

***The performance of
BIG trees and little
trees in a
Shelterwood
Silvicultural System in
the ICHmw and
MSdk, 10 years after
harvesting***

February 15, 2011

Teresa Newsome

Research Silviculturist, Cariboo Region



Goal of the presentation

To increase awareness of the existing shelterwood / partial retention trials in the Southern Interior Area and allow forest practitioners to see possible applications.



Why Shelterwoods?

- Classic system is used to promote regeneration, usually natural, under the protection of a mature overstory canopy
- Conditions can be controlled to encourage regeneration of different species
- Overstory can provide protection from severe elements such as frost
- Can be used where visual, wildlife habitat and other values would be compromised by clearcutting
- To Fill a gap in the timber supply

Where are Shelterwood Systems Appropriate?

- In ecosystems where the desired species will regenerate either naturally or as a planted seedling under a mature overstory
- Where soil protection is necessary
- Where vegetation competition needs to be controlled
- When salvaging of timber due to insect infestations such as Mountain Pine Beetle and full removal is not appropriate.
- Where a continuous canopy cover is required for a variety of reasons

Would the experience
be the same if the
bikers had to travel
through a clearcut?



The Sites

Mount 7

- Near Golden
- **MSdk**
- 15 to 45 % slope
- **Submesic**
- Pre-harvest BA
= 53.5 m²/ha
- **Fd₉Sx₁** with Pl, Bl, At & Ep present in small amounts
- Root disease: **Tomentosus**

Ice Road

- South of Nakusp
- **ICHwk2**
- 25 to 40% slope
- **Mesic to Subhygric**
- Pre-harvest BA
= 46.7 m²/ha
- **Cw₅Fd₂Lw₂Hw₁** with Pl, At, Ep, and Alder in small amounts
- Root disease: **Armillaria**

