**EP1162 Discussion Literature outline**

**Proposed headings/themes for the discussion**

1. Introductory statements
2. Tree growth
3. Stand structure
4. Stand basal area and volume
5. Implications for partial harvest silviculture systems in central BC
6. Other considerations for partial cutting in central BC
7. Conclusions

**Proposed points of discussion**

In the introductory statements paragraphs, I suggest we summarize important results from study.

From a silviculture perspective, the success of partial cutting is related to the growth response of residual trees (Thorpe & Thomas, 2007).

# Tree growth

What are the interacting effects of residual basal area, species and tree diameter class on tree growth responses over time and over the entire post-harvest period (27 years)? How did different residual basal area treatments change resource availability to residual trees?

From (Thorpe et al., 2007): treatments dramatically increase the light available to residual trees and likely cause soil temperatures to rise as more sunlight reaches the forest floor. In the cold, wet sites considered in this study, even small increases in soil temperature could have important implications for tree growth. Nutrient flush- ing following harvest may also help to explain the pattern of growth response.

Partial cuts allow for manipulation of light conditions in the understory but it is important to determine how the advance regeneration existing under different levels of suppression may react to different levels of release (Wang et al., 2011).

## Was there a lag effect in growth response? What are some potential causes of a delayed growth response?

When surrounding neighbours are removed, residual trees commonly display enhanced growth, but with a variable time lag following harvest (Thorpe et al., 2007; Thorpe & Thomas, 2007). This pattern has been found in a number of species and treatments, with peak residual-tree growth occurring 6–25 years after harvest (e.g., Youngblood 1991; Groot and Ho¨kka¨ 2000; Latham and Tappeiner 2002; Jones and Thomas 2004).

Residual black spruce trees displayed a sizeable increase in growth following partial harvest. At their peak, radial growth rates were double those found before harvest. The mean observed peak was delayed, occurring 8–9 years after harvest, and the response pattern exhibited a 2-year delay period of no response followed by a 6- to 7-year period of increase after harvest (Thorpe et al., 2007)

We hypothesize that [delayed growth response]S may be caused either by slow acclimation responses or by resource allocation to root and (or) shoot growth during the first 2 years after harvest (Thorpe et al., 2007).

## Is growth accelerating in certain tree sizes? Have other studies identified that post-treatment growth response is stronger in certain size/ages?

Younger trees are likely to display larger growth increases than old trees, while larger trees may reach faster growth rates than their smaller coun terparts (Thorpe et al., 2007; Thorpe & Thomas, 2007). Suppression may also affect individuals’ ability to respond to harvest, and thus, slow preharvest growth rates may be associated with more modest growth increases.

Suppressed trees are likely to be smaller ones, therefore, one might expect that larger trees would release faster (my thought).

(Thorpe et al., 2007) found that Tree age had a strong influence on the magnitude of predicted responses . Older trees displayed modest growth responses compared with their younger counterparts, and very old trees (>200 years old) showed little or no positive growth response to harvest.

Many studies have demonstrated the significance of tree size in predicting variation in growth (e.g., Canham et al. 2004; Jones and Thomas 2004) but size was not an important pre- dictor of growth in the present study. This is likely due in part to the small range of residual-tree sizes, but tree age does appear to be a much stronger predictor of growth in this system (Thorpe et al., 2007).

## How did spruce and fir respond to release in this study? Do silvical characteristics explain differences between species?

## What are some other sources of variation in tree growth that could be considered in future studies? Stem mapping, radial growth response can provide annually resolved growth responses.

Differences in the magnitude of individual-tree growth responses not ex- plained by tree age may be attributable to spatial variation in postharvest stand structures; such factors could account for a substantial fraction of the unexplained variation in the observed (Thorpe et al., 2007).

# Stand structure

How did tree density change over time, and among treatment units and species?

Were there patterns of mortality in the study?

How did the diameter class distribution change over time, by treatment unit?

3. **Stand basal area and volume**

What are the differences in basal area/volume increment over time (periodic and entire period) among treatment units?

Was there a lag effect in stand basal area/volume? Can this be explained by tree-level growth responses discussed previously?

Can we identify primary sources of basal area/volume increment from diameter classes and species? In other words, did most of the basal area increment come from trees of a certain size or species?

4. **Implications for partial harvest silviculture systems in central BC**

Can we make any future projections about stand volume, structure and composition among treatments? Will treatment units converge over time? When?

Can we infer implications to total stand volume from partial cutting?

Will partial harvest in central BC spruce-fir stands inevitably result in stand conversion to fir-leading if spruce are targeted for harvest?

How can our results inform the use of partial cutting to achieve different management objectives (e.g., timber production, shelterwood, bark beetle salvage, structural diversity)

5. **Other considerations of partial harvest silviculture systems in central BC**

Increasing interest in these types of silviculture systems to salvage bark beetle-killed trees while protecting residual live trees for mid-term timber supply, wildlife habitat, carbon, etc…

Blowdown is a key stand-level consideration in designing these systems. Very little blowdown in this study – can we relate this to elements of the system design (e.g., block configuration).

6. **Conclusions**