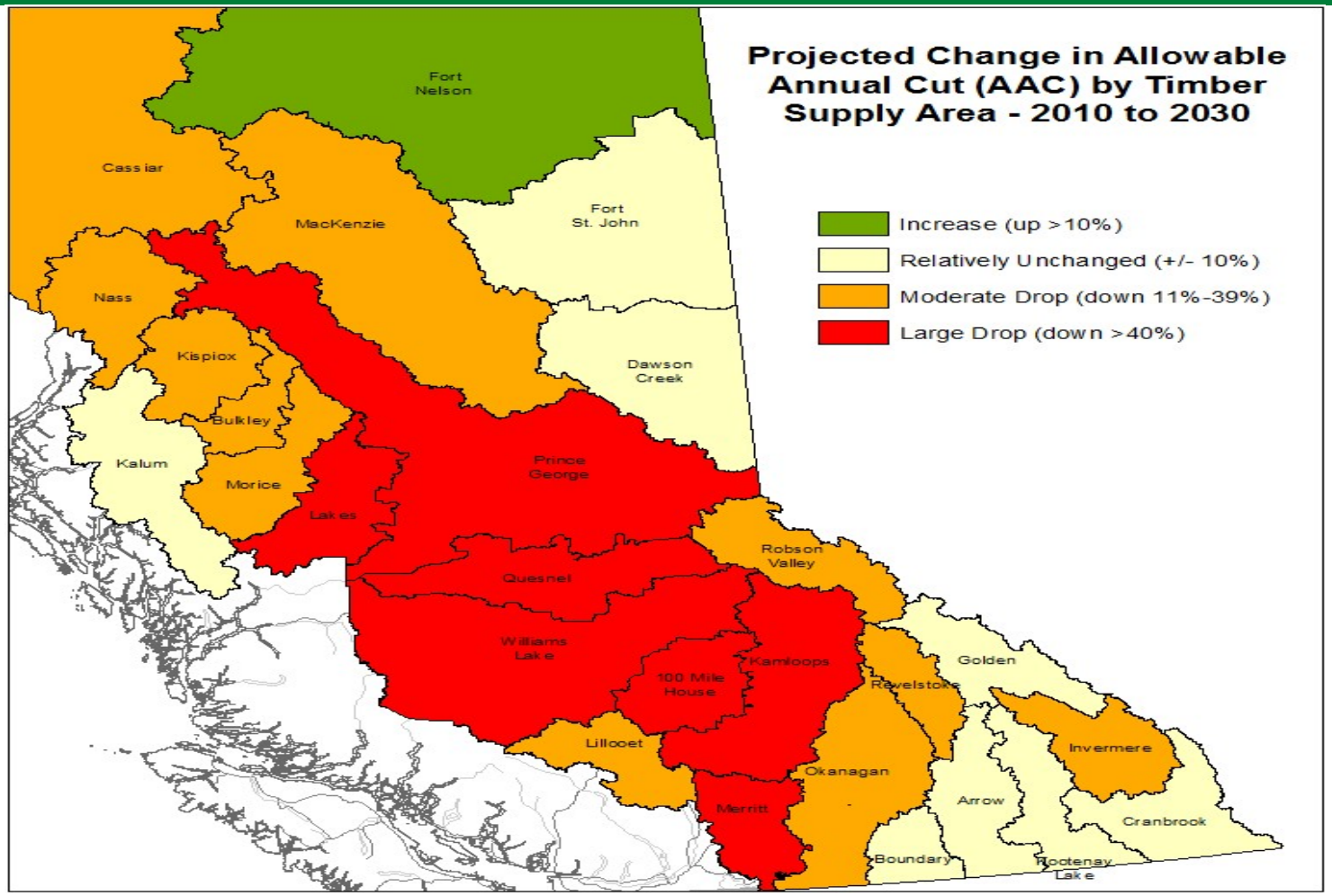
Majority of landbase not available for timber harvest today.



