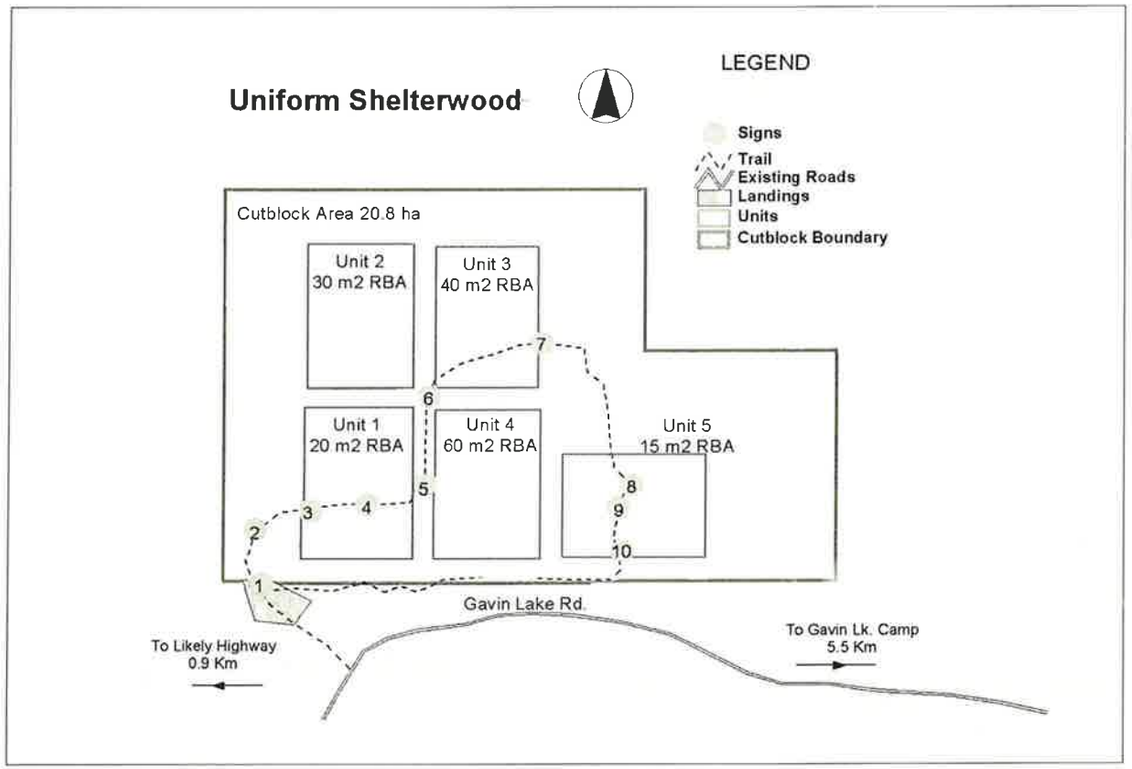

Residual Basal Areas and Harvesting Treatments

	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5
1991	40 m^2/ha fellerbuncher preparatory cut	30m^2/ha hand falling seed cut	40m^2/ha hand falling preparatory cut	60m^2/ha no harvest control	30 m^2/ha fellerbuncher seed cut
2001	20 m^2/ha fellerbuncher seed cut				15 m^2/ha fellerbuncher second seed cut
2011	final harvest	final harvest	final harvest ?		final harvest

Based on research findings from 1990 - 2001, we have learned:

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- Seed cut treatments have adequate amounts of Douglas-fir regeneration.
- A heavy seed fall occurs every 3 years.
- Seed germination and seedling survival were highest on rotting wood and mineral soil. Site preparation can be used to expose these seedbeds.
- Frost damage didn't occur on planted or natural regeneration prior to 2001.
- As of 2000, the best growth and survival of planted seedlings was in the 30m^2/ha rba treatment.
- Substantial growth of subalpine fir and green alder in the cut units necessitated slashing in 2001.
- The choice of harvesting equipment, methods and season is flexible.
- Windthrow was minor after the first harvest but can be significant on wind prone sites after the second entry.
- Bark beetle infestations have been minimal but continuous monitoring and salvage are necessary.
- Over a ten year period, stand volume growth increased with residual basal area. In the seed cuts, individual trees have responded by slowing height and increasing butt diameter compared to trees in the uncut control.