Top of Mount 7



Hang Gliding Ramp



Research Trials Below





ICHwk2: Ice Road

MSdk: Mount 7



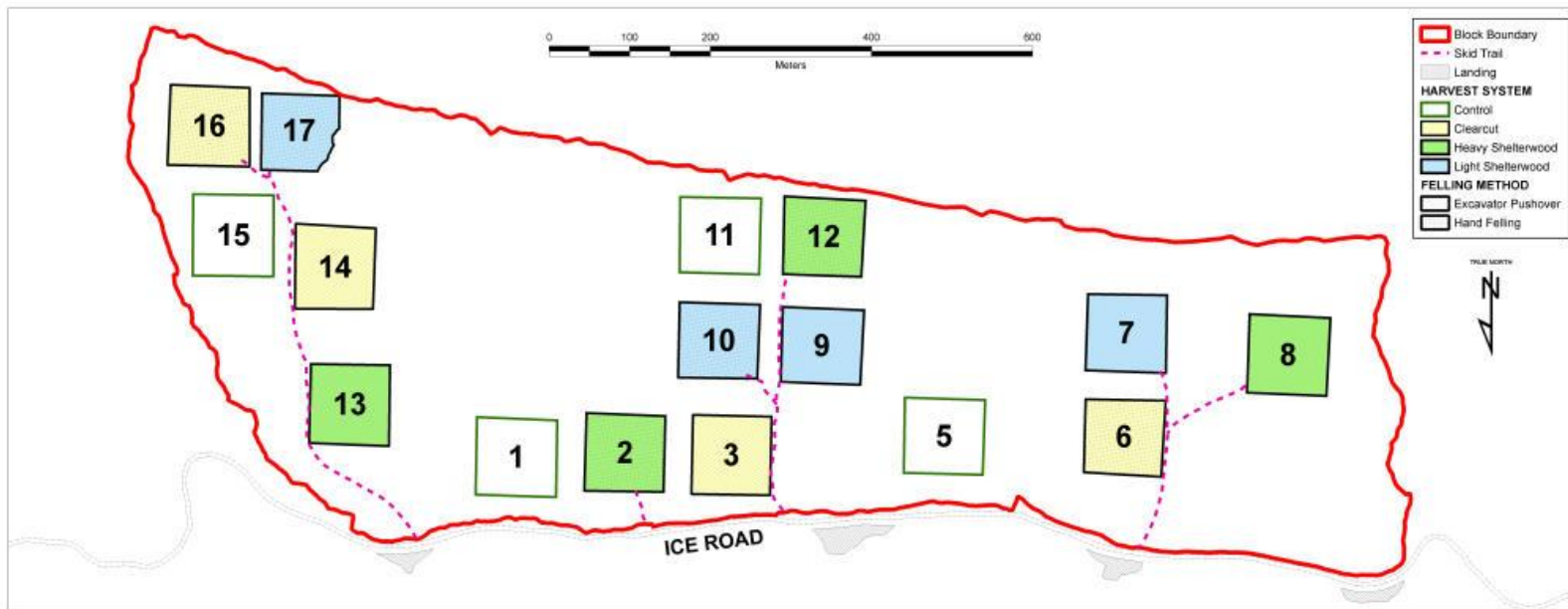
The layout and treatments

Harvesting Treatments:

- 4 levels of overstory retention
 - Clearcut (CC)
 - Low Retention (LR)
 - High Retention (HR)
 - Uncut
- Pushover vs traditional harvesting

Residual Basal Area (m²/ha) after harvest (1995/96)

	Clearcut	LR	HR	Uncut
ICH mw2 (Ice Road)	0.0	12.8	23.6	46.7
MSdk (Mount 7)	0.0	14.1	24.6	53.5



Variables Studied

- **Planted seedlings**
 - MSdk (Mount 7): Fd, Lw, Sx
