OMINECA REGION GUIDANCE
Stand and Landscape-Level Retention for Harvesting in Response to Spruce Beetle Outbreaks

September 09, 2017

About this Document

This document provides government guidance from the Ministry of Forests, Lands, Natural Resource Operations and Rural Development (the "Ministry") to forest professionals who design harvesting in response to spruce beetle outbreaks now underway in the Omineca Region. The objective of this guidance is to support considerations by professionals for carrying out spruce beetle sanitation/suppression treatments. In this regard, the Ministry's expectations are set out for:

- stand-level retention;
- landscape-level retention; and,
- use of legal and non-legal direction.

This guidance does not replace or preclude legal requirements or other sources of guidance that have been previously issued by the Ministry.

Introduction

As we near the end of an era of unprecedented salvage operations in response to the mountain pine beetle, a significant new outbreak of spruce beetle has begun within the Mackenzie and Prince George timber supply areas (TSA). In turning our attention from managing pine-dominated ecosystems toward spruce-dominated ecosystems, it is important that our practices adjust to suit the different ecological conditions and issues of these unique ecosystems.

I note that there are many differences between mountain pine beetle and spruce beetle and this document highlights some of those differences. There are lessons that can be learned from the management responses to and outcomes of implementation of the Chief Forester's Guidance document titled: *Guidance on Landscape- and Stand-level Structural Retention in Large-Scale Mountain Pine Beetle Salvage Operations - December 2005*. One such learning and a key goal of this guidance is to minimize the unintended large amalgamated harvest openings that can result from a lack of coordinated retention planning, and the associated risks to timber and non-timber values.

This document identifies the important differences between the mountain pine beetle and spruce beetle that affect our management of their host forested ecosystems. Considerations are presented on:

- Spruce-leading versus pine-leading ecosystems;
- Natural range of variability;
- Spruce beetle versus mountain pine beetle; and
- Lessons learned from previous guidance for beetle retention management (see Appendix 1)

Specific guidance is also provided relative to stand and landscape-level retention for harvesting in spruce beetle impacted forests.

We recognize that there has been significant work done to address resource management issues regarding spruce beetle management within the Mackenzie and Prince George Natural Resource Districts. Relevant documents can be found at: (https://www.for.gov.bc.ca/ftp/DPG/external/!publish/Spruce%20Beetle/Guidelines/Spruce%20Beetle%20Management%20Direction/).

Resource management involves an increasingly complex balance between development and protection of our natural resources. The Ministry is responsible for laws, policies and practices that seek to enable this evolving balance between economic, social and environmental considerations for the use of British Columbia's crown forest and range resources, and to ensure that this balance rests upon a stewardship foundation. Further, it is the duty of government to fulfil Government-to-Government agreements that are signed with First Nations, and to address issues related to Aboriginal title, rights and interests.

Developing an optimal management response to the spruce beetle outbreak now underway in the Omineca Region will require coordinated planning that addresses the management of both timber and non-timber natural resource values. In the Omineca Region, government, forest licensees and First Nations need to continue to work collaboratively to develop a coordinated response to emerging issues including the spruce beetle outbreak.

Guidance

Based on the considerations contained in Appendix 1, the following is guidance to forest professionals who are planning and implementing harvesting in response to spruce beetle. This guidance pertains to spruce beetle sanitation activities:

Landscape-Level Retention:

1. Within the spruce beetle outbreak area, licensees are expected to collaborate with each other and in partnership with the Provincial Government and First Nations to coordinate harvest planning.

2. Retention planning and reforestation activities need to consider the collective resource values, including all 11 FRPA values, any cumulative effects management direction and local species management guidance. Much of this can be found in the District Managers' Letters of Expectations. Post-harvest Silviculture activities can ensure there are no unnecessary harvesting constraints, and habitat values are recovered more quickly.

3. Forest licensees should work together to develop a coordinated spatialized retention plan that identifies areas between cut blocks that will be retained from harvesting for a minimum of 40 years.

4. The retention plan should be developed cooperatively so patch size objectives are known and respected by all operators harvesting in the management unit, and should be as long-ranging as practicable. The retention plan should set out how large or amalgamated openings will be minimized.

5. Landscape biodiversity thresholds established in orders are legal requirements.

6. Plans should be spatially-explicit for landscape-level retention, considering the full range of values for conservation. Where young seral openings are planned adjacent to each other, a retention area should be identified between two openings.