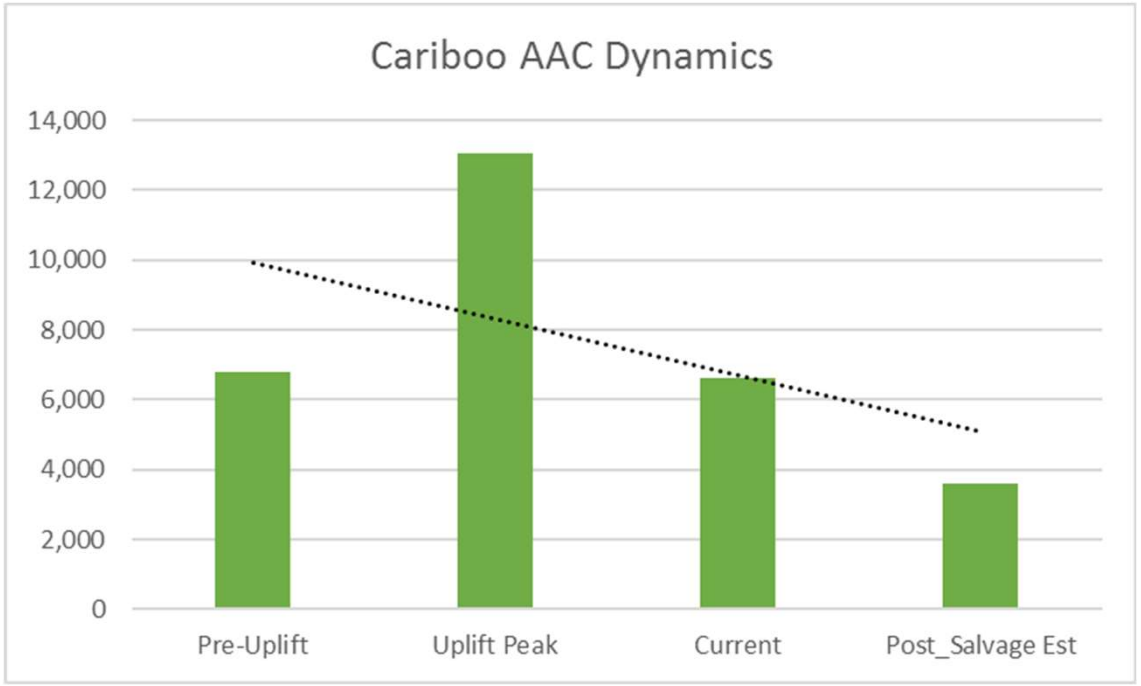
Total:·52.3%¶

- 52.3% of the Land Base is not available
- 23% of BC is available for timber harvest
- 37% of the available Land Base (THLB) is constrained in some way

