A PRELIMINARY EVALUATION OF WILDLIFE TREE RETENTION ON LARGE CUTBLOCKS HARVESTED BETWEEN 2003 AND 2005 FOR MOUNTAIN PINE BARK BEETLE SALVAGE – CARIBOO REGION

By
Geoff Price
Ecosystem Officer
Ministry of Environment

October 2007

Revised January 2008

BRITISH COLUMBIA
The Best Place on Earth

Library and Archives Canada Cataloguing in Publication Data
Price, Geoff.
A preliminary evaluation of wildlife tree retention on large cutblocks harvested between 2003 and 2005 for mountain pine bark beetle salvage [electronic resource].
Available on the Internet.
Includes bibliographical references: p.
ISBN 978-0-7726-5880-7
1. Forest management – Environmental aspects - British Columbia – Cariboo Region. 2. Habitat conservation - British Columbia – Cariboo Region. 3. Clearcutting – Environmental aspects - British Columbia – Cariboo Region. 4. Ecosystem management - British Columbia – Cariboo Region. 5. Mountain pine beetle - British Columbia – Cariboo Region. I. British Columbia. Ministry of Environment. II. Title.
SD146.B7P74 2007 634.9'20971175 C2007-960235-5

EXECUTIVE SUMMARY

In 2006, the Ministry of Environment, Cariboo Region, initiated a project to evaluate wildlife tree retention practices on large cutblocks greater than or equal to 100 hectares (gross block area) associated with Mountain Pine Bark Beetle harvest. The project was carried out in the Quesnel, Central Cariboo, 100 Mile House and Chilcotin Forest Districts. The purpose of the project was to determine if wildlife tree patches and wildlife tree retention practices are providing the range of habitats for those species dependent on wildlife trees and if those practices are consistent with the direction or guidance provided by the Ministry of Forests under the *Forest Practices Code of BC Act* and in consideration of the Cariboo-Chilcotin Land Use Plan.

A random sample of 20 post-harvest cutblocks for the Quesnel, Central Cariboo, Chilcotin and 100 Mile House Forest Districts was generated by the Data and Quality Management Section of the Forest and Range Evaluation Program (FREP) using harvest date (cutblocks harvested between 2003 and 2005) and cutblock size (greater than 100 hectares of gross area) as the selection criteria. The random list was generated from the population of cutblocks that meet the selection criteria in Reporting Silviculture Updates and Landstatus Tracking System (RESULTS). Of this random sample, the first five cutblocks on the district list were chosen for the evaluation using the protocol developed by FREP. This methodology is not designed as a compliance and enforcement tool.

The results of the evaluation showed that the total patch retention area for the 20 sampled blocks was 530.4 ha. And the total gross cutblock area was 3229.4 hectares. The percent of wildlife tree patch (WTP) area, inclusive of dispersed retention, ranged from a low of 8% to a high of 65% with an average of 19%. Gross cutblock area ranged from 110.4 hectares to 241.4 hectares.

The analysis of the 20 sampled cutblocks showed some potential biodiversity strengths and weaknesses.
Strengths included:

- The most common reserve constraint was riparian areas, either on streams or wetlands (including non-classified drainages and non-classified wetlands).
- The CWD volume in the harvested areas was similar to the volumes found in the reserves.
- 76% of the sampled blocks had more than 1 ecological anchor per hectare.

Weaknesses included:

- No mitigation measures to reduce windthrow in the harvested and reserve areas.
- Basal area equivalency (BAE) for the harvested areas was not as high as stated in the silviculture prescriptions or site plans due to windthrow.
- Reserves on riparian areas tended to be linear with little or no interior forest condition.
- Management zones on riparian features tended to harvested.
- A tendency towards smaller WTPs, particularly those that are internal to the block boundaries.
- Density of long pieces of CWD were greater in the patch reserves than the harvested area.

- Use of external (WTPs not adjacent to the harvested block) WTPs.
- Utilization of immature or stagnant stands, not representative of the preharvest stand structure, as WTPs.
- 500 meter guideline was not met on all of the sampled blocks.

A further 40 blocks were sampled in 2007 with funding provided by the Provincial Pine Beetle Response group. The 2006 data will be combined with the 2007 data and the final report will be available in the spring of 2008.

ACKNOWLEDGEMENTS

I would like to thank the following people for their assistance in both the field portion of the project and for collecting the necessary documents required for completing this project:

Kerri Howse – Stewardship Forester, Central Cariboo Forest District
Chris Lohr – Stewardship Officer, 100 Mile House Forest District
Darius Low – Stewardship Forester, 100 Mile Forest District
Lee-ann Poisson - Stewardship Forester, Quesnel Forest District
John Youds - Ecosystem Section Head, Ministry of Environment, Cariboo Region
Becky Bings - Ecosystem Biologist, Ministry of Environment, Cariboo Region
Bob Cavlek – FREP Technician, Central Cariboo Forest District

I would also like to thank Thomas Chen, Quality and Data Management Specialist, FREP for arranging the block samples and data entry, Amanda F. Linnell Nemec of International Statistics and Research Corp. for compiling the data and Nancy Densmore of the Forest Practices Branch for her advice and support in completing the final report.

I would like to acknowledge John Youds and Steve Mazur, Ministry of Environment, Cariboo Region for their support for this project.

I would like to thank John Youds, Roger Packham, Harold Armleder, Kerri Howse, Nancy Densmore, Richard Thompson, and Karen Y. Rempel for their technical review of this report.

Finally, I would especially like to thank Chris Schmid, Ecosystem Officer, Ministry of Environment, Chilcotin Forest District for his enthusiasm and help in completing the project.

TABLE OF CONTENTS

List of Figures

List of Tables

INTRODUCTION

British Columbia is currently experiencing the largest recorded Mountain Pine Bark Beetle outbreak in North America (BC Ministry of Forests and Range 2004). In 2003, the outbreak was already significantly larger than the last major outbreak which occurred on the Chilcotin Plateau in the 1980s (Wood and Unger 1996; BC Ministry of Forests and Range 2003).

In response to the potential loss of timber volume, the BC Ministry of Forests and Range increased the annual allowable cut (AAC) in the Quesnel Timber Supply Area (TSA) and has uplifted the AAC in the Williams Lake and 100 Mile House TSAs. The proposed increases are directed at the salvage of dead trees, rather than the suppression of the beetle outbreak.

The current outbreak will have a significant impact on a large portion of the pine forests in British Columbia (Eng et al. 2004). It will not be possible, nor desirable, to harvest all the affected pine stands; however, the increases beyond current level of harvest must carefully consider non-timber values, particularly wildlife tree retention.

Poorly planned and poorly executed large-scale salvage operations have the potential to significantly affect wildlife tree values (Lindemayer et al. 2004):

- large-scale salvage harvesting can undermine many of the ecosystem benefits of major disturbances;
- removal of large quantities of potential wildlife trees can have a negative impact on species that require or benefit from those wildlife trees;
- large-scale salvage logging can impair ecosystem recovery;
- some species may not adapt to the effects of two major disturbances (mountain pine bark beetle infestation and large-scale salvage harvesting) in succession.

In 2006, the Ministry of Environment, Cariboo Region initiated a project to evaluate wildlife tree retention practices on large cutblocks greater than or equal to 100 hectares (gross block area) associated with Mountain Pine Bark Beetle harvest. The project was carried out in the Quesnel, Central Cariboo, 100 Mile House and Chilcotin Forest Districts. The purpose of the project is to determine if wildlife tree patches and wildlife tree retention practices are providing the range of habitats needed by those species dependent on wildlife trees and if current tree retention practices are consistent with the direction or guidance provided by the District Managers under the CCLUP and the *Forest Practices Code*.

The harvesting practices assessed in this project were managed under the *Forest Practices Code of BC Act* (FPC) however management is now transitioning into the *Forest and Range Practices Act.*

The Cariboo-Chilcotin Land Use Plan (CCLUP) Implementation Report (February 1995) states a commitment to "Applying the Forest Practices Code, including riparian buffers, biodiversity conservation targets and wildlife habitat areas, across all zones. The development of a biodiversity strategy for the region is a key requirement." Subsequently, the Biodiversity Conservation Strategy for the Cariboo-Chilcotin Land Use Plan (July 1996) was produced. The Strategy linked as much as possible, CCLUP targets and FPC guidebooks to address the targets of the CCLUP.

The *Forest Practices Code Biodiversity Guidebook* (Province. of B.C. 1995) provides suggested levels of retention for wildlife trees, based on a biogeoclimatic (see Meidinger and Pojar 1991) subzone analysis of total area available for harvest and the amount of area previously harvested without wildlife tree retention. At the time there were no legal landscape-unit objectives, so many forest districts relied on district manager policy or guidance, based on Table 20(b) of the Guidebook to help guide implementation of wildlife tree retention.

A discussion paper entitled *Forest Stewardship in the Context of Large-scale Salvage Operations* (Eng et al 2004) was released that contained a number of recommendations for future harvest practices. In December 2005, British Columbia's Chief Forester (Jim Snetsinger) issued guidance on landscape- and stand-level structural retention in large-scale mountain pine beetle salvage operations based on this document. Included were recommended levels of retention in salvage cutblocks of different sizes (Table 1).

Table 1. Recommended proportion of stand-level retention based on opening size

Opening size (ha)	Unharvested/retained (%)
< 50	10
50–250	10–15
250–1000	15–25
> 1000	> 25

All of the blocks sampled were either harvested or approved prior to the Chief Forester's "Guidance on Landscape- and Stand-level Structural Retention in Large-Scale Mountain Pine Beetle Salvage Operations" (Snetsinger. December 2005). These data, therefore, represent a pre-guidance baseline of stand-level biodiversity on large cutblocks.

METHODS

A random sample of 20 post-harvest cutblocks for the Quesnel, Central Cariboo, Chilcotin and 100 Mile House Forest Districts was generated by the Data and Quality Management Section of the Forest and Range Evaluation Program (FREP) using harvest date (cutblocks harvested between 2003 and 2005) and cutblock size (greater than 100 hectares of gross area) as the selection criteria. The random list was generated from the population of cutblocks that meet the selection criteria in the Reporting Silviculture Updates and Landstatus Tracking System (RESULTS). Of this random sample, the first 5 cutblocks on the district list were chosen for evaluation using the protocol developed by FREP (Protocol for Stand-level Biodiversity Monitoring. April 28, 2006). This methodology is not designed as a compliance and enforcement tool. However, the data derived from monitoring cutblocks for stand-level biodiversity will help in understanding if the licensees are managing the forest land base in consideration of the Cariboo-Chilcotin Land Use Plan.

The modified FREP sample design for blocks larger than 100 hectares (Addendum for Stand-level Biodiversity Monitoring. June 28, 2006) identified the number of plots to be established that capture the variability of the retention on the block and identifies the size and type of each separate retention area but limits the time spent on the block.

Sampling within the harvest area was conducted using prism plots, fixed-area plots or complete tree counts on the whole harvest area depending on the density of any retention identified and the size of the trees retained. The sample intensity was 3 plots for the first 60 hectares plus 1 plot for every 20 hectares thereafter to a maximum of 15 plots. This sample intensity applied to each identified stratum if there was an appreciable difference in harvesting practices between the strata. For example, if one stratum was clearcut and one stratum had dispersed retention then there would be a total of 30 plots. If there was no difference in harvesting practices then all the strata were combined and sampled as one stratum.

For total area of patch retention within a cutblock, the number of plots that were sampled was 1 plot per hectare for the first five hectares and one for every 10 hectares thereafter to a maximum of 15 plots. Temporary, immature or small polygons (< 1 ha.) were not sampled. Potentially, there could be a maximum of 45 plots including 30 plots for the harvested area plus 15 plots in the patch retention area(s). Plot location was randomly selected (using either a random numbers table or the random numbers program in Excel) using the appropriate scale dot grid on the site map.