7. The development of large (>1 000 ha) early seral openings (early seral is considered to be 0-40 year old)[1] should be clearly rationalized. Information about the mapping and analysis of early seral openings is included in Appendix 4.

8. Marginally or non-impacted stands should be retained in order to contribute to the mid-term timber supply.

9. Some of the areas where the current spruce beetle outbreaks are occurring have existing harvesting history. New harvesting is expected to take into account these existing harvest openings (i.e. young seral forest) and that any new harvesting and retention incorporates the guidance provided in this document.

10. Retention areas should be co-located wherever possible to benefit multiple values.

11. Special consideration needs to be made in areas identified for Caribou management, and follow government guidance for recovery.

[1] FRPA is a continuous improvement model, based on professional reliance and best available science. While the land use orders set 20 years as a minimum age, the best available science indicates 40 years is the best practice.

12. Forest licensees, First Nations and FLNR staff should work collaboratively to establish new mechanisms for how to track, communicate and monitor harvesting, partial harvesting and retention in response to the spruce beetle outbreak.

Stand-Level Retention:

13. Stand-level retention of mature /old forest structure should increase as the size of the harvest patches increase:

Patch Size	Percent of Patch Un-harvested/Retained
<50 ha	10%
50-100 ha	>10
101-1,000 ha	>15%
>1,000 ha	>25%

Information about the mapping and analysis of stand-level retention is contained in Appendix 3.

14. Stand-level retention should be planned to be representative of the forest that was present before harvesting, considering all forest values. Retention should not be limited to non-economic stands or trees. As patch size increases, there should be greater emphasis on retention connectivity (e.g. in-block retention connected with block edges).

15. Stand-level retention, especially in spruce dominated ecosystems, should be planned considering potential future wind and blowdown events. Refer to Maxwell 2010 for additional information.

16. As many live and non-susceptible trees as possible – by species and age class – should be retained to maintain the range of forest values. Ensure the impacts on all forest values including mid- and long-term stand yields are considered.

17. Secondary stand structure (i.e., understory trees) should be retained and protected.

18. Partial harvesting silviculture systems[2] should be utilized to optimize harvest of trees attacked by beetle while retaining healthy trees. Partial harvesting also mimics the naturally occurring gap disturbance pattern created by spruce beetle.

[2] Partial harvesting silvicultural systems recommended include any partial harvesting method that mimics gap disturbance patterns. The commonly used method of clearcutting with retention patches is not a recommended partial harvesting system. See http://www2.gov.bc.ca/gov/content/industry/forestry/managing-our-forest-resources/silviculture/silvicultural-systems

19. The distance between cover for large and small animals should be managed in harvested openings. This should include management of block edge, in-block retention and coarse woody debris (CWD) management for amount, distribution and piece size. Within harvest blocks, the distance to standing tree cover should not exceed 250 metres, and should be less on average (*Prince George Land and Resource Management Plan*, 1999 and *Omineca Regional Wildlife Tree Patch Retention Guidance*, 2005). Managing the distance between standing trees will also support seed and pollen dispersal and will contribute to maintaining a natural range of genetic variability (Leadem, C.L. et.al 1997).

20. Management of CWD should include maintaining large pieces and CWD in various patterns (Chief Forester Guidance on Coarse Woody Debris Management, 2010).

Legal Requirements vs. Non-legal Expectations of Government

21. Government has established legal means (set out below) to conserve forests in order to meet other values. This guidance appeals that management beyond these legal standards is necessary in order to protect timber supply and address government's duty to manage for multiple forest resource values. As such, legal orders should be viewed as a baseline, or minimum, target for retention.

22. In the Omineca Region, the thresholds for landscape level retention are regulated by law through established land use orders that must be complied with. Legal orders include:

    i. Order Establishing Provincial Non-Spatial Old Growth Objectives,
    ii. Order Establishing Landscape Biodiversity Objectives in the Prince George TSA,
    iii. Ministerial Order – Non-spatial Landscape Biodiversity Objectives in the Mackenzie Forest District, and
    iv. Order to Establish *the Obo River and Fox Landscape Units and Objectives*.

23. Some forest management units (i.e. area based tenures) have unique results or strategies that address landscape biodiversity, and these are also to be followed.