AAC Dynamics

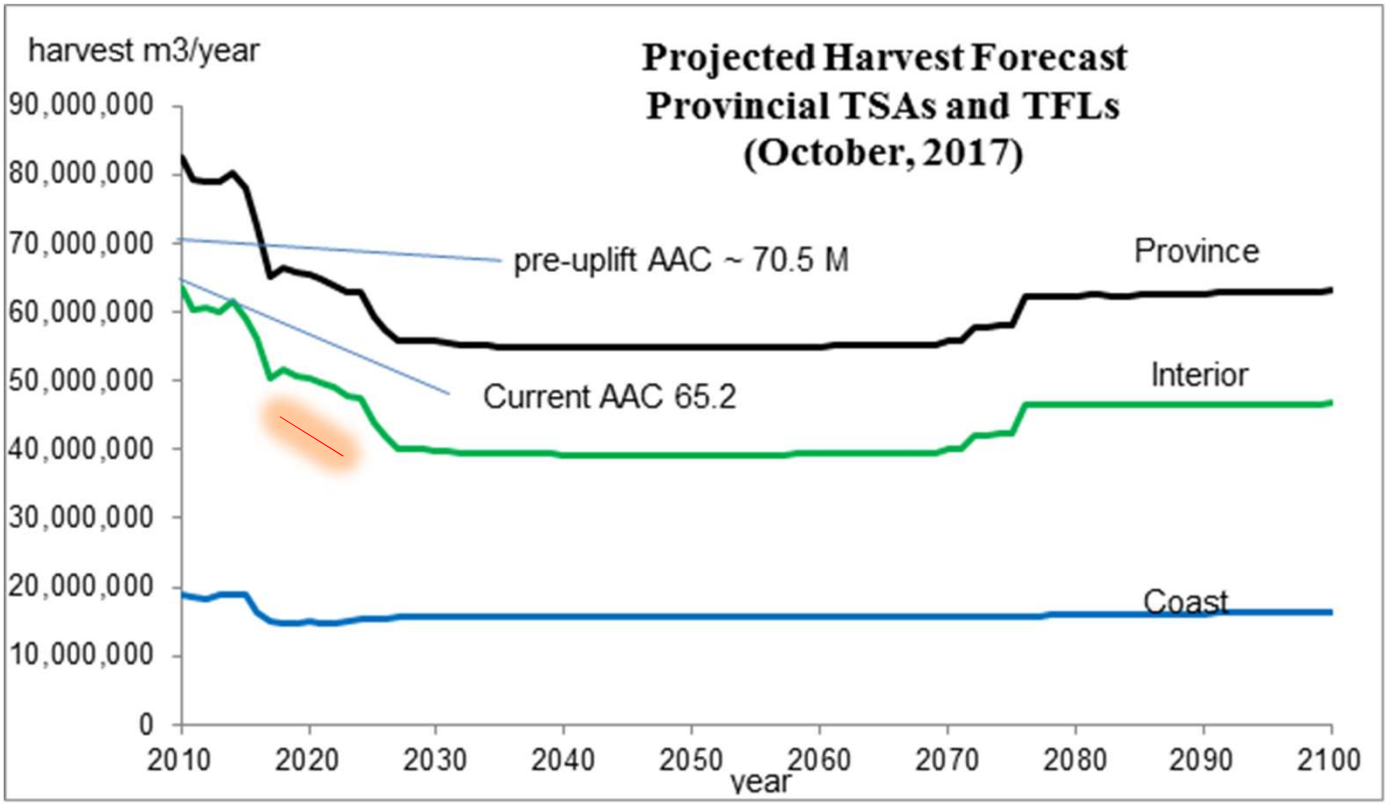


Cariboo Subset of AAC Impacts



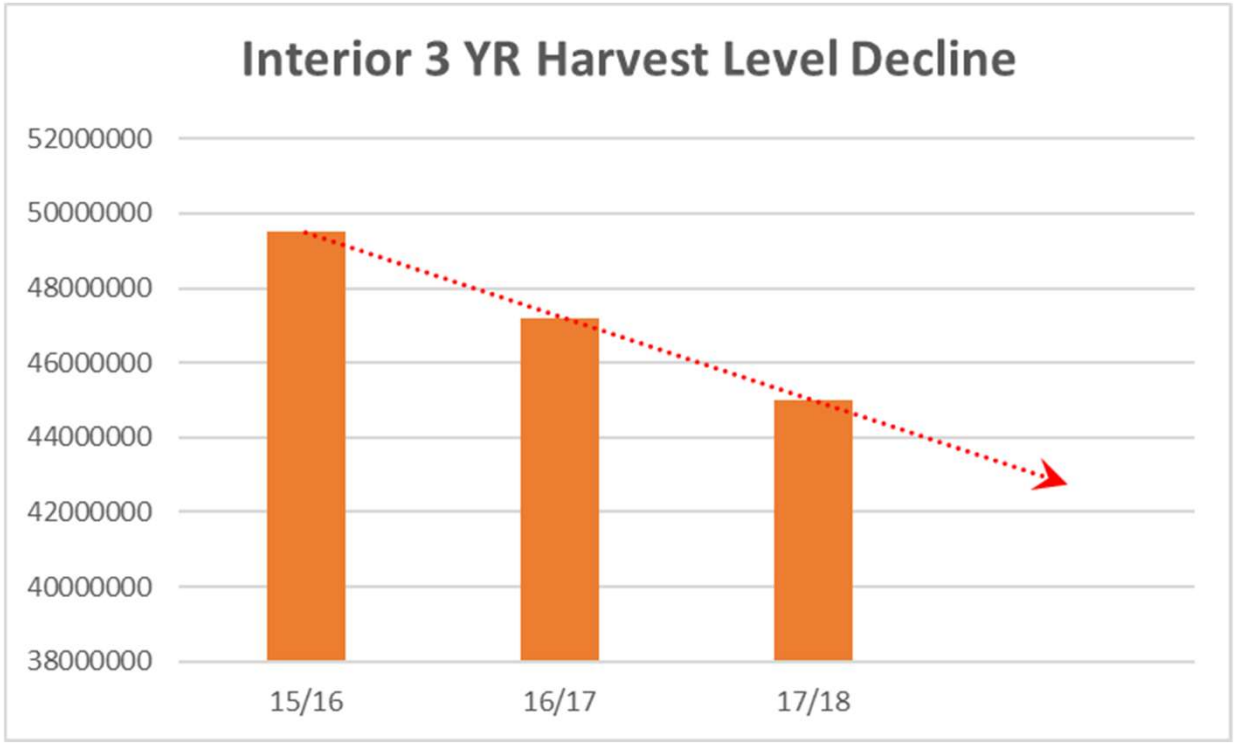
- Above is based on West Fraser information and estimates.
  - Post Salvage represents partitioned green estimate (total AAC likely higher).
  - Post Salvage includes estimated Wildfire impacts to timber supply.