Coarse woody debris (CWD) data was collected by establishing a 30-meter line transect (two 15-meter legs) from each plot center. The first 15-meter leg continues on the same bearing from the previous plot. The second leg is at a 90° angle to the first leg. Data for CWD include tree species, diameter, length, and decay class. Only diameter is used to calculate volume. Length is collected as a qualitative indicator for CWD – long pieces are better for habitat and decay more slowly.

The indicators used to assess wildlife tree retention are (from State of Cutblocks: Resource Stewardship Monitoring for Stand-level Biodiversity Monitoring, Densmore and Thompson 2005.):

1. **Percentage area retained:** The percentage of area retained as tree cover on a cutblock in relation to the gross cutblock area. This includes wildlife tree patches (WTPs) and dispersed trees and retention on the block that is not labelled as WTP, as long as it is anticipated to be maintained for at least one rotation.
2. **Individual patch size:** Total area in hectares of each separate patch.
3. **Patch location:** Patches can be either *internal* (completely surrounded by harvested area), on the *edge* of the block (partially surrounded by harvest area), or *external* to the block (not physically connected to the block).
4. **Presence of ecological anchors (other than veteran trees):** Ecological anchors include hollow trees, cavity nests, wildlife trails, active wildlife tree feeding and large stick nests.
5. **Presence of veteran trees:** An estimate of the density of veteran trees (trees that are significantly bigger and older than the harvested stand) for each patch on a cutblock.

6. **Number of tree species retained in the harvest area:** A count of the number of tree species remaining.
7. **Wildlife Tree Class 3+ stems per hectare:** Trees classified as Wildlife Tree Class 3–9 are dead trees, with class 3 trees having just recently died.
8. **Big, dead trees:** Must be > 30 cm in diameter and 10 m in height. Wildlife Tree Class 3+ stems per hectare.
9. **Stems per hectare large diameter trees (all classes) > 50 cm:** live or dead large diameter trees
10. **CWD –**total volume per hectare in wildlife tree patch(es)
11. **CWD** – total volume per hectare in the harvest area(s)
12. **CWD** – number of pieces per hectare >10 m. long in the patch area
13. **CWD** – number of pieces per hectares >10 m. long in the harvest area
14. **Presence of invasive species:** Includes such species as Canada thistle, Dalmatian toadflax, hound's tongue, and knapweed.
15. **Windthrow:** The percentage of retained trees windthrown.

RESULTS

Twenty cutblocks over 100 hectares gross area in 4 forest districts (5 blocks per district) were sampled for the evaluation. Of the 20 blocks that were sampled 6 blocks were in the Interior Douglas-fir (IDF) Biogeoclimatic Ecosystem Classification (BEC) zone, 4 were in the Sub-boreal Spruce (SBS) BEC zone and 10 were in the Sub-boreal Pine Spruce (SBPS) BEC zone.

All of the blocks sampled had some level of retention and met or exceeded the minimum wildlife tree retention guidelines, as per the guidance of the district managers. The guidelines were based on draft landscape unit information from Table 20(b) of the Biodiversity Guidebook (September 1995).

The evaluation project commenced in June of 2006 and was completed in October, 2006. A total of 457.5 person hours of staff time was dedicated to the project from the Ministry of Environment (MoE) and Ministry of Forests and Range (MoFR) staff.

Patch Retention

The total patch retention area for the 20 sampled blocks was 530.4 ha. (Table 2). All of this retention is expected to be retained for the entire rotation (long-term retention).This is based on the assumption that any patch retained for wildlife, riparian, or biodiversity values, and identified as such on the site plan or silviculture prescription, will be maintained at least for the rotation for that cutblock. The total dispersed retention area is 58.5 ha (basal area equivalent area).

Table 2. Summary of retention levels (ha.) on the 20 sampled cutblocks

A	Total gross block area	3229.4
B	Total patch retention area	530.4
C	Total dispersed retention area [1]	58.5

[1]Dispersed retention area is given as basal area equivalent area (i.e., a scaling down of the actual dispersed area). Basal area equivalency converts dispersed retention to an equivalent amount of solid area retention.

A comparison of the total amount of wildlife tree patch area to the gross block sizes is shown in Figure 1. The percent of WTP area ranged from a low of 8% to a high of 65% with an average of 19% for an average of 26.5 hectares of patch retention. Block 11 had the highest retention level percentage (69.9 hectares, 65% retention) due to the presence of two goshawk nests which provided the ecological anchor for the WTP.

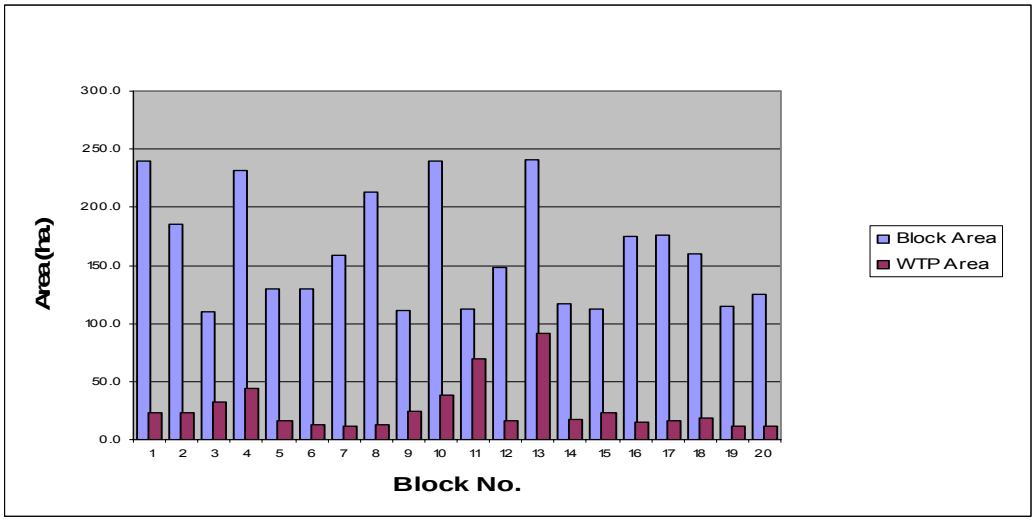

Figure 1: Wildlife Tree Patch area as compared to block area.

The dispersed retention, reported as basal area equivalent (BAE) area in the harvested areas ranged from 0 to 10.1 hectares (<2% overall compared to gross block area). Individual trees can contribute to the required retention area on a basal area equivalency basis, however basal area does not ecologically equate to patch area. A one hectare patch containing large trees, shrubs or wet sites is more ecologically sound and provides more habitat value than a number of single trees scattered throughout a block (*Biodiversity Guidebook* 1995). WTPs also provide valuable undisturbed forest floor. Arguably, single tree retention may provide perching and nesting opportunities and a source of CWD.

Patch Location

The most prevalent reserve constraint used to determine WTP placement was riparian management areas, either on streams or wetlands (including non-classified drainages and non-classified wetlands). The next most common reserve constraint was low or non-merchantable timber sometimes associated with very rocky ground. The use of these constraints sometimes dictated the location of the WTPs (see Figure 2). Cutblocks with a least one internal patch represent a lower risk to biodiversity. In some cases, WTPs consisted of immature or stagnant

stands (stands that exhibit little or no growth) that did not appear to be representative of the pre-harvest stand structure. These WTPs did not exhibit the best attributes for wildlife habitat.

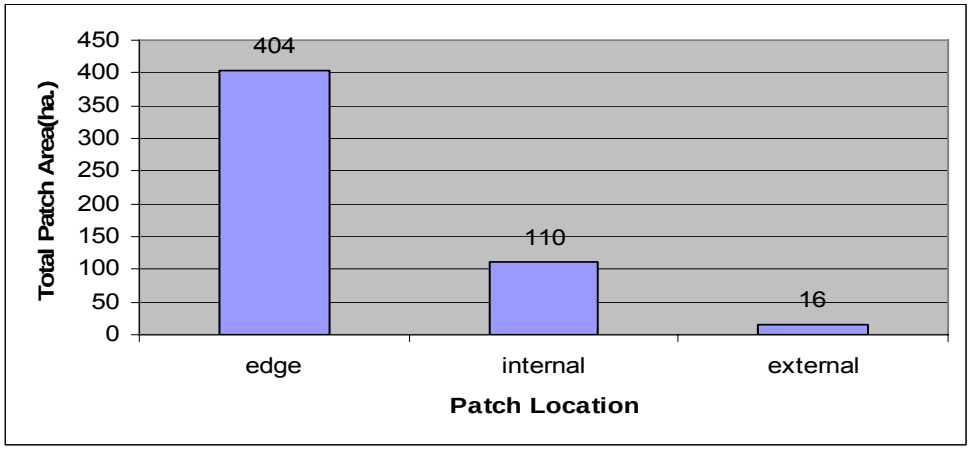

Figure 2: A comparison of WTP area and their locations in relation to the block boundaries.

Seventy-six percent of the total area of the WTPs was located on the edge of the blocks and twenty-one percent were located in the interior of the blocks and three percent were located external (not adjacent) to the block.

All of the WTPs had some level of mountain pine bark beetle infestation ranging from 20% to 100% of the WTP depending on the level of the pine component. The infestation was also observed in the WTPs which consisted of immature pine stands. It is important to note that, at minimum, remnants of the former stand should be left behind. Therefore, the assumption can be made that during the planning phase and during harvest that these stands had not been attacked and the choice of these areas as WTPs was appropriate at the time.

Patch Size

Figure 3 shows the comparison, between blocks, of the size and number of WTPs. The two hectare "cut off" was taken from the *Biodiversity Guidebook*, 1995 as this is the smallest area that potentially could be an Old Growth Management Area (OGMA) and it also must meet the age and structural requirements of old seral forest. These patches can contribute to old seral forest requirements within the landscape unit.

The number of WTPs, both internal and external, less than or equal to 2 hectares is 92 (66%) and those over 2 hectares is 48 (34%). These numbers indicate an overall tendency towards smaller WTPs particularly those that are internal to the block boundaries. Internal WTPs less than 2 hectares in size accounted for 87% of the total number of internal patches. The smaller WTPs (<2 ha.) only account for 13.6% (72.1 ha.) and those greater than 2 hectares account for 86.4% (457.9 ha.) of the total WTP area. The habitat value of small patches is low, given that they are comprised entirely of edge habitat and do not have any interior forest condition. They are not large enough to provide a buffer for danger trees of valuable size, and most wildlife tree users require breeding territory that may be several hectares in size. However, small patches may provide some connectivity acting as "stepping stones" between the block reserves or unharvested stands.

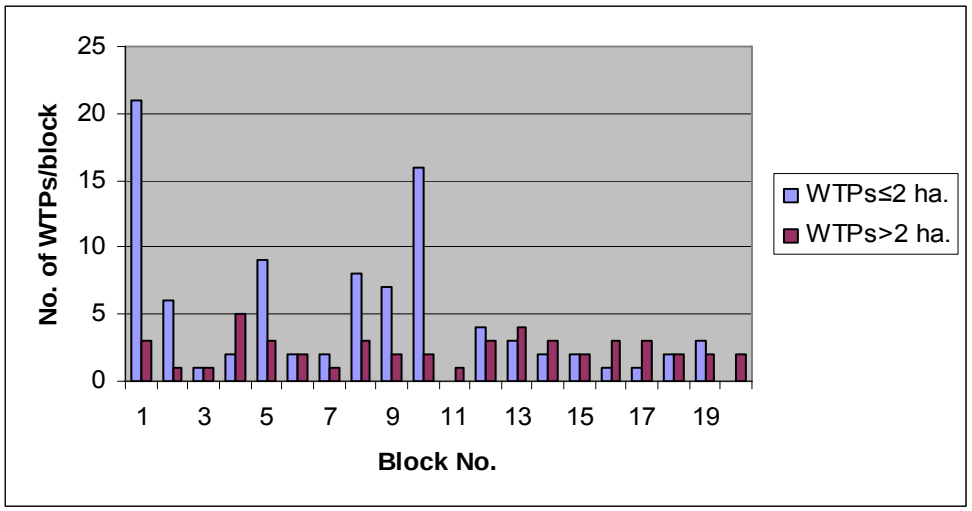

Figure 3: WTP sizes and number on a per block basis

Ecological Anchors

Another indicator that was used to determine WTP effectiveness was the presence or absence of ecological anchors. Ecological anchors include features such as bear dens, large stick nests, large hollow trees, wildlife trails, active feeding on wildlife trees or coarse woody debris and large trees. Some ecological anchors are relatively rare occurrences and assessors watched for these features as they walked the block rather than relying on plot data to indicate presence or absence. Ecological anchors combined with the reserve constraints can provide an indication of the quality of the retained area. For example, there may be a high density of large trees in the retained area which may indicate a good choice of a retention area. Figure 4 shows the density of ecological anchors per hectare of patch retention.