Uniform Shelterwood Silvicultural Systems for Douglas-fir Regeneration

A co-operative research trial based on a classical silvicultural system

Co-operators:

Ministry of Forests, Research
Weldwood of Canada Ltd.,
UBC/Alex Fraser Research Forest

Current funding provided by the Forest Investment Account

Brochure Updated 2002

Why are we doing this research? 1

Douglas-fir forests provide important diversity in the landscape for wood supply, wildlife, and recreation and they are valuable winter habitat for mule deer. Regeneration of Douglas-fir is therefore an important forest management objective.

After clearcut harvesting in this biogeoclimatic subzone (dry, warm Sub-boreal spruce), Douglas-fir plantations frequently fail due to a number of environmental factors, in particular, summer frost. Rather than clearcutting, partial retention of the overstory canopy could reduce frost and encourage natural regeneration of Douglas-fir. How much overstory to retain and how to harvest have been the focus of this ongoing research trial.

This demonstration area is one of three study sites that were established in 1991 to answer these questions.

What treatments are we testing? 2,3

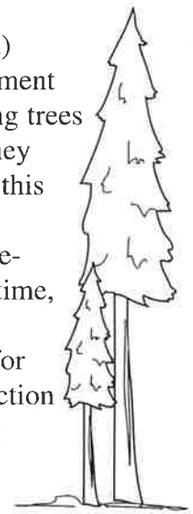
Basal area is a measure of how fully the trees occupy the site. Prior to harvest, the basal area of this stand was approximately 60m^2/ha as seen in the non-harvested control (unit 4). As shown on the map, there are currently five different treatment units with residual basal areas (rba) ranging from 25% to 100% of the original pre-harvest level. The buffer area surrounding the units was treated the same as unit 1.

Two methods of harvesting were tested in 1991: hand falling with line skidding, and fellerbuncher falling with grapple skidding. Results from these two methods were similar so harvesting in 2001 was done by fellerbuncher only. The harvesting done in 1991 and 2001 is described as 'thinning from below', which means that trees of poor vigour were harvested first. Species other than Douglas-fir were also selected for harvesting in order to retain as much Douglas-fir as possible in the residual stand.

Shelterwood defined 4

The Shelterwood Silvicultural System is a classical method to regenerate even-aged forests.

Some species (Douglas-fir included) require protection from the environment when they are young. The sheltering trees are referred to as 'overwood' and they remain for many years (20 years in this study) to provide seed and protect regeneration. The protection requirements of regeneration change over time, therefore multiple harvests may be required to provide growing space for regeneration in stages. When protection is no longer required, the remaining overwood is removed.



Why shelterwood? 5

Young trees require protection from many environmental factors including drought, frost, vegetation and insects. In this location the factor most limiting to Douglas-fir regeneration is summer frost. A uniform shelterwood was selected because Douglas-fir regeneration was observed under mature Douglas-fir, and evenly spaced overwood provides for seed distribution and frost protection.

What are preparatory and seed cuts? 6

The preparatory cut sets the stage for regeneration by improving the vigor of the prospective seed producers and exposing them gradually to increased wind. The seed cut induces the actual establishment and growth of seedlings by opening up growing space.

What are the risks? 7

Partial cutting in forests over 100 years old incurs certain risks:

- There is increased exposure to weather. After the initial harvest, on this site, wind and heavy snow broke some stems.
- Harvesting may cause damage and stress in the residual stand increasing the risk of pest damage. Bark beetles have been present in the stand since the initial harvest and minor salvage operations have been necessary.
- Falling residual trees may damage the regeneration layer. Careful harvesting during the second entry resulted in minimal damage.
- The highest quality trees remain on the site for the longest period of time and are most exposed to risk of loss through fire, insects and other disturbances.

What are we studying? 8,9

In each treatment unit, natural regeneration, understory vegetation, and mature tree growth and mortality were measured before and after harvesting. We are also sampling: seedfall, windthrow, soil and air temperatures, snow interception, planted seedlings, and small mammal populations. This information is being used to determine why some treatments are more successful than others for regenerating Douglas-fir in these forests.

An analysis of the cost and efficiency of planning and implementing partial cutting has been completed.

To avoid disturbing research in progress, please stay on the trail and do not remove anything from the site. Thank you.

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