Provincial Harvest Forecast



- 18/19 Interior Harvest is closer to 45 M – trending down substantially toward **40 M**.
  - Projecting a **10 M m3 (20%)** drop in interior harvest (from 50 M).

Recent Decline in Interior Harvest Rate



- Approx 5 million m3 harvest level reduction over 3 years.
- This is among **record lumber markets experienced in 2017 and 2018**.
- Another 5 million to go….

Changing Harvest Metrics

- Harvest is declining AND…….. shifting into different stand types.
  - Change in species composition – less Pli and more Sx, Bl (Fdi).
  - Change in reforestation objectives
    - Sites with other leading non-timber objectives - Wildfire risk reduction, Wildlife habitat restoration
  - Modified harvest systems – Partial cutting with no reforestation triggered
  - Marginal timber growing sites with reduced stocking standards – enhanced N/A

Changing Harvest Metrics

- Downward pressure on the THLB for other resource values.
  - Migratory Birds.
  - Goshawk
  - Fisheries Sensitive Watersheds.
  - Wildlife Habitat Areas
  - Ungulate Winter Range
  - Species at Risk – Southern Mountain Caribou
  - Federal Govt. Pathway 2020 Protection Targets – Indigenous Protected Conservation Areas…
  - What else can you think of……

Natural Disturbance = Wildfires

- **2.5 Million Ha** burned in last two years.
- Approx. **1 million ha of THLB** impacted.
- Estimate 250,000 ha of existing plantations (FG and Non-FG) = **250 Million seedlings!**

Natural Disturbance = Wildfires

- 2010 fires west of Williams Lake = direct seeding for reforestation success.
- Low site productivity
  - Lack of deployable Orchard Seed
  - Orchard seed also cost prohibitive for direct seeding.