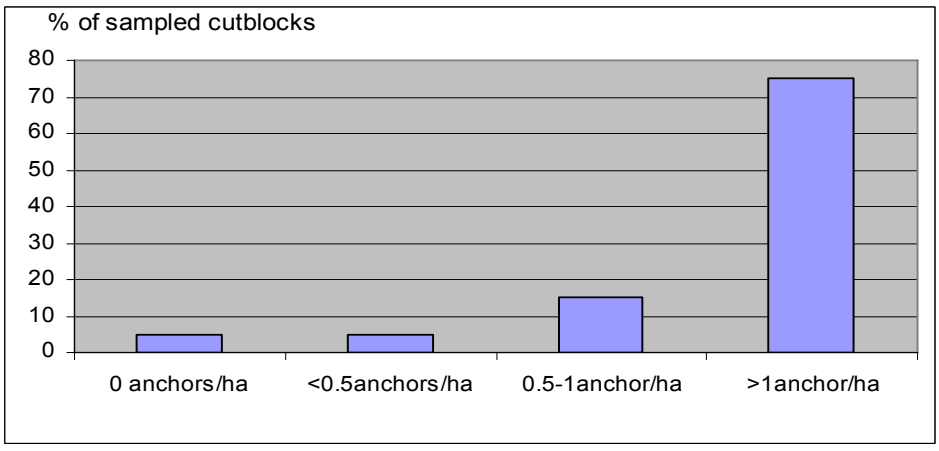

Figure 4: Density categories of ecological anchors in 20 cutblocks

Blocks with no ecological anchors are in the highest risk to biodiversity category for this indicator. Blocks with more than one or more ecological anchor per hectare of patch retention are of the lowest risk. The number of ecological anchors ranged from 2 to 8 per hectare of patch retention

Large Dead Trees

Large dead trees (functional snags) are important habitat for wildlife tree users. The BC Ministry of Forests and Range has indicated that the minimum size for a dead tree to be functional for bird reproduction is 20 centimeters (cm) at diameter at breast height (dbh) and 10 meters in height. Large dead tree densities were calculated from the plot data (veteran trees found in the plots were included in this indicator).

The 30 cm dbh and 10 meter cut-off for this indicator was chosen as it met the functional dead tree description. Figure 5 shows the amount of Class 3 wildlife trees greater than 30 cm and greater than 10 meters in height from the patch and harvested area strata combined.

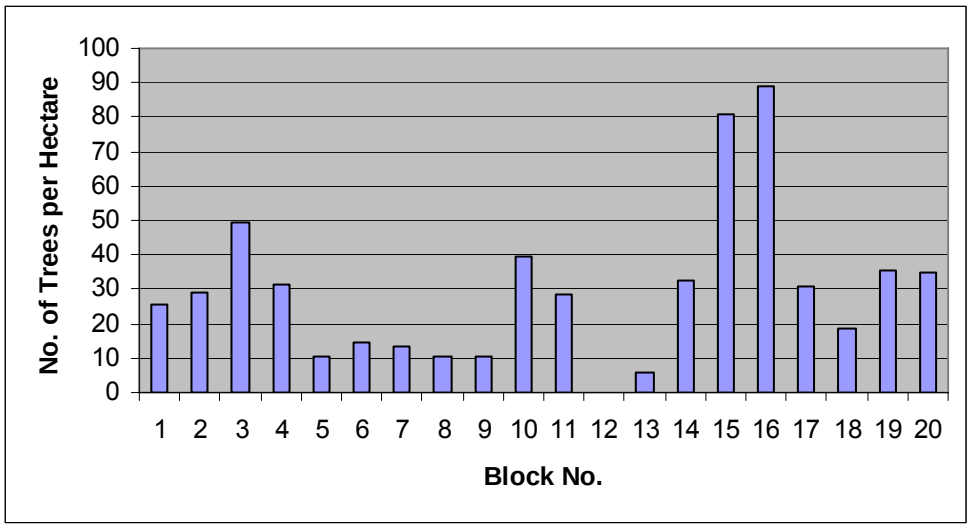

Figure 5: Number of Class 3 Wildlife Trees > 30 cm. dbh and > 10 m. in height per block.

Invasive Species

Data collected on the presence of invasive species showed that only 2 of the 20 sampled blocks had invasive species present. The distribution of the invasive species was sparse and located in areas of disturbed soils i.e. landings and road right-of-ways. The data did not indicate a concern regarding invasive plants.

Windthrow

Windthrow in the patch reserves and harvested areas represents a potential risk to biodiversity. Windthrow is not necessarily detrimental as windthrown trees do have value. For example, coarse woody debris inputs from WTPs are an important contribution to biodiversity. However, the effectiveness of a WTP, depending on the size, can be reduced from the loss of vertical structure if the amount of windthrow is significant. The impact to smaller WTPs can be more significant compared to a larger WTP. Larger WTPs can absorb a greater percentage of windthrow and still remain effective. Windthrow can also raise the concern regarding forest health. Windthrown trees if left, particularly Douglas-fir and spruce, may attract bark beetles and exacerbate an already significant forest health problem.

Table 3 provides an estimation of windthrow levels for each reserve type. The patch retention areas (PW, PR, and PO) had an average of 57.7% of the reserves with less than 5% windthrow, 22.6% with 5 – 15% windthrow, 17.7% with 16 – 30% windthrow, and 2% with greater than 30% windthrow.

Table 3. Percent of reserve types with windthrow

Reserve type[1]	<5% windthrow	5-15% windthrow	16-30% windthrow	>30% windthrow
PW	60	25	9	6
PR	63	26	11	0
PO	50	17	33	0
DW	45	22	22	11
DO	50	17	17	16

[1] PW=Patch Wildlife; PR=Patch Riparian; PO=Patch Other; DW=Dispersed Wildlife; DO=Dispersed Other

The dispersed retention areas (DW, DO) had an average of 47.5% with less 5% windthrow, 19.5% with 5 – 15% windthrow, 19.5% with 16 – 30% windthrow, and 13.5% with greater than 30% windthrow.

Windthrow was estimated for each retention area (dispersed or patch) in a cutblock. A single weighted windthrow value (weighted by area) was calculated for each cutblock. Figure 6 shows the percent of windthrown trees in the dispersed retention (reported as basal area equivalent area) and patch reserve strata. The Basal Area Equivalent (BAE) did not appear to be as high as originally stated in the silviculture prescriptions or site plans (if identified) for the harvested areas due to windthrow.

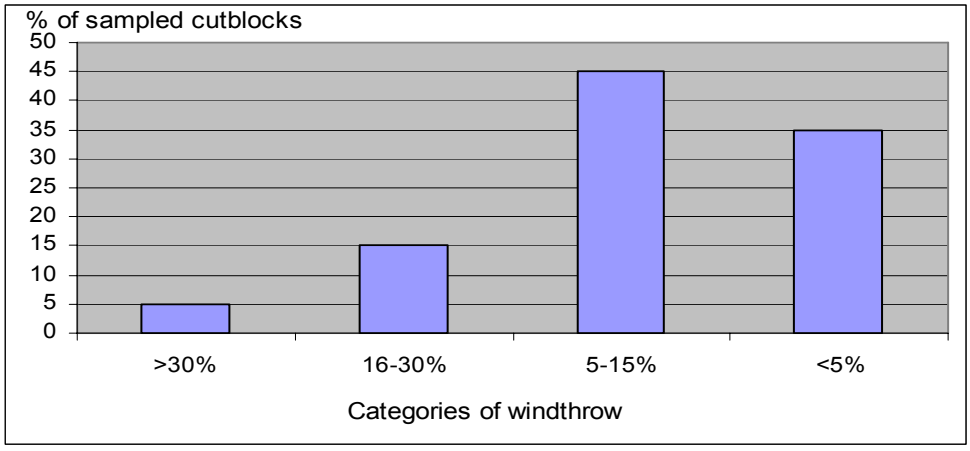

Figure 6: Distribution of windthrow by categories in the 20 sampled cutblocks.

Inter-patch Distance

With the current Mountain Pine Bark Beetle epidemic, large cutblocks are becoming more common. It is important that these large blocks mimic the natural disturbance pattern associated with large natural disturbances. Retaining WTPs that are consistent with the 500 meter inter-patch distance is one way of mimicking these disturbances. The minimum recommended WTP size is 0.25 hectares (*Forest Practices Code Biodiversity Guidebook*, BC Ministry of Forests 1995).

Inter-patch distance (the distance between individual WTPs and/or mature forest) is important and was originally based on territory size and dispersal requirements of wildlife (*Forest Practices Code Biodiversity Guidebook*, BC Ministry of Forests 1995). The maximum inter-patch distance requirement of 500 meters has been recommended as a way to ensure at least some internal retention in larger cutblocks. This inter-patch distance was always meant as a maximum distance. Large natural disturbances almost always leave substantial remnants of the former stand behind, scattered throughout the opening, which provides important features for biodiversity.

Figure 7 shows the number of the cutblocks sampled per forest district that met the intent of the 500 meter guideline for inter-patch distance. To determine if the patch reserves had met the intent of the 500 meter guideline, the distance was measured between the designated patch reserves and/or mature forest from the site plan or silviculture prescription maps. Forested areas on the block perimeter were considered as contributing to the guideline as per District Manager guidance and the *Forest Practices Code Biodiversity Guidebook*, BC Ministry of Forests 1995).

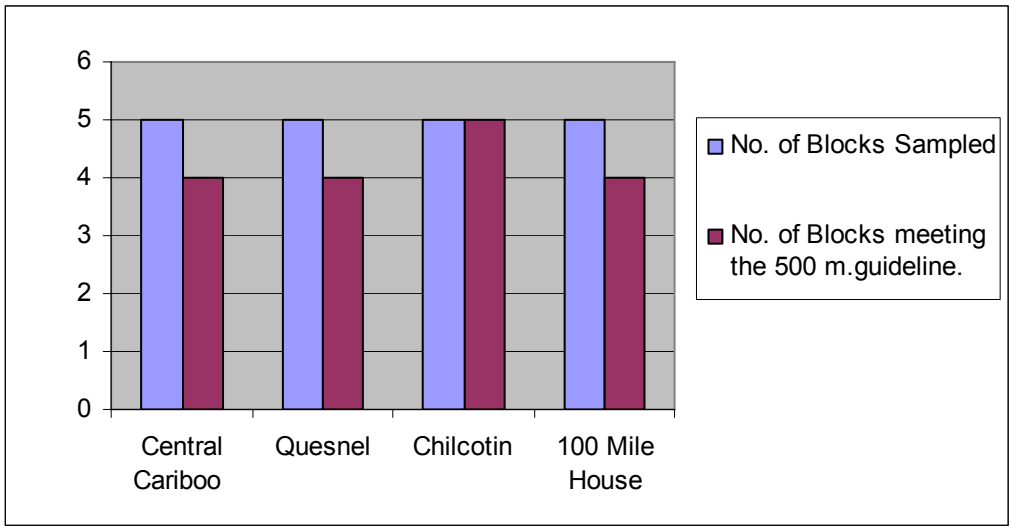

Figure 7: Number of cutblocks by district meeting the intent of the *Biodiversity Guidebook* 500 meter guideline.