24. Spatialized old growth areas, including legal and non-legal Old Growth Management Areas and approved spatial recruitment areas, have been established in some biodiversity reporting units. Proposed development within spatially identified old growth areas within the Mackenzie

Natural Resource District are required to follow the *Old Growth Management Area Amendment Policy- Mackenzie Natural Resource District* (January 2015) and all legal and non-legal Old Growth Management Areas and approved spatial recruitment areas should consider the *Omineca Region – Guidelines for Spruce Beetle Treatment in Special Management Areas* (2017)[3].

25. Practitioners and licensees are expected to consider the local best management direction provided by Government such as guidance in the District/TSA Forest Health Strategy.

Sept 21, 2017

Approved / Not Approved	Signature Diane Nicholls, ADM Chief Forester	Date

3 https://www.for.gov.bc.ca/ftp/DPG/external/!publish/Spruce%20Beetle/Guidelines/Spruce%20Beetle%20Management%20Direction/Omineca%20Region%20Guidelines%20for%20Spruce%20Beetle%20Treatment%20in%20SMAs%20May%202017.pdf

Appendix 1 - Considerations

The following sections discuss key considerations that should be incorporated into forest planning and operations for management responses to the spruce beetle outbreak.

a. Spruce-leading vs. Pine-leading Ecosystems

The ecosystems where spruce beetle and mountain pine beetle occur are very different.

Lodgepole pine-leading stands that are impacted by mountain pine beetle typically regenerate naturally from stand initiating events, such as fire. These ecosystems are typically drier and are even-aged. Alternatively spruce-leading stands are typically found in wetter ecosystems, where stand initiating events are less common, and tend to be associated with insect/disease and blowdown. These stands tend to be of mixed age and species and have higher structural complexity.

Operations in spruce dominant ecosystems often pose a greater challenge than typical pine ecosystems. For example:

- The terrain is often more challenging;
- There are often more identified sensitive areas and non-timber values including fish and wildlife, recreation, terrain stability and visual quality;
- Disturbance recovery and stand regeneration times are longer; and
- There are often more riparian areas which harvesting and road construction operations need to consider.

Hydrologic considerations for spruce beetle infested watersheds are also important. The magnitude of hydrologic change at the watershed level will depend upon a variety of factors such as severity of attack, time since attack as well as stand and ecosystem characteristics. Sanitation and salvage operations, particularly in the wetter spruce ecosystems, may results in adverse hydrological responses, if mitigation measures are not implemented. If a spruce beetle impacted stand is left unharvested, hydrologic change occurs gradually, whereas clear-cut harvesting results in immediate change at the stand level and contributes to the collective impacts on watershed hydrology. Hydrologic response to forest harvesting such as increased peak flow have been observed when 20% or more of a watershed has been disturbed (Stednick, 1996; Winkler et al., 2010). Specific operational considerations for minimizing hydrologic response to beetle related harvesting are provided in *Omineca Region - Guidelines for Watershed Planning*.

Together, these factors increase the risk of detrimental impacts to sensitive areas and non-timber resources for harvesting in spruce beetle impacted stands. Forest planning and operations must consider and respond to this increased risk.

b. Natural Range of Variability

For the Omineca and Northeast Regions of the Ministry of Forests, Lands and Natural Resource Operations and Rural Development, the best available information about natural range of variability and recommended management guidance can be found in Technical Report 059, *Land Units and Benchmarks for Developing Natural Disturbance-based Forest Management Guidance for Northeastern British Columbia* (DeLong 2011). The follow excerpts are from the Wet Mountain natural disturbance unit section of the document where the majority of the current spruce beetle outbreak is occurring.

> *In the absence of stand replacement disturbance, stands are affected by damaging agents that operate in older stands, so-called matrix disturbance agents (Lewis and Lindgren 2000). The agents most commonly associated with older trees in this Natural Disturbance Unit are spruce beetle, western balsam bark beetle, tomentosus root disease, and stem decays such as Indian paint fungus (Echinodontium tinctorium (Ellis & Everh.) Ellis & Everh.). These agents alter stand species composition and horizontal and vertical structure by causing tree mortality either on their own or with other damaging agents (e.g., wind, disease). Spruce beetle may cause severe mortality at regular intervals, leading to a shift in species composition to subalpine fir and release of suppressed trees (Lewis and Lindgren 2000).*
>
> ***Recommended Practices***
>
> ***Old forest:*** *Since forests with "old forest characteristics" dominated the landscape in this Natural Disturbance Unit, old forest reserves should be well distributed throughout all watersheds. A high degree of connectivity between these old forest patches should be planned since there was always a high degree of connectivity of old forest in the natural landscape.*
>
> ***Young natural forest:*** *Some proportion of areas disturbed by natural disturbance agents (e.g., wildfires, pests, wind) should be left not salvaged to offer habitat (e.g., burned snags) that cannot be provided by young managed stands.*
>
> ***Silvicultural system:*** *Some form of partial cutting that approximates the effects of spruce beetle attack would seem appropriate to maintain the type of stand structure most common in the natural landscape. Some balance between this system and clear-cut with reserves to approximate wildfire pattern is warranted.*