 - ICHwk2 (Ice Road): Fd, Lw, Cw
- **Natural regeneration**
 - Densities
 - Growth of some advanced regeneration
- **Growth and yield of residual stand**
- **Vegetation response**
- **Light levels**

MSdk: Mount 7 Site



Low Retention (14m²)



Clearcut



High Retention (25 m²/ha)_{L3}



MSdk

Clearcut



High
Retention



Low Retention



ICHmw2: Ice Road



Low Retention (13m²/ha)



Clearcut



High Retention (24 m²/ha)



ICHmw2



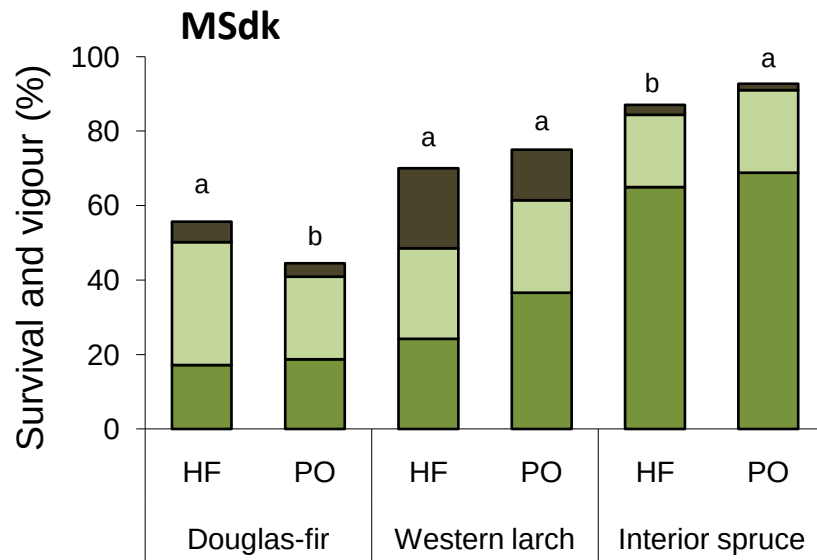
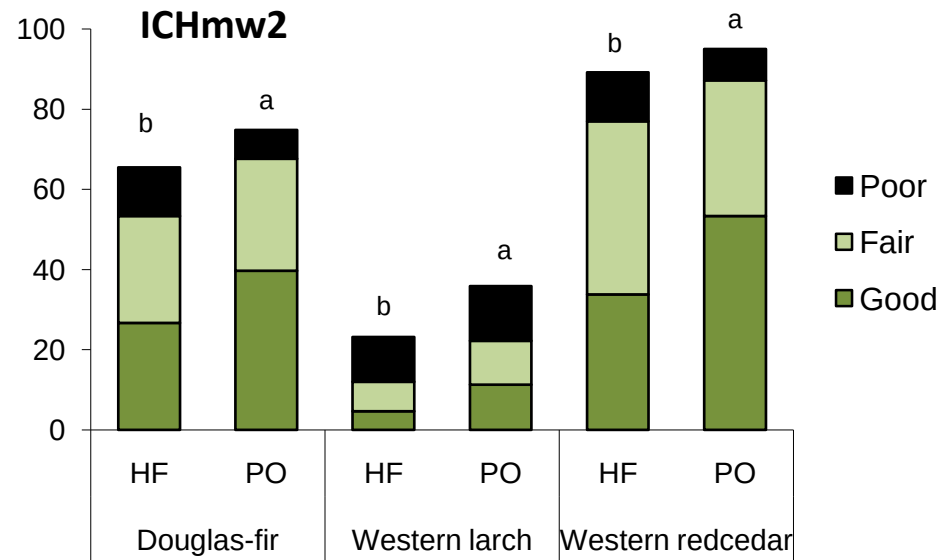
Root
Disease