The data shows that only 3 (15%) of the 20 blocks sampled did not meet the intent of the 500 meter guideline. The number of blocks per district meeting the intent of the 500 meter guideline ranged from 4 to 5. The number of blocks meeting the 500 meter guideline poses a low risk to biodiversity.

Coarse Woody Debris

Figure 8 shows the comparison of CWD between the WTPs and the harvested areas. It was assumed that the post-harvest CWD volumes in the patches reasonably represented a natural baseline. The post-harvest data for the harvested areas shows that, in 9 of the 20 blocks, the CWD volumes present in the harvested areas were higher than that found in the patch reserves. Coarse woody debris volumes ranged from 4.3 m^3 to 157 m^3 (average 72.7 m^3) in the patch reserves and 15.6 m^3 to 94 m^3 (average 56.3 m^3) in the harvested areas. Only five

silviculture prescriptions identified a CWD volume to be left post-harvest. The balance of the blocks sampled did not have a volume identified. Based on this it was impossible to determine if the practices achieved what was intended for CWD retention. It is important to note that there was not much variation in piece size on the blocks. Ideally, there should be a wide spectrum of diameters and lengths left as CWD that represents the pre-harvest condition.

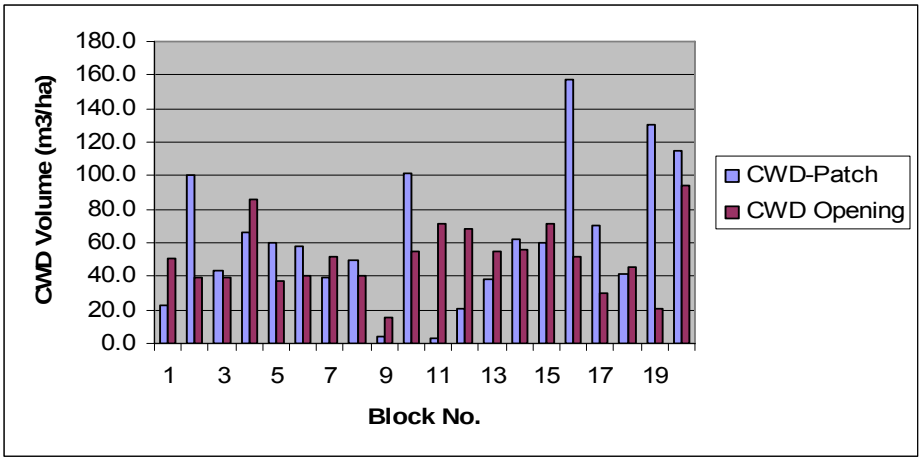

Figure 8: Comparison of CWD between the patches and the openings.

Analysis of the CWD decay classes shows that 13% of the pieces were class 4, 40% were class 3, 36% were class 2 and 11% were class 1 in the harvested areas (see Form D in Appendix 1 for a description of the decay classes). Compared to the retention areas where 30% were class 4, 26% were class 3, 24% were class 2 and 20% were class 1 (see Figure 9). CWD class 4 represents pieces that are the most decayed and class 1 the least. The assumption can be made that the CWD levels in the patch retention areas can be considered close to natural levels. There is a higher percentage of decay class 2 and 3 in the harvest areas versus the retention areas. This may be attributable to the time elapsed between harvest and sampling where the pieces in decay class 1 have decayed enough to be considered class 2 and the same for class 2 to class 3. Similarly, decay class 4 may have decayed enough to have become decay class 5. Decay class 5 is not measured as these pieces are in an advanced state of decay and have finished providing value to biodiversity (Nancy Densmore pers. com).

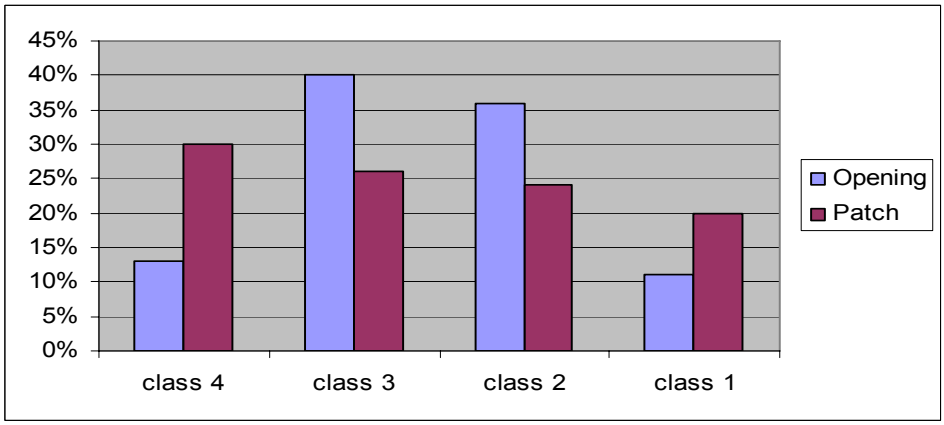

Figure 9: Comparison of decay classes between the retention and harvest areas.

The lower percentage of decay class 1 pieces indicates that a long term source of the range of decay classes is missing. Over time, without recruitment, CWD will disappear from the

openings and not last a rotation versus continual recruitment in the WTPs. Increased dispersed retention and more CWD left in the opening during harvesting could mitigate the risk to biodiversity.

The abundance of long pieces of CWD is an important element of managing for biodiversity. Long pieces of CWD take longer to decay providing a long-term habitat element. Large pieces of CWD provide the greatest habitat value (Lofroth 1998). Figure 10 is a comparison of long pieces (>10 m.) between the harvested area and the WTPs. The data on long pieces of CWD shows that the number of long pieces per hectare ≥ 10 meters in length is generally greater in the patch retention area. Length has been chosen as the key size indicator since as average length increases so does the average diameter (Densmore 2007).

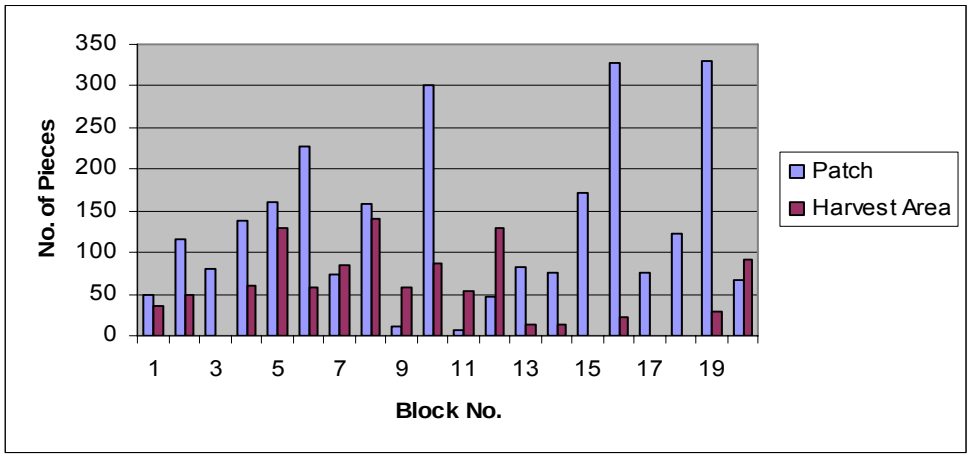

Figure 10: Density of long pieces (≥10 m.) of CWD per hectare.

Figure 11 shows a comparison in piece size of the CWD in the retention area and the harvested areas. On average the piece size was less in the harvested area than the patch retention. It is unclear whether the lack of longer pieces and variation in piece size can be attributed to the pre-harvest stand structure or the harvesting practices (breakage or bucking practices). All the available silviculture prescriptions or site plans indicated that the CWD component would be made up of stems below the utilization standards.

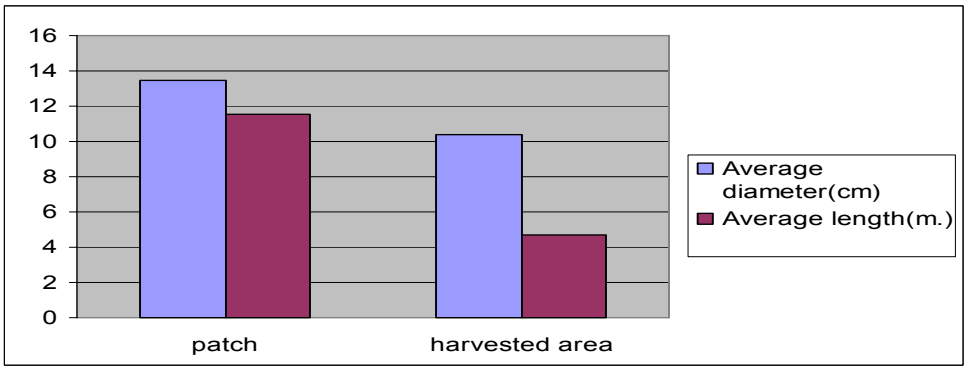

Figure 11: Comparison of piece size in the retention area and the harvested areas.

DISCUSSION

Based on the findings from the evaluation, the wildlife tree retention levels for the sampled blocks are consistent with the direction put forward by the District Managers under the *Forest Practices Code of BC Act.* The minimum requirements for wildlife tree retention have been met. However, this is not meant to imply that there are not risks to biodiversity.

If the targets from the Chief Forester's guidance are applied then an overall average retention of 15% would be expected for each block sampled. The overall retention was 19% inclusive of the dispersed retention areas. The lowest was 8% and the highest was 69%.

The use of reserve constraints for WTPs was, for the most part, appropriate under existing policy or guidance from the MoFR. Riparian features (wetlands, wet sites, streams) where available, provided the main focus for wildlife tree retention. The next most common constraint was areas of rocky ground and/or low timber merchantability. The use of these constraints dictated where the WTPs were placed. Seventy-four percent of the WTPs were placed on the edges of the blocks; twenty-four percent were located internal to the block boundaries and three percent external (not adjacent) to the blocks. External patches are not considered appropriate as they do not provide any ecological benefits to the harvested block. These patches are given the highest risk to biodiversity next to blocks that have no retention patches. In addition, the external and edge patches are not marked on the ground and may be susceptible to harvest.

While the use of riparian features for WTP retention is appropriate, the practices in the riparian management zones (RMZs) could be improved. The site plans or silviculture prescriptions indicated that the management zones would be treated the same as the rest of the block. This generally meant that the RMZs were clearcut. This was particularly evident on features that have both riparian reserve zones (RRZs) and RMZs such as S3 streams and W1, W2, and W5 wetlands. If just the reserve zones are set aside as retention patches provide a high risk to biodiversity as they are linear and narrow in nature, provide little or no interior forest condition, and are subject to windthrow potentially reducing the effectiveness of the patch. In addition, the absence of a substantial buffer on riparian features allowed for easier access for cattle. Excessive use of riparian zones by cattle can reduce habitat suitability for fish and wildlife.

Another indicator that was used to determine WTP effectiveness was the presence or absence of ecological anchors. The number of ecological anchors ranged from 2 to 8 per hectare of patch retention. Blocks with more than one ecological anchor per hectare of patch retention are of the lowest risk. The higher the number of ecological anchors the lower the risk to biodiversity. Unless it was stated in the prescription or site plan (e.g. a raptor nest or bear den) it was difficult to ascertain if the retention patch was placed to protect an ecological anchor or if the anchor came after the fact. The assumption was made that the patch was placed over an area to protect the ecological anchor. The best WTPs are those designed to manage for ecological anchors.

The post-harvest data for the harvested areas shows that, in 9 of the 20 blocks, the CWD volumes in the harvested areas were higher than those found in the patch reserves. Overall, coarse woody debris volumes ranged from 4.3 m^3 to 157 m^3 (average 72.7 m^3) in the patch reserves and 15.6 m^3 to 94 m^3 (average 56.3 m^3) in the harvested areas. While the higher

volume of CWD in the harvest areas represents a lower risk to biodiversity, the lack of large pieces represents the opposite.