It is important to note that DeLong 2011 defines young seral forest as stands < 40 years old. For the Wet Mountain natural disturbance unit (location of the majority of the current spruce beetle outbreak), 40 % of natural disturbance was stand replacement and 60 % was gap replacement. Gap replacement is disturbance openings caused by death of individual trees or small groups of trees.

Gaps are generally < 1 ha and remove 40% of the basal area of a stand. Additional information about natural range of variability for natural disturbance units in the Omineca and Northeast regions can be found in Appendix 1.

A significant body of knowledge supports the benefit of applying a resource management regime which aligns with natural disturbance patterns and natural range of variability. As much as is practicable, forest planning and operations for harvesting of spruce beetle impacted stands should aim to be consistent with natural disturbance science and management principles.

c. Spruce Beetle vs. Mountain Pine Beetle

There are inherent differences between spruce beetle and mountain pine beetle and the stand characteristics of the host tree species.

Typically, spruce beetles show a patchy dispersal pattern, both within a stand and across the landscape resulting in a lower percentage of stand mortality when compared to mountain pine beetle attacked stands. In part this is due to the nature of the "gap dynamic" uneven-age stand structure typically found in spruce-dominated ecosystems. These ecosystems are both un-even aged and are comprised of multiple species, giving them a diverse structure in comparison to fire-driven Lodgepole pine dominant ecosystems. Although large diameter host trees are preferentially attacked by both mountain pine beetle and spruce beetle, the diversity of individual tree age and size in spruce ecosystems, factors into the typically lower mortality rate associated with spruce beetle events.

Insect behaviour plays an important role in the distribution pattern of host-tree mortality. Jackson et al. 2008 shows that mountain pine beetle can disperse between 30 and 110 kilometres per day when flying with the wind above the forest canopy with a shorter range when flying within a stand (Safranyik 1989). This most often results in extensive areas of mountain pine beetle killed pine. Studies available for spruce beetle suggest dispersal is primarily limited to within a few hundred metres of the brood tree, although they are capable of flights lasting over 11 kilometres nonstop in flight mill tests (Chansler 1960). Werner and Holsten (1997) show dispersal distances of spruce beetle from 90 metres to 300 metres in mark-recapture study of adult beetles captured in Alaska.

This evidence of localized dispersal for spruce beetle, in combination with a mixed one-year and two-year life cycle, suggests that the spread of spruce beetle across the landscape is likely to be less

aggressive than was observed at the height of the mountain pine beetle outbreak. At the peak of mountain pine beetle populations, extreme behaviour was observed that was not previously documented or anticipated (i.e. attack within juvenile stands or within stands with a low percentage of pine). While there is always potential for unprecedented behaviour (Werner and Holsten 1997), especially within the context of climate change, the evidence in the scientific literature, in combination with our knowledge of historical spruce beetle outbreaks suggest that spruce beetle population growth is unlikely to reach extremes comparable to the mountain pine beetle outbreak during the past decades.

Current science shows that spruce beetle biology, behaviour and infestation pattern is significantly different than mountain pine beetle. It is expected that forest planning and operations will consider these differences. It is also expected that government and licensees will continue to research and monitor the spruce beetle outbreak and be responsive if and when changes occur.

d. Lessons Learned from Previous Guidance for Beetle Retention Management

In 2005 the Chief Forester released a document titled "*Guidance on Landscape-and Stand-level Structural Retention in Large-Scale Mountain Pine Beetle Salvage Operations*" (Snetsinger 2005). In that document the Chief Forester's guidance can be roughly summarized as:

- At the landscape level, collaborative, multi-stakeholder, long-term landscape-level planning is the best option of managing increased retention; and
- At the stand level, retention of mature and old forest structure should increase as the size of the harvest patches increased.