Differences in
Vegetation



Planted seedlings: Survival 10th Year

Harvesting Methods

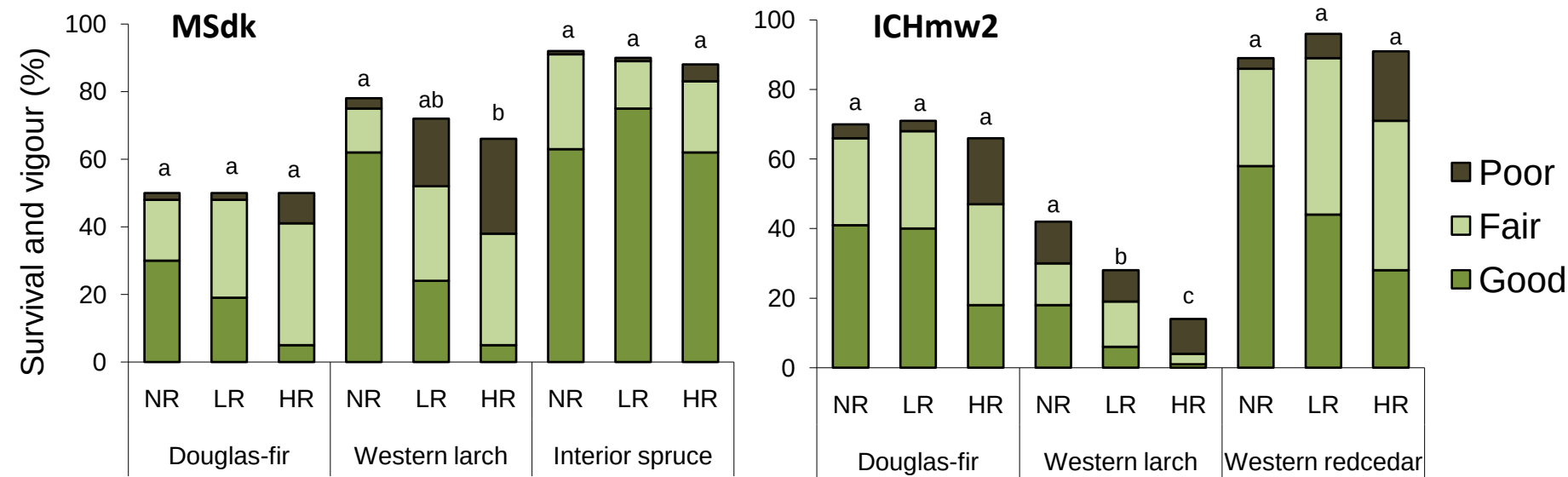


HF = Hand Falling

PO = Pushover Logging

Planted seedlings: Survival 10th Year

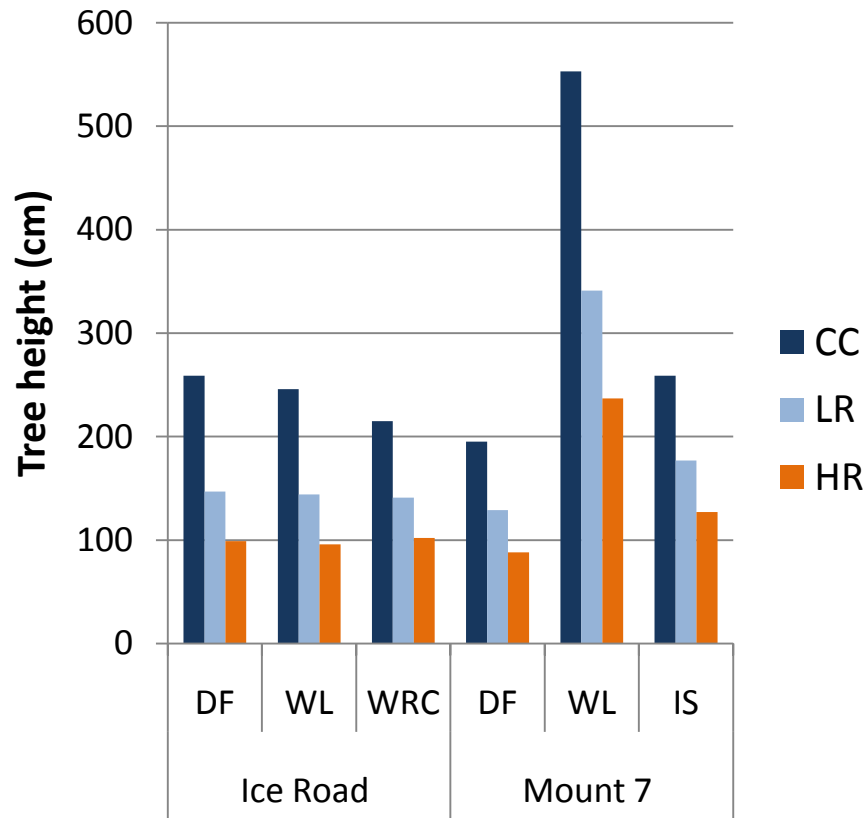
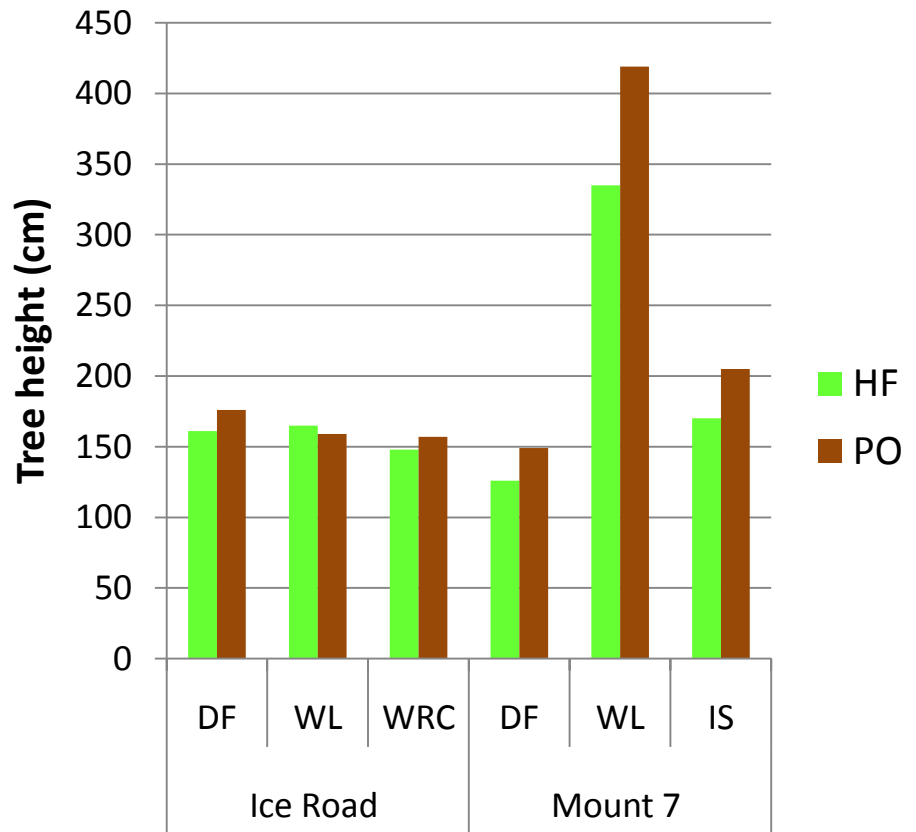
Retention Treatments