The data on long pieces of CWD shows that the number of long pieces per hectare generally is greater in the patch retention areas compared to the harvested areas. This may be attributed to existing utilization standards and the bucking practices and breakage. A basic premise is that the more a harvested stand can mimic a natural stand the better it can support biodiversity (BC Ministry of Forests 1995). Therefore, the lack of long pieces of CWD represents a risk to biodiversity.

Windthrow estimations ranged from 2.5 % to 37.2 % in the WTPs on a per block basis. The BAE from the dispersed retention areas was not as high as originally stated in the silviculture prescriptions or site plans (if identified) for the harvested areas due to windthrow. Windthrow potentially represents a higher risk to biodiversity. If there is a significant amount of windthrow in a WTP, in particular the smaller ones, the effectiveness is reduced. There were no mitigation measures noted on any of the sampled blocks even if there was an identified windthrow risk.

The Biodiversity Guidebook and various other publications have all recommended stand-level retention in the form of Wildlife Tree Patches (WTPs). A maximum inter-patch distance of 500 m was recommended as a way to ensure at least some on-block retention in larger cutblocks. Inter-patch distance was met on 17 of the 20 blocks. This does meet the intent of stand-level retention for the maintenance of stand-level biodiversity and presents a low risk to biodiversity.

Table 4: Summary of biodiversity highlights

Trend or Indicator	Good for Biodiversity	Risk to Biodiversity
3% of the blocks had external patches		Yes
100% of the blocks have patch retention	Yes	
CWD volume is comparable between patch and opening	Yes	
Long pieces of CWD less common in the harvest area compared to the patches		Yes
85% of the blocks met the 500 m. guideline	Yes	
75% of the blocks have >1 ecological anchor	Yes	
67% of the WTPs are <2 ha.		Yes
20% of the blocks with few large trees (dbh > 50 cm)		Yes
86% of internal WTPs < 2 ha.		Yes

In summary, the results of this effectiveness evaluation indicate that for the blocks harvested between 2003 and 2005 that there is risk to the maintenance of biodiversity.

A further 40 blocks were sampled in 2007 with funding provided by the Provincial Pine Beetle Response group. Data from this evaluation and data collected from the 2007 sample will be combined to better evaluate wildlife tree retention practices in the Cariboo. The final report will be available in the spring of 2008.

RECOMMENDATIONS

Based on the findings of this evaluation, the following recommendations are provided:

1. WTPs should be at least 2 hectares in size. This would allow for some windthrow and still maintain the integrity of the WTP.

2. Identify more internal WTPs. External WTPs are to be avoided.

3. Sanitation measures in WTPs should only be considered if a significant forest health issue (e.g. Douglas fir Bark Beetle) threatens forests outside WTPs. The use of non-harvest methods is recommended. Salvage logging should never occur in WTPs leaving the standing dead trees and leaving the downed trees to contribute to the CWD component.

4. Treat the entire Riparian Management Zone (RMZ) of all riparian features as a Riparian Reserve Zone (RRZ) and seek opportunities to increase the size where possible.

5. Where moderate or high windthrow hazard exists, widen the width of the RMA to connect to a natural windbreak, if possible. Maintain 100% retention within the entire RMA unless alternative windthrow management measures are proposed.

6. More attention needs to be paid to the interpatch distance. The maximum inter-patch distance between WTPs should not exceed 500 metres and patches should be be scattered throughout the block.

7. Retention patches on the edges of cutblocks should be carefully tracked (at least in the short-to mid-term) to ensure their continued presence for an entire rotation.

8. Maintain a wide range of decay and diameter classes of CWD, where they exist, in the harvested area.

REFERENCES

BC Ministry of Environment. Victoria, B.C. Forest Practices Code of B.C. 1995. Biodiversity Guidebook.

Biodiversity Conservation Strategy for the Cariboo-Chilcotin Land Use Plan. Biodiversity Conservation Strategy Committee. July 1996.

Biodiversity Conservation Strategy Committee. Biodiversity Update #12. 2005

Cariboo-Chilcotin Land Use Plan, 90-Day Implementation Process Final Report. February 1996.

Densmore, N., R. Thompson. 2005. State of Cutblocks: Resource Stewardship Monitoring for Biodiversity 2005.

Densmore, N. 2007. Stand-level Biodiversity Monitoring in 44 Large Cutblocks in the Central Interior of British Columbia

Densmore, N., J. Parminter, and V. Stevens. 2005. Coarse woody debris: inventory, decay modelling, and management implications in three biogeoclimatic zones. BC Journal of Ecosystems and Management 5(2):14-29.

Eng, Marvin. 2004 Forest Stewardship in the Context of Large-scale Salvage Operations: An Interpretation Paper.

FRPA Resource Evaluation Program. 2006. Protocol for Stand Level Biodiversity Monitoring.

FRPA Resource Evaluation Program. 2006. Addendum to the Protocol for Stand Level Biodiversity Monitoring.

FRPA Resource Evaluation Program. 2005. Preliminary Assessment of the Effectiveness of Wildlife Tree Retention on Cutblocks Harvested Between 1999 and 2001 under the Forest Practices Code. FREP Report #2.

FRPA Resource Evaluation Program. 2005. Evaluation of Cutblocks Harvested Under the Forest Practices Code: 1996-2002. FREP #3.

Parminter, J. 2002. Coarse Woody Debris decomposition - principles, rates, and models. Presented to: Northern Interior Vegetation Management Association (NIVMA) and Northern Silviculture Committee (NSC) Winter Workshop: Optimizing wildlife trees and coarse woody debris retention at the stand and landscape level. January 22-24, 2002. Prince George, B.

Quesnel Forest District Enhanced Retention Strategy Committee. 2006. Quesnel Enhanced Retention Strategy

Stathers, R.J., T.P. Rollerson, S.L. Mitchell. Windthrow Handbook for British Columbia Forests. B.C. Ministry of Forests, Victoria, B.C. Working Paper 9401
Stone, J., J. Parminter, A. Arsenault, T. Manning, N. Densmore, G. Davis, and A. MacKinnon. 2002. Dead Tree Management in British Columbia. In: Proceedings of the symposium on the ecology and management of dead wood in western forests. November 2-4, 1999. Reno, Nevada.

APPENDICES

Appendix 1: Field Data Collection Forms

BRITISH COLUMBIA Forest and Range Evaluation Program

Stand-level Biodiversity
Resource Stewardship Monitoring
Plot Information – Form A Side 1

1 Plot Identification

Page ____ of ____

Date (mm/dd/yy) _____ Opening ID _____

Assessed by _____

Plot # _____ Stratum ID _____ Stratum Type _____

UTM E _____ N _____ Zone _____

2 Plot Information (trees)

Trees Exist ☐ Yes ☐ No

Fill in one of:

BAF _____ Fixed area radius (m) _____ Full Count Area (ha) _____

3 Stand Table

Tree #	Spp.	WT Class	DBH *(cm)	Ht* (m)	Comments (Tree)

FS 1244-A1 HFP 2007/04

* Decimal place means measured

BRITISH COLUMBIA Forest and Range Evaluation Program

Stand-level Biodiversity
Resource Stewardship Monitoring
Plot Information – Form A Side 2

4 Plot Information (CWD) Stratum ID _____ Plot # _____

Course Woody Debris (30 m transect) CWD in transect | Yes | No
1st Leg _____ ° 2nd Leg _____°

Log #	Spp.	Decay Class	Dia.* (cm)	Length* (m)	Comments

FS 1244-A2 HFP 2007/04

* Decimal place means measured

BRITISH COLUMBIA Forest and Range Evaluation Program

Stand-level Biodiversity
Resource Stewardship Monitoring
Stratum Summary– Form B Side 1

5 Stratum Summary (one card per Stratum)

Date (mm/dd/yy) _____ Opening ID _____

Assessed by _____

Stratum ID _____ Stratum type _____

# of plots in stratum _____ Mapped Stratum size (ha) _____

BEC subzone variant and site series _____

Stratum location and size consistent with map? ☐ Yes ☐ No ☐ Not mapped

If 'no' or 'not mapped', estimated size (ha) _____

Tick one of: ☐ Harvest area with no retention ☐ Harvest area with dispersed retention ☐ Patch Reserve

6 Patch/Dispersed Summary

Estimated age of oldest trees in reserve (other than Vets) _____

Patch location: ☐ Internal to block ☐ Edge of block ☐ External/not touching block ☐ N/A

% of total trees in reserve windthrown: ☐ < 5 ☐ 5–15 ☐ 16–30 ☐ >30

Distribution of windthrow: ☐ Edge ☐ Internal ☐ N/A

Windthrow treatment: ☐ Feathering ☐ Topping ☐ Both ☐ None ☐ Other_____

7 Reserve Constraints	% of reserve	Ecological Anchors		stratum estimate
None	☐	None		☐
Wetsite		Bear Den	stratum count	
RMZ		Hibernaculum	stratum count	
RRZ		Vet tree/ha	0, 1-10, 10-20, etc.	
Rock outcrop		Mineral lick	stratum count	
Non-commercial brush		Large stick nest	stratum count	
Non (or low) merch timber		Cavity nest	stratum count	
Sensitive terrain or soil		Large hollow tree	stratum count	
UWR / WHA		Large witches broom	stratum count	
OGMA		Karst feature		Y N
Visuals		Largest tree for site (not Vets)		Y N
Cultural heritage feature		CWD heavy natural concentration		Y N
Recreation feature		Active wildlife trails		Y N
Other: _____		Active WLT/CWD feeding		Y N
		Uncommon tree species		Y N
Total constrained		Other: _____		

Comments:

FS 1244-B1 HFP 2007/04

8 Stratum Type Codes

PR	Patch riparian	Treed patch left within a riparian management area. Use riparian designation regardless of patch being classified as a WTP on site map.
PW	Patch wildlife	Treed patch left outside of RMA and designated as a wildlife tree patch.
PO	Patch other	Tree patch left outside of RMA for purpose other than PR, PW, and anticipated to remain for the full rotation.
PT	Patch temporary	Treed patch that will likely be harvested before rotation end (e.g., indication on map that this is a temporary deferred area).
PU	Patch unidentified	A patch found in the field but not mapped. No indication on map regarding patch purpose and patch not in a RMA.
DR	Dispersed riparian	Dispersed trees left within a RMA. Use riparian designation regardless of other coding from map.
DW	Dispersed wildlife	Dispersed trees left outside of RMA and designated as wildlife trees.
DO	Dispersed other	Dispersed trees left outside of RMA for purpose other than DR, DW, and anticipated to remain for the full rotation.
DT	Dispersed temporary	Dispersed trees that will likely be harvested before rotation end (e.g., indication on map that trees are left as part of a commercial thin or shelterwood).
CC	Clearcut	Zero retention in stratum.

9 Guidance for plot establishment (trees)

- For stratum with very low retention levels, do a full count (e.g., < 15 trees/stratum).
- Target tree/plot is 6–10 trees.
- For fixed area plots, 30 m radius is standard.
- When 30 m radius fixed plot needs to be adjusted, go up or down in 5 m increments to maximum 50 m, minimum 15 m.
- For Basal Area plots or fixed area plots, use same BA or plot radius for all plots in stratum.

10 Guidance for CWD transect establishment

- For every plot in a patch, establish a 30 m transect.
- For every plot in a dispersed area, establish a 30 m transect.
- For every harvest area with no retention, establish 3–30 m transects.
- To establish a 30 m transect, choose a compass bearing for first 15 m of transect, then add 90° to bearing and establish final 15 m ('L' shaped) transect.
- When a piece of CWD is crossed more than once on a transect, count and record each time as a separate piece.
- Minimum CWD diameter is 7.5 cm.