Natural Disturbance = Wildfires

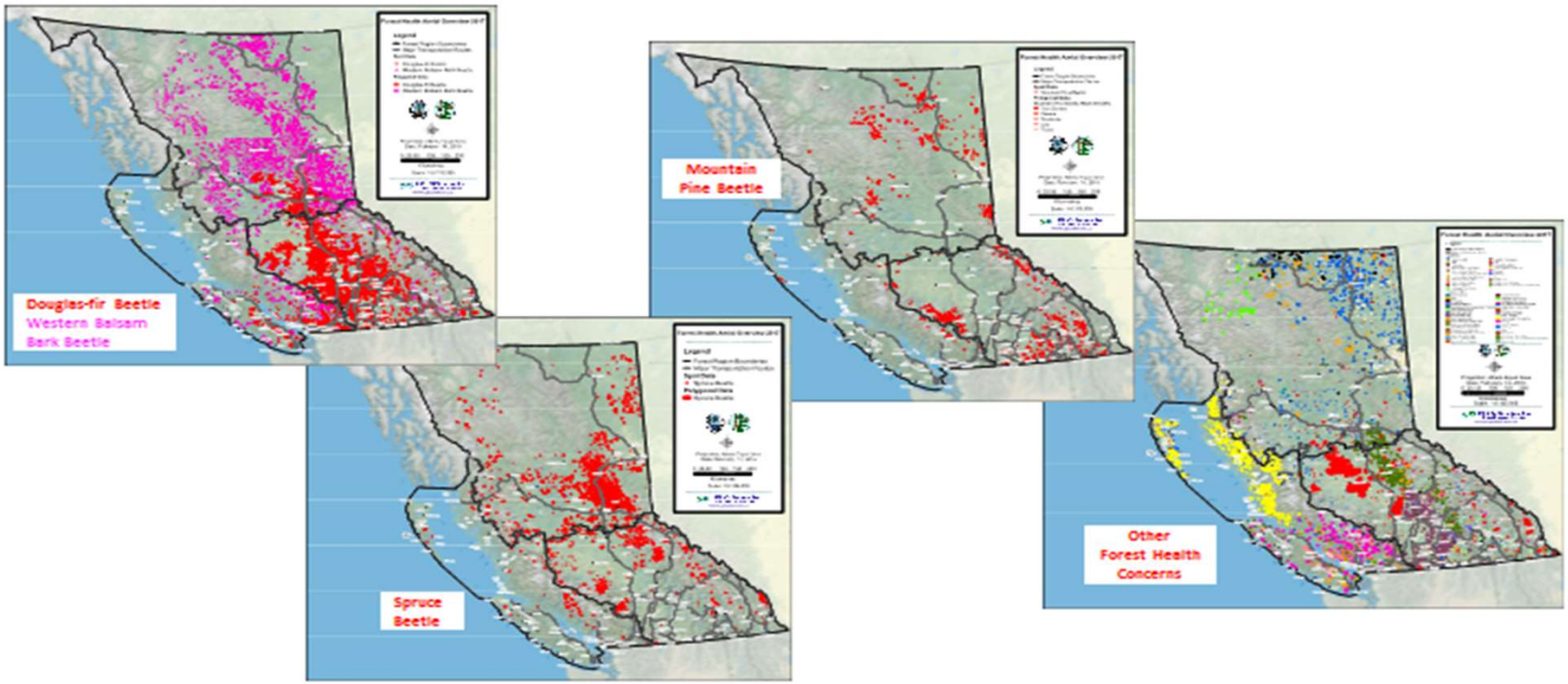
- A good place for silviculture investment?
  - How much of this landbase can be reforested?

Natural Disturbance = Wildfires

- How much will we harvest? NOT MUCH.
  - Retention is a focus within fires.
- Elephant Hill Fire fully planned.
  - ~191,000 ha / 120,000 ha THLB
  - Initial Est of 4.5 M m3.
  - Actual Developable Vol = 1.5 M m3 = **65% non-recoverable!**
  - **Why such a gap?**
    - **Terrain instability risk**
    - **Hydrology risk**
    - **VRI reliability**
    - **Burn severity**
    - **Conservation focus**
    - **Low volume partial cut stands and extreme silv risk and costs = Unecomic**

Natural Disturbance = Climate Change Uncertainty

Mother Nature's Indicators of Poor Forest Health and Conditions



- We have a lot of mortality occurring in our forests from factors other than fire.
- Govt not responding with increased harvest rates = risk of non-recoverable losses in the THLB.