NR = No Retention
 LR = Low Retention
 HR = High Retention

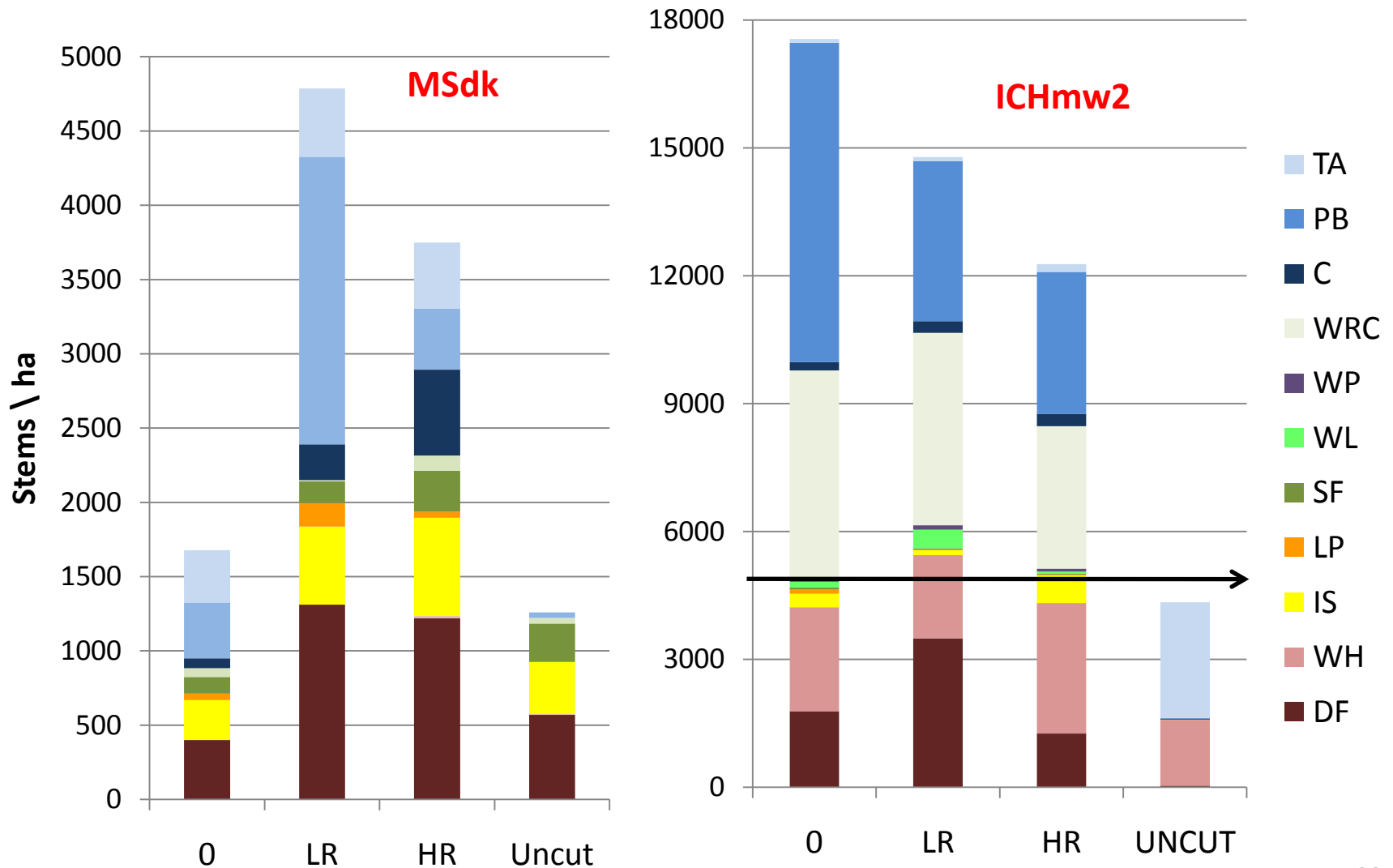
Planted Seedlings

10th Year Seedling Height Response