The Forest Practices Board Special Report, *Biodiversity Conservation during Salvage Logging in the Central Interior of BC (FPB/SR/35) November 2009*, it was reported that there was additional stand-level retention, on a block by block basis, following the release of the Chief Forester's guidance document. However, there was no planning for, or implementation of a "conservation uplift" at the landscape-level. The result of this lack of coordinated landscape (or between block) retention planning was large (>1 000 hectare) and very large (>10 000 hectare) young seral amalgamated harvest openings (functional openings) when individual cut-blocks were planned with insufficient mature and old forest retention between individual blocks. The Province of BC's natural resource agencies issued two response documents (May 13, 2010 and April 4, 2011) in which it was recognized that there is a lack of coordinated landscape-level planning for retention of old and mature forest. Refer to the Forest Practices Board website for additional documentation (https://www.bcfpb.ca/reports-publications/reports/biodiversity-conservation-during-salvage-logging-in-the-central-interior-of-bc/).

Analysis of the retention and patch size in mountain pine beetle salvage harvesting areas indicated that young seral patches (i.e. functional openings) in the large and very large patch sizes were common. The

analysis indicated that in the Prince George TSA there were 14 functional openings that were larger than 10 000 hectares and the largest was greater than 60 000 hectares (Izzard 2016). These very large functional openings had a median in-block retention level of 8% and a combined retention (including in-block and remnant intra-patch mature/old forest) of 16%. This falls short of the guidance which recommended 25% retention for large and very large harvest openings and may not be consistent with natural disturbance patterns.

It is clear that forest professionals implemented the guidance provided by the Chief Forester on a block by block basis, however retention in mountain pine beetle salvage falls short of the guidance particularly in large (>1 000 ha) functional openings which have resulted from cumulative stand-level decisions for individual cut blocks. Due to the scale of large and very large functional openings, increased risk to non-timber values is likely high. Management practices need to avoid similar risks from occurring in the ecosystems which are now facing impacts from the spruce beetle and associated harvest activities. When planning for and implementing harvesting of spruce beetle impacted stands, best practices as described in this guidance document will be implemented at both the stand and landscape level.

Appendix 2: Natural Range of Variation Additional Information

The following map displays natural disturbance units in northeastern BC as well as 2015-17 aerial overview survey spruce beetle occurrence locations. A corresponding table is provided with natural range of variability statistics. Refer to DeLong 2011 for additional information regarding natural range of variability.