FS 1244-B2 HFP 2007/04

BRITISH COLUMBIA Forest and Range Evaluation Program

Stand-level Biodiversity
Resource Stewardship Monitoring
Block Information – Form C Side 1

11 Opening Identification

Opening # _____ Opening ID _____

Licence # _____ CP# _____ Block _____

Licensee: _____ District _____

Location Description: _____ Year of Harvest: _____

NAR: _____ Gross area (ha) _____ Override _____

# of patch reserves in block _____ # of patch reserves sampled _____

12 Innovative Practices

Were any innovative and/or unique forest practices used on this block?
Please describe:

13 Invasive Plants

Were invasive plant species present on this block? ☐ Yes ☐ No ☐ Don't know

Species Code / Distribution Code

_____

Comments:

14 Evaluator Opinion/Comments

To what extent did the practices on this cutblock maintain stand-level biodiversity, given the opportunities that were likely available?

☐ Poorly ☐ Moderately ☐ Well ☐ Excellent ☐ Don't know

Rationale:

FS 1244-C1 HFP 2007/04

BRITISH COLUMBIA Forest and Range Evaluation Program

Stand-level Biodiversity
Resource Stewardship Monitoring
Block Summary – Form C Side 2

15 Photo Notes

16 Stratum Summary When No Plots Established (S.16 or Form B, not both for each stratum ID)

Stratum ID	Stratum type	Size (ha)	BEC	Patch Location			Total Constrained %	Ecological Anchor (count by stratum unless otherwise noted)								Windthrow %
				Internal	Edge	External		Vets / (ha)	Large Stick Nest	Cavity Nest	Large Broom	Lgst Tr Y/N	Uncom Tree Species Y/N	Other	None	

17 Quality Check: Sum of patch area + Sum of dispersed + CC + NP + Other = Cutblock gross area

FS 1244-C2 HFP 2007/04

BRITISH COLUMBIA Forest and Range Evaluation Program

Stand-level Biodiversity
Resource Stewardship Monitoring
Reference – Form D Side 1

Wildlife Tree Class

Live		Dead						Dead Fallen
		Hard →			Spongy	→ Soft		
1	2	3	4	5	6 ≈ 2/3 original height	7 ≈ 1/2 original height	8 ≈ 1/3 original height	9
								

Live		Dead			Dead Fallen
		Hard →	Spongy	→ Soft	
1	2	3	4	5	6
					

CWD Decay class

Log class 1	Log class 2	Log class 3	Log class 4	Log class 5
Fresh / Recent	Aging/ colour fading	Fading colour	Light to reddish brown	Class 5 not Sampled
Hard	Sap rot (but still hard)	Advanced Decay (spongy)	Extensive Decay (crumbles/mushy)	
Bark firm	Loose Bark	Bark Trace/Absent	Bark Absent	
Elevated	Sagging	Sagging to Settled on ground	Fully settled on ground	
Hard Branches with Twigs	Soft branches	Branches stubs/absent	No Branches	
Supports Person	May not support person	Breaks easy	Shape collapses when stepped on	

Invasive Plants Distribution Code Chart

1 rare or single occurrence	4 several sporadically spread individuals	7 spread uniformly throughout
2 a few spread sporadically throughout	5 clustered in a few spots	8 spread throughout site with some gaps
3 cluster in a single spot	6 clustered in several spots	9 spread densely throughout

FS 1244-D1 HFP 2007/04

British Columbia Tree Code List

NATIVE CONIFERS

Cedar	**Thuja**	**C**
western redcedar	*T. plicata*	Cw
Cypress	Chamaecyparis	Y
yellow-cedar	*C. nootkatensis*	Yc
Douglas-fir	**Pseudotsuga**	**F**
Douglas-fir	*P. menziesii*	Fd
coastal Douglas-fir	*P. menziesii* var. *menziesii*	Fdc
interior Douglas-fir	*P. menziesii* var. *glauca*	Fdi
Fir (Balsam)	**Abies**	**B**
amabilis fir	*A. amabilis*	Ba
grand fir	*A. grandis*	Bg
subalpine fir	*A. lasiocarpa*	Bl
Hemlock	**Tsuga**	**H**
mountain hemlock	*T. mertensiana*	Hm
western hemlock	*T. heterophylla*	Hw
mountain x western hemlock hybrid	*T. mertensiana* x *heterophylla*	Hxm
Juniper	**Juniperus**	**J**
Rocky Mtn. juniper	*J. scopulorum*	Jr
Larch	**Larix**	**L**
alpine larch	*L. lyallii*	La
tamarack	*L. laricina*	Lt
western larch	*L. occidentalis*	Lw
Pine	**Pinus**	**P**
jack pine	*P. banksiana*	Pj
limber pine	*P. flexilis*	Pf
lodgepole pine	*P. contorta*	Pl
lodgepole pine	*P. contorta* var. *latifolia*	Pli
lodgepole x jack pine hybrid	*P.* x *murraybanksiana*	Pxj
ponderosa pine	*P. ponderosa*	Py
shore pine	*P. contorta* var. *contorta*	Plc
western white pine	*P. monticola*	Pw
whitebark pine	*P. albicaulis*	Pa
Spruce	**Picea**	**S**
black spruce	*P. mariana*	Sb
Engelmann spruce	*P. engelmannii*	Se
Sitka spruce	*P. sitchensis*	Ss
white spruce	*P. glauca*	Sw
spruce hybrid	*Picea cross*	Sx
Engelmann x white	*P. engelmannii* x *glauca*	Sxw
Sitka x white	*P.* x *lutzii*	Sxl
Sitka x unknown hybrid	*P. sitchensis* x ?	Sxs
Yew	**Taxus**	**T**
western yew	*T. brevifolia*	Tw

NATIVE HARDWOODS

Alder	**Alnus**	**D**
red alder	*A. rubra*	Dr
Apple	**Malus**	**U**
Pacific crab apple	*M. fusca*	Up
Arbutus	**Arbutus**	**R**
Arbutus	*A. menziesii*	Ra
Aspen, Cottonwood, or Poplar	**Populus**	**A**
poplar	*P. balsamifera*	Ac
balsam poplar	*P. b.* ssp. *balsamifera*	Acb
black cottonwood	*P. b.* ssp. *trichocarpa*	Act
hybrid poplars	*P.* spp.	Ax
trembling aspen	*P. tremuloides*	At
Birch	**Betula**	**E**
Alaska paper birch	*B. neoalaskana*	Ea
Alaska x paper birch hybrid	*B.* x *winteri*	Exp
paper birch	*B. papyrifera*	Ep
water birch	*B. occidentalis*	Ew
Cascara	**Rhamnus**	**K**
cascara	*R. purshiana*	Kc
Cherry	**Prunus**	**V**
bitter cherry	*P. emarginata*	Vb
choke cherry	*P. virginiana*	Vv
pin cherry	*P. pensylvanica*	Vp
Dogwood	**Cornus**	**G**
Pacific dogwood	*C. nuttallii*	Gp
Maple	**Acer**	**M**
bigleaf maple	*A. macrophyllum*	Mb
vine maple	*A. circinatum*	Mv
Oak	**Quercus**	**Q**
Garry oak	*Q. garryana*	Qg
Willow	**Salix**	**W**
Bebb's willow	*S. bebbiana*	Wb
Pacific willow	*S. lucida*	Wp
peachleaf willow	*S. amygdaloides*	Wa
pussy willow	*S. discolor*	Wd
Scouler's willow	*S. scouleriana*	Ws
Sitka willow	*S. sitchensis*	Wt

UNKNOWNS

Unknown	X
Unknown conifer	Xc
Unknown hardwood	Xh

OTHERS

Other tree, not on list	Z
Other conifer	Zc
Other hardwood	Zh

FS 1244-D1 HFP 2007/04

Appendix 2. Stand Level Biodiversity Guidelines for the Quesnel Forest District

BRITISH COLUMBIA

File: 18830-01/General

March 5, 1999

[redacted]
Quesnel, British Columbia
[redacted]

Dear [redacted]

Enclosed for your information is a document entitled "Stand Level Biodiversity Guidelines for the Quesnel Forest District".

This document has been prepared by Ministry of Forests staff in cooperation with habitat protection staff of the Ministry of Environment, Lands and Parks (MELP). It is intended to provide guidance to prescribing foresters who are developing prescriptions for timber harvesting in the Quesnel Forest District.

The document is also intended to fulfil a commitment made by Herb Langin, MELP Regional Director, to [redacted] that guidelines for wildlife tree patch establishment would be in place by March 15, 1999.

I would like to stress that this document is intended to assist, not direct, prescribing foresters.

Please direct any comments or questions to the undersigned.

Yours truly,

G Grant

Gerry Grant, R.P.F.
District Manager
Quesnel Forest District

Ministry of Forests
Quesnel Forest District
Location:
322 Johnston Avenue
Quesnel, British Columbia
V2J 3M5
Mailing Address:
322 Johnston Avenue
Quesnel, British Columbia
V2J 3M5
Tel: (250) 992-4400
Fax: (250) 992-4403

February 25, 1999

Stand Level Biodiversity Guidelines for the Quesnel Forest District

1.0 INTRODUCTION

These guidelines are established to address the requirements of the *Forest Practices Code of British Columbia Act* (FPC) and the practices recommended in the Biodiversity Guidebook. The guidelines will remain in effect until landscape units and landscape level biodiversity objectives are established for the Quesnel Forest District.

Biodiversity management is part of sound forest management practices. Prescribing foresters are encouraged to discuss stand level biodiversity strategies with Ministry of Environment, Lands and Parks (MELP) Habitat Protection staff.

2.0 DEFINITIONS

Gross Block area

- Includes all internal and eligible adjacent reserves.
- This is the area used for advertising a Silviculture Prescription (SP) and Stand Management Prescription (SMP), and for biodiversity calculations.

Cutblock area

- The Cutblock Area is defined in the Determining Cutblock or Opening Size section of the Green-up Guidebook.
- The Cutblock Area is essentially that portion of the block that is being developed for harvesting. This does not include peripheral reserves outside the cutblock boundary, but does include all internal Riparian reserves, Wildlife Tree Patches (WTPs), and non-productive (NP) areas less than 1 hectare.

Eligible area

The area that will contribute towards the biodiversity calculations for individual cutblocks. It will be the summation of all of the categories of WTP eligible areas described below for each block, and include applicable Lakeshore and Riparian reserves.

3.0 BOUNDARY MARKING

- Map and GPS (traverse) all proposed reserves within the cutblock that are equal to or greater than 0.25 ha in size and shown on SP and any required Logging Plan (LP). Reserves smaller than 0.25 ha in size and single wildlife tree retention must be identified and described on the SP, but do not require mapping.
- Adjacent reserves that are not within the Cutblock Area must be adequately tied into natural features (e.g. streams or wetlands) to ensure reasonably accurate mapping. These adjacent reserves must be accurately located when the surrounding area is scheduled for harvesting.

4.0 COARSE WOODY DEBRIS

Actions to maintain coarse woody debris are to be specified in the SP as required by Section 39(3)(m)(i) of the Operational Planning Regulation. Current utilisation standards are considered adequate to meet minimum coarse woody debris requirements. The following are considerations for enhancing coarse woody debris management:

- Leaving deciduous stems to contribute to coarse woody debris in the future.
- Leaving dead and down trees in Riparian Management Areas unless these create a forest health concern.
- Leaving felled hazard trees on site unless there are overriding forest health issues.
- Leaving large debris and partly decayed logs that do not require removal under the utilisation standards. These should be left on the block as they do not generally present a problem to planters or substantially affect plantable spots, yet they are of high value for soil nutrition and small mammals.
- Leaving Grades 3, 4, and 5 wood on the block unburned, where the cutting authority does not require its utilisation.
- Leaving small piles of large diameter debris or unburned slash piles.

Landing Debris pile characteristics which result in good wildlife habitat:

- composed primarily of large diameter pieces (15+ cm), criss-crossed so as to create cavities within the pile.
- dimensions should be about 3 meters wide, 6 meters long, and 3 meters high. Larger and smaller debris piles are less used by wildlife, and larger piles occupy plantable space.
- preferably within 30 meters of mature timber.
- preferably near riparian areas.