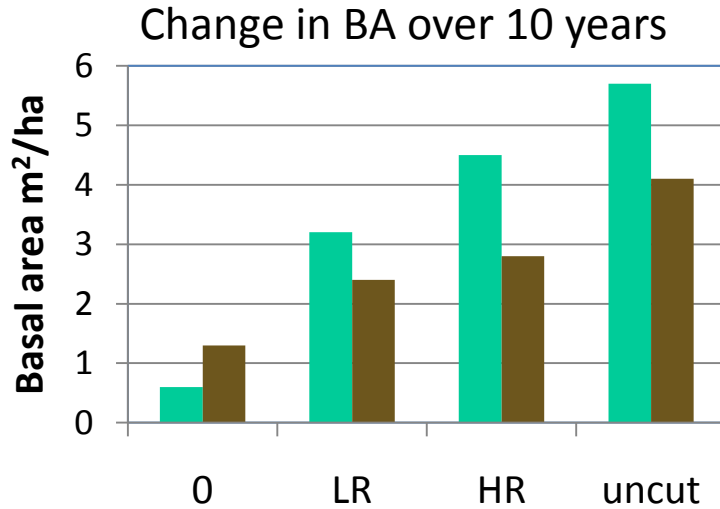
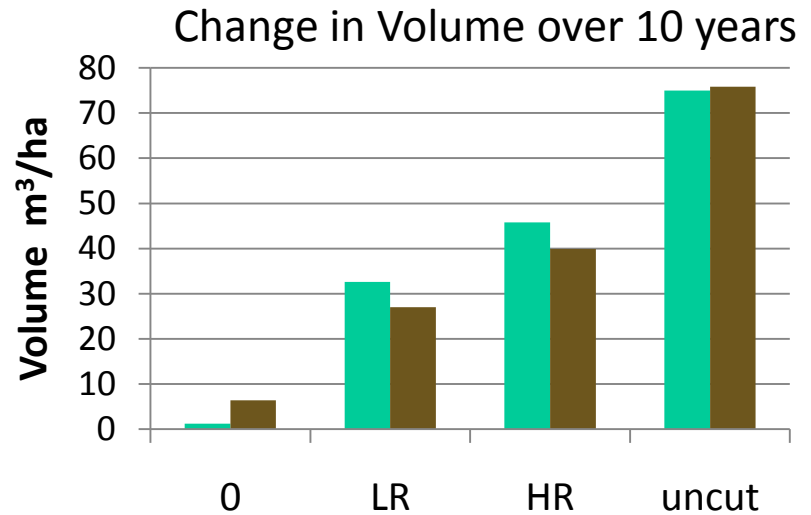
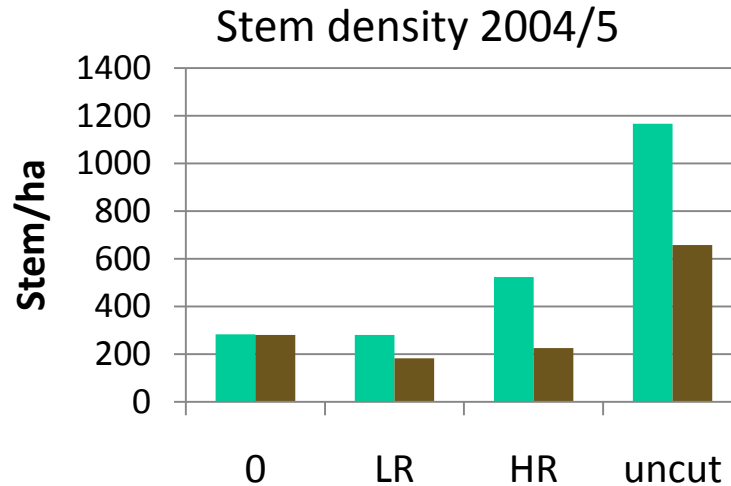