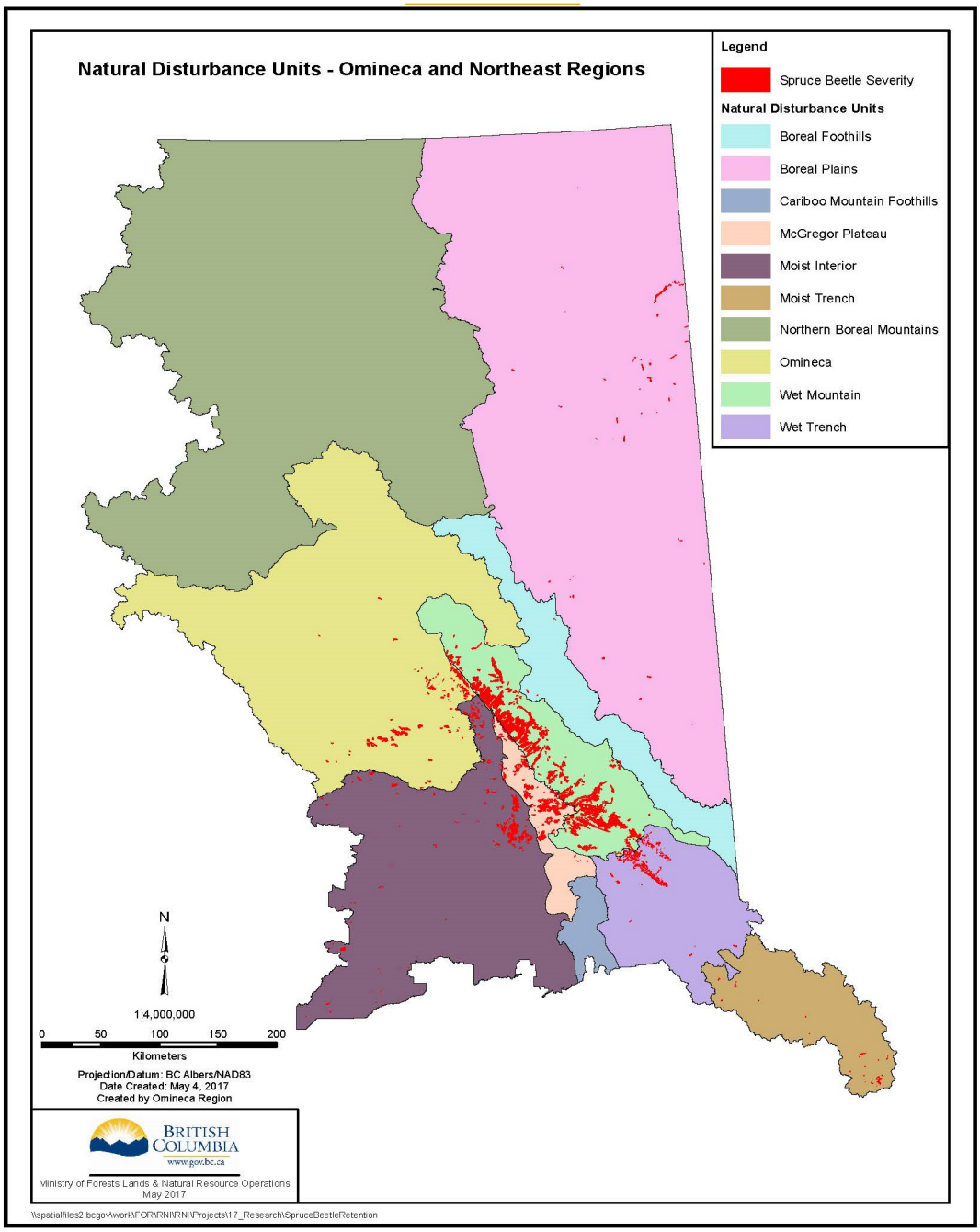

Figure 1: Natural disturbance units of northeastern BC and current spruce beetle outbreak

Table1: Estimates of statistics relating to temporal and spatial pattern of natural disturbance in the Natural Disturbance Units of the Prince George Forest Region (DeLong 2011).

Natural Disturbance Unit	Stand Replacement Disturbance Cycle[a]	Time since disturbance distribution[b] (% of total forest area)[c]				Patch Size (% of total disturbance area)[c]				Disturbance type (% of disturbance area)[d]	
		>250 yrs	>140 yrs	>100 yrs	<40 yrs	>1000	100 -1000	51 - 100	<50	Stand Replacement	Gap Replacement[e]
Boreal Plains - Alluvial	200[d]	23 - 36	44 - 57	61 - 66	18 - 24	0	0	40[d]	60[d]	80	20
Boreal Foothills - Mountain	150	15 - 25	33 - 49	43 - 62	19 - 36	40	30	10	20	80	20
Boreal Plains – Upland	100	6 - 12	17 - 33	28 - 49	25 - 50	70	20	5	5	98	2
Boreal Foothills – Valley	120	8 - 17	23 - 40	33 - 55	19 - 45	40	30	10	20	90	10
McGregor Plateau	220	26 - 39	43 - 61	54 - 72	13 - 31	40	45	5	10	90	10
Moist Interior - Mountain	200	23 - 37	41 - 61	52 - 72	12 - 33	40	30	10	20	70	30
Moist Interior - Plateau	100	6 - 12	17 - 33	28 - 49	25 - 50	70	20	5	5	98	2
Moist Trench - Mountain	300	39 - 50	58 - 69	66 - 77	10 - 22	60	30	5	5	70	30
Moist Trench – Valley	150	15 - 25	33 - 49	43 - 62	19 - 36	70	20	5	5	90	10
Northern Boreal Mountains	180[d]	20 - 35	37 - 60	48 - 70	12 - 34	60[d]	30[d]	5[d]	5[d]	70	30
Omineca - Mountain	300	39 - 50	58 - 69	66 - 77	10 - 22	40	30	10	10	70	30
Omineca - Valley	120	8 - 17	23 - 40	33 - 55	19 - 45	60	30	5	5	95	5
Wet Mountain	900	74 - 80	84 - 89	88 - 93	3 - 7	10	60	10	20	40	60
Wet Trench - Mountain	800	70 - 77	80 - 88	83 - 92	4 -11	10[d]	60[d]	10[d]	20[d]	40	60
Wet Trench - Valley	600	63 - 72	76 - 84	81 - 90	4 -11	10[d]	60[d]	10[d]	20[d]	60	40

[a] Disturbance cycles are the inverse of disturbance rate (% of total forested area/yr) x 100. Unless noted in the text, disturbance rates were derived using methodology outlined in DeLong (1998) and generalized for the NDU.