Dispersed Small Mammal Piles:

- these debris piles are being successfully used in 100-Mile F.D.
- buncher operators place a "bunch" of three or four whole trees (deciduous or waste) on the ground, with the trunks parallel.
- the branches in combination with some overlapping of the trunks create cavities, summer and winter, that are extensively used by small mammals and fur-bearers.
- if disc-trenching is planned and the pattern of trenches can be predicted, the trees should be laid parallel to the trenches so that the weasel huts can be maintained between them.
- the type of pile informs skidder operators to leave them out in the block, rather than taking the waste wood to the landing.

5.0 WILDLIFE TREE PATCHES

The district manager has determined that the percentage of a cutblock area required as wildlife tree patches from Table 20(b) of the Biodiversity Guidebook be set at 9 %. This determination is supported by the *Forest Practices Code Timber Supply Analysis, February 1996.*

The requirement for wildlife tree patches may be applied to the individual cutblock or at the cutting permit level where forest management concerns limit options at the cutblock level.

All Workers Compensation Board requirements must be met while working adjacent to WTPs.

WTP Identification and Distribution

- WTPs should be composed of trees which represent the size, structure and species found in the mature component of the stand, and should include the upper 10% of the diameter distribution to over-represent the stand's highest value wildlife trees.
- WTPs should follow a natural, windfirm boundary. Straight edges and rectangular shapes should be avoided.
- Riparian reserves and other suitable reserve areas which are within or immediately adjacent to the cutting boundary should be selected as WTPs, **if** they meet the other WTP criteria.
- A 500 metre maximum distance between WTPs and/or mature forest should be adhered to unless there are overriding forest management concerns. Only WTPs greater than 0.25 hectares are considered sufficient to address the 500m maximum distance requirement. MELP staff should be consulted where the Licensee proposes a variation from the 500 metre requirement, and a rationale provided in the SP.

Dwarf Mistletoe

- Choose areas of lightest infestation for WTPs. Mixed wood patches are favoured in areas of heavy infestation.
- Establish WTPs on the edge of the cutblock and minimise the edge against the cutblock boundary.
- Where in-block WTPs are required to meet the "500 meter rule", these should be kept as round as possible to minimise the edge effect. Few larger WTPs are better than many smaller ones. Girdling of a 5 to 10 meter ring around the WTP or planting non host species may be options to reduce re-infection of crop trees.

Bark Beetles

- Non infested areas, or patches of red or grey attack, should be the first choice for WTPs.
- Select less susceptible timber types for WTPs where they are available.

Root Rots

- For *Armillaria*, select root rot areas as patches if they are identifiable.
- For *Tomentosus*, leave infected trees for future snag recruitment.

Windthrow Prone Areas

- All WTPs should be located on the most windfirm areas possible. The establishment of a management zone for feathering and/or crown thinning may be required to protect the integrity of the WTPs. Position WTPs in the least exposed areas along the edges of the cutblocks.
- In areas of high blowdown potential, larger, more wind firm WTP reserves may be left on some blocks while no, or limited, WTP reserves may be left on others (still to average out to 9 % over the Licensee's cutting authority area) where the 500 metre rule is met through block boundary design. This also applies to areas with significant forest health concerns, where larger reserve areas with less disease or insect infestation should be selected as WTPs.
- It is recognised that the 500m distance rule may be compromised in some circumstances and other treatments, such as stubbing and deciduous wildlife tree retention, should be used to compliment the WTPs.
- Even with careful planning, post logging blowdown events may occur in riparian or WTP areas. The decision to conduct salvage harvesting should be based on the contributing value of the blowdown for wildlife habitat and coarse woody debris, and on the potential forest health concerns.
- MELP should be consulted regarding wildlife values of WTPs and Riparian Management Zones when developing harvesting proposals, and MELP approval is required for harvesting within Riparian Reserve Zone areas.

Broadcast Burning near WTPs

- The use of broadcast burning for site preparation complicates the management of WTPs. As much as possible, cutblocks should be laid out to locate WTPs adjacent to the boundary while still meeting the 500m maximum distance to suitable habitat requirement.
- In block WTPs should be located in a manner that allows for protection of the WTP during the prescribed burn.

WTP Replacement

- Identification of replacement WTPs may required where the original WTPs are compromised by windthrow, prescribed burning or other damage. MoF and MELP should be consulted during identification of replacement WTPs.

Eligible area calculations for WTPs

(1) Productive areas

- WTPs that are required in addition to the forested riparian reserves must be representative of the mature forest cover contained in the general cutblock area while still meeting the characteristics of WTPs described in the Biodiversity Guidebook. Biodiversity reserves should aim at containing **representative amounts** of mature timber types with emphasis on the larger tree sizes.
- A WTP may be centred around a feature such as NCBr and encompass adjacent mature timber. The timbered area, excluding the NCBr will be considered as "eligible area".
- In general, WTPs located in the upland area adjacent to riparian areas are considered to be of higher value for biodiversity.

  Note: Patches of immature timber should only be included as WTPs, or as part of a WTP, where no other options exist. Otherwise, they are part of the next pass.

(2) Non-Productive areas

- As above for productive areas, a WTP may include a **small** unclassified treed wetland that is surrounded by a timbered reserve or a treed black spruce swamp. However, wetland areas without forest cover will not be counted towards the WTP requirements.
- Another example of acceptable WTP areas are ***forested*** rocky areas, steep inoperable gullies or wet areas with minimal timber values. The timber contained within these rocky areas, as well as that dispersed through NCBr areas, can often be the most wind firm.

(3) Single Dispersed Wildlife Trees, Non-Mappable Clumps & Group Reserves.

- Small clumps of trees, or individual trees, can be quantified by stating the total basal area that will be retained over the block or within the Standards Units. The SP must clearly describe what tree species and ages/diameters comprise these non-mappable clumps or single trees. This area will count directly as eligible WTP area (as calculated in below for partial cut areas), providing it is consistent with overall stand characteristics.
- Small non-mappable clumps (<0.25 ha.) and single trees contained within the block (including RMZ's) count towards the stand level biodiversity retention percentage, but are not sufficient to address the 500m maximum distance between WTPs.

  Note: A maximum of 50% of the WTP requirements for a block can be made up of various combinations of single trees, group reserves and stubs. However, if the dispersed trees and stubs are all deciduous the maximum portion of WTP requirements made up of dispersed wildlife trees and stubs is reduced to 25% .

(4) Stubbed trees

- Tree stubs will count towards the biodiversity calculations at 1/2 of the basal area equivalent described above for dispersed trees. Tree stubs are of shorter usefulness in relation to live trees, but may be a viable alternative in some blowdown prone areas.

(5) Partial Cut Areas

- For RMZ's and other areas that are partial cut or selectively logged, the residual basal area can count towards the calculation below **if a minimum amount is committed to in the SP** (e.g. 10 to 20 m^2 basal area to be left in an RMZ should have the $10m^2$ figure used; 30-50% basal area retention should have 30% used).
- A selectively logged block will require a Stand and Stock table for the SP and this will be used for the calculations. For true uneven-aged management, the minimum basal area that is to be retained following the initial **and future harvest entries** (cutting cycles) will be utilised for the calculation below.
- For shelterwood systems, partial cutting, etc., the residual basal area (BA) will only count towards biodiversity if the residual trees are not scheduled for future removal until the next rotation.
- A snag component must be retained in partial cut areas in a manner consistent with WCB regulations.
- If 10% or less of retained individual trees blow down later, they may be salvaged without need to replace the WTP area.

Partial Cut eligible area calculations:

$$\textbf{Eligible area (ha)} = \frac{\text{Minimum residual BA/ha X applicable area (ha)}}{\text{Total Basal Area/ ha}}$$

OR

Eligible area (ha) = Min % BA retention X applicable area (ha).

Appendix 3. Example of a Forest Development Plan clause in the 100 Mile House Forest District

As per the management direction provided by the CCLUP Integration Strategy early seral stage limitations are not applied within this plan and it is considered that a minimum 25% of the fir leading stands harvested within mule deer winter range will meet old seral stage requirements and a minimum of 25% of the fir leading stands harvested within mule deer winter range will meet mature seral stage requirements.

4.113 Wildlife Tree Patches

We will continue to consider Table 20(b) of the Biodiversity Guidebook and direction from the District Manager to provide stand level Biodiversity on a cutting permit basis. We are directed by the District Manager letter dated April 24, 2001. Wildlife tree patches will be located and designed in consultation with the Habitat Protection Officer using whenever possible the recommended distribution and retention characteristics of Wildlife Tree Patches as stated in the Biodiversity Guidebook. Wildlife Tree Patches will be designed where possible to "overlap" other constraining landscape features or higher level plan constrained areas as recommended by the Integration Strategy. In general, Wildlife Tree Patches will contain Riparian Reserve Zones such as Spruce/Deciduous Patches or Old Growth Douglas-Fir stands. Wildlife Tree Patches will be tracked at a cutting permit level. Information from the Integration Policy as well as the Provincial Wildlife Tree Policy and Management recommendations have and will be used in development of this plan.

In balance with the Integration Strategy priority for overlap is the need to place Wildlife Tree Patches where they are of benefit to wildlife. Riparian areas due to their value as habitat are preferred; but, where riparian areas are not available conditions of overmature forest, uncommon stand types, abundance of snags, abundance of understory and other significant habitat attributes will be utilized as Wildlife Tree Patches. Forest Health risks will be evaluated before area is developed as WTP.

Where individual tree retention is prescribed within a silvicultural prescription, development will follow Statutory Decision Maker guidance provided in their letter of September 23, 1998. Where partial cutting of more than 50% basal area is prescribed, a Wildlife Tree Patch will be provided of the appropriate size; or, attribute management to provide an equivalent level of attribute retention will be developed. We are currently planning at a WTP percentage of 11%.

will consult with MELP on WTP design and location where requested in the FDP.

Impact from audible noise may also be a concern in certain areas. In these cases, seasonal restrictions and timing windows may be instituted. For example, CP 152 due to its proximity to Flat Lakes Park, may be harvested outside the peak summer use season to maintain the tranquillity of the park setting for visitors.

4.114 Coarse Woody Debris

No management objectives have been set for the management of coarse woody debris, this absence of targets will be reflected in silviculture prescription development. We are guided by the Ministry of Forests documents "A Short Term Strategy for Coarse Woody Debris Management in BC Forests" and Bulletin Number 33.

In absence of targets will continue to retain in the bush as coarse woody debris grades of timber which are not utilized and/or which are not in conflict with the utilization standards of approved cutting permits. In addition, site specific retention of Wildlife Tree Patches or individual tree retention will add to coarse woody debris through time as a result of decay, blowdown and natural mortality.

During harvesting an effort will be made to stub some unmerchantable trees with woodpecker holes or other indications of active use or these trees will be left standing if not in contravention with WCB.

4.12 Wildlife

4.121 Mule Deer

Mule Deer Winter (MDW) Range harvesting will be conducted in accordance with the management direction provided by the Integration Strategy and the Regional Mule Deer Winter Range Strategy. In addition, we are guided by the 2001 MDW range recommended Interim Management Guidelines for MDWR from the Regional Mule Deer Committee. To achieve the timber targets for Mule Deer Winter Ra will target for harvest non fir species. Priority will be for harvest of lodgepole

Appendix 4. Wildlife Tree Patch Guidelines for the Williams Lake Forest District

BRITISH COLUMBIA

File: 19000-01

December 1, 1998

Sean Donahue, R.P.F.
c/o Williams Lake Forest District
925 North 2nd Avenue
Williams Lake, British Columbia
V2G 4P7

Dear Sir/Madam:

The attached list is a revised agreement between the Ministry of Forests and habitat protection staff of the Ministry of Environment, Lands, and Parks specifying new wildlife tree patch guidelines for cutting permits in the Williams Lake Forest District. Please note the new guidelines are associated with draft landscape units instead of supply blocks.