Natural Regeneration Density

(>30 cm tall to <4 cm DBH)



Response of the Overstory



■ ICHmw2 ■ MSdk

Study Summary

Regeneration

- Seedling survival was not affected by the different retention levels except for shade intolerant western larch. A slight reduction in vigour was found on the higher retention treatments.
- Seedling height growth was best where there was the most available light i.e. CC>LR>HR with the shade intolerant trees growing the fastest.
- Species of natural regeneration will be strongly affected by the residual overstory and the advanced regeneration present HOWEVER stand tending activities can be used to manipulate the species composition.
- Advanced naturals grew as fast as planted seedlings so there may be no need to plant if naturals are present.
- Small patch openings can regenerate very effectively in the MSdk and ICHmw2.
- PO logging did not appear to reduce the Armillaria infections.

Study Summary cont'd

Vegetation

- Reduced amount of birch, thimbleberry and fireweed at both sites on the retention treatments

Performance of residual timber

- Treefall occurred in some blocks usually due to exposure to wind or wetter soil conditions.
- Trees in the HR treatment can produce the same volume as a whole Chilcotin pine stand in 30 years if they keep growing at 0.4 m^3 per ha/yr.
- Need to look at individual species to determine if some species are more responsive than others....Larch at ICHmw2 were visually not doing well

Other Shelterwood / Partial Retention Studies

- **SBSdw** trials near WL – extremely good Df regeneration and extraordinary volume growth on the residual trees ($\sim 6 \text{ m}^3/\text{yr}$ where 30 m^2 BA retained).
- **IDFdm2** – St Mary's near Cranbrook – extremely good response by natural regeneration and by the suppressed trees in the understory.
- These contrasts provide food for thought.

SBSdw: North of Williams Lake



IDFdm2: Near Cranbrook



What are the challenges with a Shelterwood System?

Harvesting

- Potential increase in logging costs: specialized marking, layout, roads etc.
- Selecting sites and species combinations where treefall will be minimal (i.e. Not on shallow or wet soils or exposed to excessively high winds and avoid shallow rooted species)
- Requires a long-term commitment to a block
- Damage may occur to the residual trees and regeneration during logging
- There must be enough timber volume of acceptable species left to make it economically feasible to make the last entry (i.e. Is 15m² BA enough?)
- Biological timing of overstory removal may not always coordinate well with other variables such as timber prices

Challenges cont'd

Regeneration

- Insufficient natural regeneration
- Regeneration of non-preferred species
- Effects on roots diseases are still not well understood
- Insects or diseases may “drop in” from overstory trees



Advantages to this system?

- Can assist in creating diversity of species across the landscape
- Allows for natural regeneration
- Provides an environment for seedlings that may not regenerate well in clearcuts
- Allows for the removal of early serial species that may decline with time or are taking up growing space but not performing well
- Can take some timber volume now to assist in the mitigation of a mid-term timber supply and residual trees will continue to grow providing more timber
- Can be used to address wildlife or visual concerns
- Stands with over 20m² under current guidelines can be considered stocked. i.e. no regeneration obligations.(Is this good or bad?)

Implementation Issues

- Current administrative system designed for clearcutting does not support a shelterwood or partial retention harvesting system well
 - Surveys
 - Timber allocation (volume based tenures)
 - RESULTS
- Could created a “timber slum” if the stand, either regeneration or overstory, do not respond as expected or if a final cut does not occur

In Conclusion

- Careful thought is needed for application of Shelterwood systems: objectives, priorities and projected outcomes need to be well defined
- More complex systems should and can be part of our forest landscape to create diversity and resiliency
- A number of different species can be targeted not just species that grow quickly in the first 10 years
- Administration issues will need to be considered
- With appropriate care and attention this system can work well!

Some research team members