[b] This is the range in percent of the total forested area within the NDU, that has not had a stand replacement event for the specified time period, estimated to be present at any one time. See Section 2 for details on how the estimate was determined.

[c] Patch size distributions were estimated using methodology outlined in DeLong (1998) except where noted in the table.

[d] Based on expert opinion.

[e] Disturbance openings caused by death of individual trees or small groups of trees. Gaps generally < 1ha in size and removing <40% of the basal area of a stand.

Appendix 3: Information about the mapping and analysis of stand-level retention

When a new cut-block is proposed it is important to consider what impact the new block will have to existing functional openings or amalgamated early seral patches. This will require consideration of adjacency to and size of other harvesting. A methodology for determining functional openings or young patch size distribution is outlined in Appendix 4.

For mapping and assessing stand-level retention, two main methods for mapping and assessing have been implemented, as illustrated in the diagram below. These methods were identified in the Forest Practices Board Report of 2009. In both of the methods of calculation the retention with the patch delineation illustrated below, the result was a greatly increased distribution of patches in the larger opening classifications (250-1 000ha, >1 000ha) than is found in the individual cut-blocks.

Although the harvest-plus method of delineation identified larger patch sizes, the inclusion of intra-patch remnant mature/old areas in this method resulted in a higher percentage of retention compared to the harvest-only method. These findings were consistent with a Forest Analysis and Inventory Branch (FAIB) discussion paper completed for the Prince George TSA (Izzard 2016).