The guidelines were developed by estimating the current condition and availability of the forest in each draft landscape unit and, in the absence of landscape unit plans, applying this information to Table 20(b) of the *Biodiversity Guidebook.*

These new guidelines apply to any permit where the final boundary field layout is not complete by January 1, 1999.

Yours truly,

James Sutherland, R.P.F.
District Manager

Attachment

Ministry of Forests Williams Lake Forest District
Location: 925 North Second Avenue, Williams Lake, British Columbia, V2G 4P7
Mailing Address: see location
Tel: (250) 305-2001
Fax: (250) 305-2034

Wildlife Tree Patch Guidelines
By Landscape Unit
For the Williams Lake District
January 1/99

Landscape Unit	WTP %
Alkali	12
Bambrick	10
Big Creek	10
Big Lake	10
Chimney	14
Churn	8
Dash	10
Dog Creek	12
Farwell	12
Gaspard	12
Hawks Creek	14
Koster-Lone Cabin	6
Mackin	12
Meldrum	14
Nadila	3
Riski	12
Tautri	10
Twan	12
Upper Big Creek	4
Upper Churn	10
Williams Lake	14

G:\WorkGrp\TIM\TEMP\bnf1118.doc

Appendix 5. Wildlife Tree Patch Guidelines for the Horsefly Forest District

BRITISH COLUMBIA

Document name: G:\!WorkGrp\OFFSERV\WPTEMP\may WTP letter.doc jk
Contact: Mark Brodrick Date typed: 2001/02/23 Date last saved: 2001/02/23 12:51 pm

File: 12150-20/WTP
12430-25/CCLUP

April 18, 2001

«Name»«rpf»
«title»
«address»

Dear «Name»:

I am writing in regard to the requirement for operational plans to provide for stand level biodiversity in accordance with the *Forest Practices Code of British Columbia's* Operational Planning Regulation 18 (i)(u) and 39 (2)(d).

Please find attached *Wildlife Tree Patch Guidelines for the Horsefly Forest District*, which specifies new wildlife tree patch (WTP) guidelines for operational plans. These guidelines supercede any previous direction given regarding this matter.

The draft landscape units identified in this table are in accordance with the Cariboo Region Landscape Unit Planning Strategy dated June 30, 1999 and the required WTP percentages are based on the methodology outlined in the *Forest Practices Code Biodiversity Guidebook.*

These revised targets are effective July 1, 2001. Major Licencees are not expected to re-visit cutblocks where final block boundary field layout is complete.

Although the intention is to balance WTP targets by cutting permit, it is desirable to achieve WTP representation on an individual cut block basis. Submissions will be reviewed to determine adequate WTP representation.

Ministry of Forests
Horsefly Forest District
Location:
Horsefly Lake Road
Horsefly, British Columbia
V0L 1L0
Mailing Address:
P.O. Box 69
Horsefly, British Columbia
V0L 1L0
Tel: (250) 620-3200
Fax: (250) 620-3540

The following is a list of the criteria for an acceptable WTP:

1. WTP should be representative of the stand being harvested.

2. Prescribing foresters are encouraged to maximize overlaps with areas that have been constrained for other reasons such as riparian reserve zones, steep slopes, sensitive soils, visually sensitive areas, and resource features.

3. Areas with a high number of active or high potential wildlife trees, or wildlife habitat features, should be identified as WTPs. High potential wildlife trees include large deciduous trees, coniferous vets, trees or snags with obvious feeding or cavity presence.

4. WTPs should be located away from roads to minimize the potential that snags will be felled to ensure worker safety, ensuring compliance with WCB regulations.

5. Efforts should focus on identifying WTPs inside block boundaries rather than the perimeter, if overlaps can be maximized inside the block boundaries. They should be designed to be as windfirm as possible, and should consider site, stand, and individual trees during layout. The use of a feathered edge boundary may be a consideration to ensure that the WTP is windfirm.

6. Standing dead trees associated with beetle attack (no live brood) or root rot centres may be considered as part of the WTP requirement.

7. Single tree retention is subject to basal area equivalency formulas. Single tree selection is site specific and the prescribing forester needs to support the decision in the SP, and consider other resource values. Use of single trees should address both representation and structural diversity.

8. Principles on interpatch distance can be obtained from the *Biodiversity Guidebook*. WTPs should be placed so that the distance between areas of mature timber (including the WTP) is less than 500 meters. Deviation from this guidance may be acceptable, but needs to be rationalised by the prescribing forester.

9. Stubbing to create wildlife trees should be considered, particularly on the perimeter of WTPs identified in riparian areas.

10. Inclusion of non-forested areas in WTPs should be avoided, unless if they are less than 10 percent of the area of the WTP and less than one hectare in size (for example, small wetlands that are difficult to map with a few scattered stunted trees).

11. The CCLUP Integration Report provided assumptions for WTP contributions to old seral targets. Planned WTP's anticipated to contribute to old seral targets should reflect the old seral requirements.

«Name»«rpf»

Further advice is provided in the *Forest Practices Code Biodiversity Guidebook* and the attached *Provincial Wildlife Tree Management Recommendations* dated February 2000. If you have any questions or require clarification, please contact this office. Thank you for your co-operation in this matter.

Yours truly,

Frank Miklas, R.P.F.
District Manager
Horsefly Forest District

Geoff Price
Habitat Protection Officer
Horsefly Forest District

Attachments (2)

pc: Rodger Stewart, Manager of Fish, Wildlife, Habitat Protection & FRP, Cariboo Region
Robin Hoffos, Senior Habitat Biologist

bpc: Bill Ashman, District Tenures Officer, Horsefly Forest District
Gerry Mooney, District Silviculture Officer, Horsefly Forest District
Kerri Howse, Major Tenures Forester, Horsefly Forest District
Mike Lloyd, Operations Manager, Horsefly Forest District
Mark Brodick, District Planning Officer, Horsefly Forest District

Wildlife Tree Patch Guidelines
for the
Horsefly Forest District

Draft Landscape Unit	Percentage of Cutblock Area Required as WTP
Beaver Valley	7
Black Creek	7
Cariboo Lake	11
East Arm	7
Eastside	7
Horsefly	7
Likely	9
Little River	9
Lower Cariboo	11
MacKay	11
McKinley	9
McKusky	7
Mitchell Lake	5
Moffat	9
Niagara	5
Penfold	7
Polley	9
Wasko / Lynx	7
Westside	7

Appendix 6. Interim Wildlife Tree Patch Guidelines for the Chilcotin Forest District

BRITISH COLUMBIA Ministry of Forests

MEMORANDUM

Distribution: MF/LL
Document name: h:\docs\wtp_res.doc FM
CONTACT: fmiklas, O.M., FD5, 394-4740
Date typed: 97/02/07 Date revised: 97/02/07 01:56 pm

File: 18800-03/wtp

February 7, 1997

To: Chris Schmid

From: Frank Miklas
Operations Manager
Chilcotin Forest District

Re: Interim Wildlife Tree (WTP) guidelines for the Chilcotin Forest District

As requested, the following is provided in response to your December 17, 1996 memo.

Yvonne Parkinson is currently preparing a District Landscape Unit Strategy for incorporation into the Regional Landscape Unit Strategy. I have asked Yvonne to solicit your input in this exercise; therefore, my preference is focus our efforts on developing the landscape unit strategy rather than revisiting the WTP guidelines.

Specific areas within the district that, in your opinion, are at risk because of the 8% can be discussed on a case by case basis; however, the Chilcotin Forest District is not prepared to re-negotiate the WTP guidelines agreed to on July 29, 1996. If you would like to discuss specific areas of concern I would be happy to meet with you and Clinton.

Frank Miklas
Operations Manager
Chilcotin Forest District

CHILCOTIN DISTRICT WILDLIFE TREE PATCH (WTP) INTERIM GUIDANCE

GENERAL

Use the *Biodiversity Guidebook's* recommendations as a reference to determine attributes and distribution of the patches.

HOW MUCH?

- 8% of the area of blocks requiring SPs.
- Not every block requires its own unique WTPs an aggregate of blocks may utilise a single patch but the 8% area guideline would be determined on the aggregate of block areas.
- Individual tree retention shall equate to 50% of its representative area in a natural stand but is the least desired method of WTP establishment.

PATCH ATTRIBUTES

Candidate areas should have some of the following attributes:

- Evidence of use by cavity nesters or woodpecker holes
- standing trees exhibiting rot, cat face etc.
- a variety of tree species, including deciduous (preferably non-mistletoe species)
- a range of tree diameters favouring the larger tree diameters
- both live and dead trees in various states of decay (where a snag hazard exists ribbon no work zone)
- see guidebook for further information

LOCATIONS OF WTPS

- Where possible, locate WTPs in Riparian Management Areas (RMA) adjacent to, close to or within the cutblock.
- If needed, within the block (block greater than 500 m in perpendicular directions) *see below.*
- Where no RMA exists and there is no spatial necessity, locate WTPs outside of the perimeter of the block.
- Patches should have a maximum 500 m spacing.
- Care should be taken to not isolate timber through WTP establishment
- WTP areas need not be within or adjacent harvest cut blocks but the 500 m spatial distribution requirement must be considered.

- Care should be taken in the design and location of WTPs to ensure they do not conflict with any Forest Development Plans

*No point along the block boundary should be greater than 500 m from a WTP.

DESIGN AND LOCATION OF WITHIN BLOCK WTPS

- Utilise wind firm trees in orientations that will minimise blowdown.
- Patch sizes in monocultures should be limited to 2.5 ha and no smaller than 1 ha, unless useful attributes can be found.
- If available use area of immature in conjunction with surrounding mature timber. In these cases up to 50 percent of the patch area can be immature and the immature will have 50 percent area equivalence (a one ha WTP that is 50 percent immature will contribute .75 ha toward block WTP requirements).
- Use monoculture only to fulfil spatial distribution criteria (**500 m maximum between patches**).
- Use of monoculture with limited attributes is justified as WTP recruitment.

SIZE

- WTPs of a larger size provide for the needs of biodiversity to a greater degree and are more appropriate in an interim situation as they may provide for subsequent harvest chance once landscape biodiveristy objectives are established. It may also be feasible to harvest WTPs in the future providing adequate replacement attributes have been successfully recruited.
- Areas of old seral stage should be reserved in units > 2 ha's if possible as they will then contribute to seral stage forest requirements for landscape level biodiversity (see page 60 of *Biodiversity Guidebook)*.

ESTABLISHMENT OF WTPS IN SELECTION HARVESTING

- Establishment of WTPs in selection harvesting should be given consideration where trees exhibiting significant value are present.
- Area retention should consider individual tree retention that is attributable to selection harvesting (i.e. 40 ha cut block with 50% stem retention has 25% WTP requirement already established, however, these stems may not exhibit high value wildlife attributes and thus even though the 8% requirement has been addressed a WTP may be established which is focused on more valuable attributes).

MARKING SBFEP

If a WTP is in an island within the block, orange boundary flagging tape is to be used.

Where the patch is outside of the block, orange and black stripped flagging tape is to be used. The block boundary will be mark in orange.

If a WTP is completely outside of the block (shares no common boundary with the block) it must be tied to the block boundary. These areas will be treated as separate standard units.

MARKING AND TRACKING GENERAL

- All WTPs will be included as a separate standard unit in SPs and designated as no treatment WTP.
- WTPs within a block must be boundary marked and traversed as part of block establishment and in accordance with block traversing guidelines for the Chilcotin Forest District.
- WTP adjacent cut blocks need not be boundary marked (except the common block boundary) nor traversed but must be accurately mapped using good map and photo and map ties. These will receive separate block designation and have SPs indicating they are a no treatment standard unit.
- WTP which are not adjacent harvest blocks need to be accurately mapped and tracked via a no treatment Silviculture Prescription.

Accepted as interim guidance by:

Chris Schmid
Forest Ecosystem Specialist
Ministry of Environment, Lands and Parks

Gerry Grant
District Manager
Chilcotin Forest District
July 29/96

g:\wpin\corp\off\wptemp\tj070401.doc