Provincial Harvest Rationalization & Seedling Demand

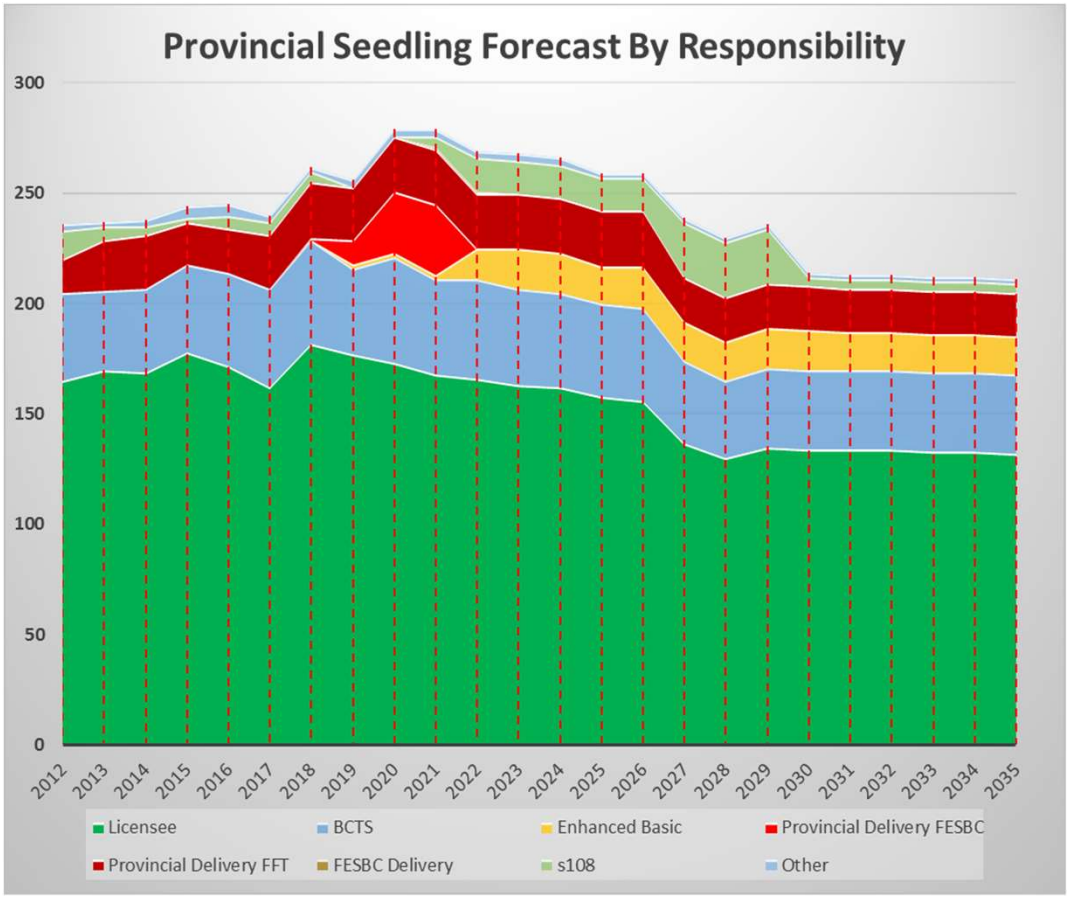
- We know that the Interior harvest level is declining by **10 M m3**.
  - 2015 through 2022.
  - DOES NOT factor additional THLB impacts from natural disturbance and other conservation pressures.

- How many seedlings are represented in **10 M m3** of harvest?
  - 40,000 ha (+/-) @ 250 m3/ha
  - **48 million seedlings** @ 1200/ha

- This is **20%** of the Provincial 5 year average and this alone would reduce the long-term average to 200 million seedlings/year.

- How can we inform our the tree improvement business among all these uncertainties on BC's land base?

Provincial Seedling Forecast = Severe Capacity Challenges



- Demand outstrips capacity to supply for next 5 years.
  - Result is increased costs across all phases.
- Demand increase is short-term
- Unlikely to see new Nursery investments to fully address demand.
- Planting community will try to respond but there is a shortage of labor.

How do we address the Reforestation Challenge

- Develop a landscape level approach.
  - Landscape level silviculture strategies with yield based performance metrics (not density based).
    - Iterative stepwise process.

- Prioritized approach to reforestation based on THLB certainty, Ecological and Economic Metrics.
  - Stratify the landbase and prioritize limited resources where return on investment is greatest.
  - Target highest productivity sites with lowest THLB risk that are closest to manufacturing centers.

- Manage for resilience
  - Promote climate adapted forests and site conditions that are resilient to disturbance.
    - Resilience at multiple levels - Landscape / Forest / Stand

- Need to prioritize actions across the user/demand categories.
  1. Tenure Obligations.
  2. BCTS.
  3. Govt Objectives Programs.

How do we Plan our investments in Seed Orchards

- Be conservative and focus on the long-term predictable forest disturbance regimes (Harvest).

- Develop forecasting models linked to overall forest management paradigms on the landscape – TSR and the ISS.
  - Use these as a base to link reforestation needs to the rate and pattern of harvest.
  - Analyze sensitivities to estimates for forecasted natural disturbance and conservation outcomes.

- Consider temporal aspects for distribution of reforestation programs on the landbase over time.
  - Orchard investments made today will not bare yields until 8-10 years from now.
    - Seed Orchard Planning needs to forecast demand this far out with confidence, and look further (10 yrs) to assess demand and payback on orchard investments.
    - Seed deployment is obviously a large factor for investment confidence = broader is better.

THE END!