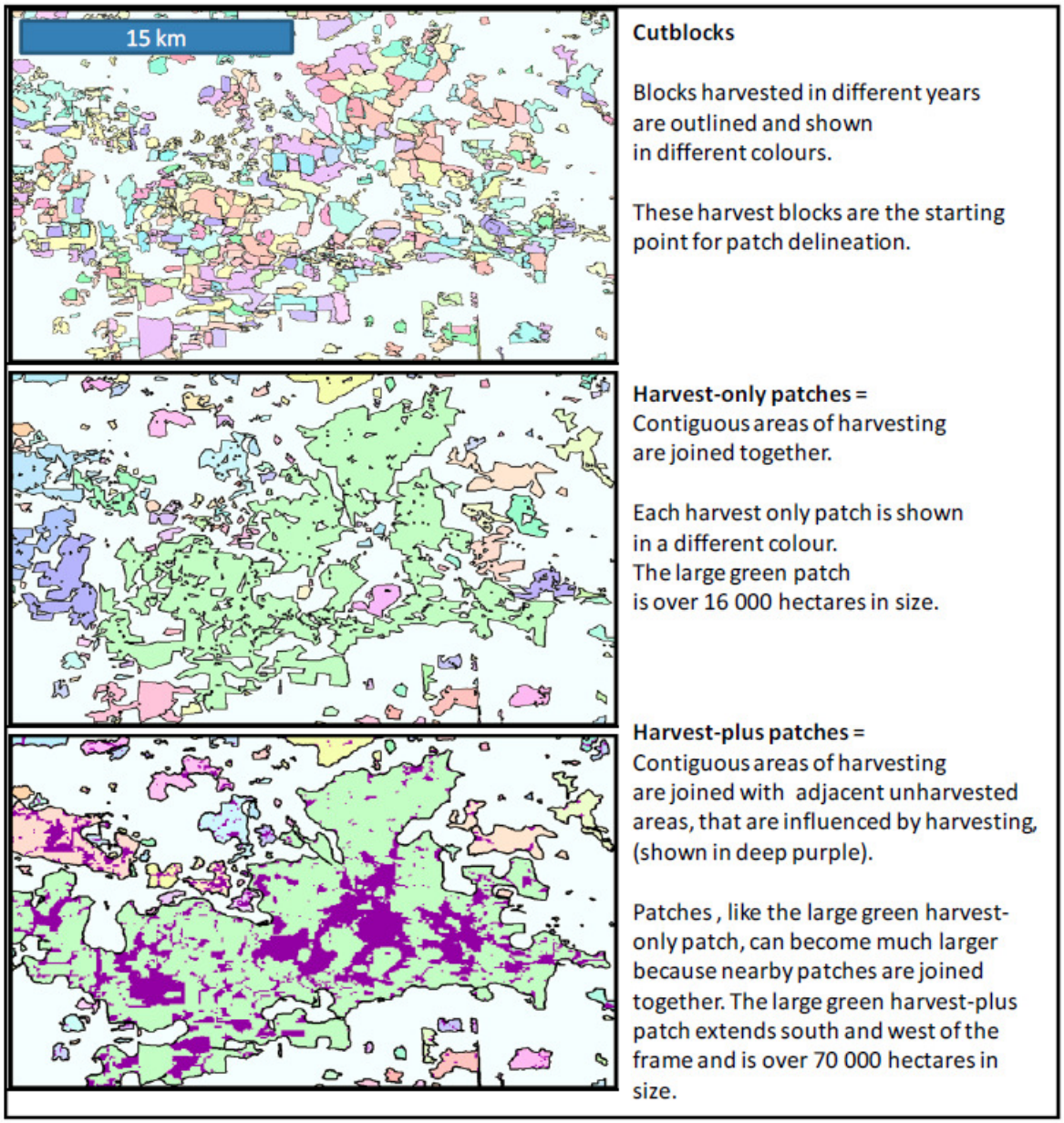

Figure 2: Illustration of applying the two methods of patch delineation to a portion of the study area (Forest Practices Board, 2009)

In reference to spruce beetle related harvesting:

Spruce beetle disturbance tends to follow a patchy distribution. It is important to manage the mid-term timber supply to maintain the viability of the forest industry. Although individual cut-blocks have unique characteristics and challenges, there will be opportunities to balance short and long term economics along with provisions for non-timber resources with sanitation and salvage harvesting of spruce beetle impacted stands. Whereas large contiguous functional openings were often the norm for mountain pine beetle salvage, they should be the exception not the rule in the case of spruce salvage.

For the purposes of harvest planning and operations in spruce beetle impacted stands, retention of stand-level mature /old forest structure should increase as the size of the harvest patches increase.

Table 2. Recommendation for stand-level retention based on patch size using the Harvest – plus patches method.

Patch Size	Percent of Patch Un-harvested/Retained
<50 ha	10%
50-100 ha	>10
101-1,000 ha	>15%
>1,000 ha	>25%

By clearly defining the patch size evaluation method, foresters can more accurately interpret stand-level retention guidance.

Appendix 4: Mapping and analysis of early seral openings information

The following methodology is provided as guidance for mapping and analysis of early seral, functional openings or young forest patch size and distribution. Refer to *Order Establishing Landscape Biodiversity Objectives for the Prince George Timber Supply Area October 20, 2004 - Implementation Policy* for additional information.

Young Forest Patch Size Distribution

Analysis Steps for Patch Size

1. Identify all patches < 50 ha and buffer by 75 m.

    a. If any of these patches touches another patch that also has a 75 m buffer then they must be within 150 m. Merge these patches and de-buffer by 75 m.

    b. Assess all patch sizes in hectares. Identify all patches <50 ha and remove from further analysis.

2. Identify all remaining patches >50 ha and buffer by 100 m.

    a. Any patches touching must be within 200m. Merge and de-buffer.

    b. Identify all patches <100 ha and remove from further analysis.

3. Identify all remaining patches >100 ha and buffer 200 m.

    a. Any patches touching must be within 400m. Merge and de-buffer.

    b. Identify all patches <500 ha and remove from further analysis.

4. Identify all remaining patches >500 ha and buffer by 300 m.

    a. Any patches touching must be within 600m. Merge and de-buffer.

    b. Identify all patches <1000 ha and remove from further analysis.

5. Identify all remaining patches >1000 ha and buffer by 400 m.

    a. Any patches touching must be within 800m. Merge and de-buffer.

6. Bring all of the coverage's created in steps 1-5 back into one spatial dataset. Some of the smaller patches may now reside within the perimeter of the larger patches.

Note: this methodology was also implemented in the *Biodiversity Conservation during Salvage Logging in the Central Interior of B.C. FPB/SR/35*

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