

Ministry of Forests, Lands and Natural Resource Operations

QUESNEL TIMBER SUPPLY AREA  
TECHNICAL WORKING GROUP FINAL REPORT

August 31, 2011

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## **EXECUTIVE SUMMARY**

The recent Timber Supply Review (TSR<sub>4</sub>) set the current allowable annual cut (AAC) for the Quesnel Timber Supply Area (TSA) at 4,000,000 cubic metres, of which a maximum of 650,000 cubic metres can be attributed to non-pine coniferous volume. The most recent timber supply projection, completed for this project, shows the harvest level dropping to about 1,150,000 cubic metres per year by 2023 and remaining at that level for 46 years as a result of the mountain pine beetle (MPB) epidemic. This midterm AAC is an improvement over that projected during TSR<sub>4</sub>, where the midterm was forecast at 720,000 cubic metres, and is a result of updating modeling assumptions used during the TSR<sub>4</sub> process.

Significant economic and social repercussions are expected during the transition to a lower AAC, especially compared to the current AAC, the previous uplifted harvest levels, or the pre-MPB AAC. Forest Analysis and Inventory Branch (FAIB) completed a timber supply analysis in 2010 to identify potential opportunities to increase the AAC in the midterm. This analysis revealed potential for decreasing the impacts through the review and modification of the following factors:

- Forest sector management practices and administration: regeneration/reforestation, fertilization, stand merchantability/economics and operating areas;
- Deferral or relaxation of objectives for other forest values: visual quality objectives, wildlife/fish habitat, and biodiversity.

The Quesnel TSA is subject to the Cariboo Chilcotin Land Use Plan (CCLUP), designated as a Higher Level Plan (HLP), a Land Use Objectives Order (LUO) and many Government Actions Regulation (GAR) orders. This hierarchy of plans and orders either removes land from the Timber Harvesting Land Base (THLB) or limits access to timber through time. These reductions in THLB and timber access limitations were reflected in the most recent TSR<sub>4</sub>.

As described above, these values/exclusions present two types of harvest constraints. The first type of constraint results from areas removed from the THLB that are unavailable for harvest (e.g. riparian reserve zones, Old Growth Management Areas (OGMA), Wildlife Habitat Area (WHA) no-harvest areas). Areas associated with the second type of constraint are within the THLB and have defined disturbance percentages which restrict the rate of harvest as compared to the unconstrained THLB (e.g. riparian management zones, Visual Quality Objectives (VQO), WHA modified harvest zones, Mule Deer Winter Range (MDWR) areas).

A more detailed timber availability analysis was completed to identify potential options to improve the midterm timber availability and examine the effects on non-timber values. This analysis was reviewed by the Quesnel TSA Midterm Timber Supply Technical Working Group (the Working Group) and by major licensees operating in the TSA. A joint licensee/Working Group review of the analysis output concluded that some identified values were considered infeasible for further investigation; these included riparian reserve and management zones, some permanent OGMAs and Caribou WHA areas. Specific values were identified that required additional analysis to identify potential opportunities to enhance timber access while limiting impacts on non-timber values, including OGMAs, VQOs, MDWR areas, Wildlife Tree Patches and Conservation Legacy Areas for stand-level biodiversity (WTP and CLA) and mature seral objectives. Low site exclusions were also identified as a factor that should be assessed for potential harvest opportunity.

Following the joint review, the Working Group selected opportunities that have potential to mitigate mid-term timber supply impact and outlined the implications of these opportunities.

The following table provides an overview of the Pre beetle and current timber supply information for the Quesnel TSA, along with the timber availability and non-timber value impacts of the maximum and feasible mitigation assessments.

Scenario	Harvest (cubic metres per year)	Period for which Volume is Available for Harvest	Zone	Change to Volume Available for Harvest Compared to Reference Forecast	Harvest Gap Compared to Pre-Beetle Forecast	Legal/Policy Implications	Non-Timber Value Implications
Pre-Beetle Forecast	2 340 000	Pre-beetle conditions	All	n/a	n/a	n/a	n/a
TSR 4 Results & Updated Midterm Forecast (Reference Forecast)	4 000 000	Short-term (to 2019)	All	n/a	+ 71%	Meets current legislation/policy	Meets current legislative requirements
	1 150 000	Mid-term	All	n/a	- 53%	Meets current legislation/policy	Meets current legislative requirements
Maximum Mitigation (Mitigation opportunities created by removal of all assessed non-timber value objectives)	4 000 000	Short-term (to 2019)	All	0%	+ 71%	Meets current legislation/policy	Meets current legislative requirements
	1 648 000 <sup>2</sup>	Mid-Term	All	+ 43%	- 30%	Amendments required to Land Use Objectives Order  Amendment required under GAR  Amendment required related to FPPR 7(2)	Loss of old growth  Loss of visual integrity for recreation, tourism, well-being  Increased risk to watershed-level hydrological integrity  Loss of winter habitat for Mule deer  Loss of habitat for caribou  Loss of structural diversity at the landscape level  Loss of cultural and spiritual opportunities
Feasible Mitigation (Mitigation opportunities suggested by forest licensees)	4 000 000	Short-term	All	0%	+ 71%	Meets current legislation/policy	Meets current legislative requirements
	1 493 000	Mid-Term	Varies by value	+ 30%	- 36%	Amendments required to Land Use Objectives Order  Amendment required	Loss of old growth in ERDZ and IRMZ areas of CCLUP  Reduced visual

<sup>2</sup> The potential volume in this maximum midterm harvest level includes overlap between the values that results in some level of unquantified inflation in the actual maximum volume that would be realized if all value constraints were removed. An understanding of the impact of this overlap on the volumes is gained by reviewing the details presented in Appendix 2 for each of the values. Further analysis is required to accurately determine the timber availability should all these values be removed.

						under GAR Amendment required related to FPPR 7(2)	integrity for recreation, tourism, well-being  Increased risk to watershed-level hydrological integrity  Unquantified impact on winter habitat for Mule deer  Reduced structural diversity at the landscape level  Loss of cultural and spiritual opportunities
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The changes that would be required to implement the feasible mitigation scenario are summarized in the table below. Together, these mitigation opportunities could potentially increase mid-term timber supply by 393 000 cubic metres per year.

Potential Increase to Mid-Term Timber Supply	Non-Timber Value	Zone	Legal Changes Required	Consultation and Review Requirement	Decision-Maker and Amendment Timing	Non-Timber Implications
47 000 to 57 000 m <sup>3</sup> /year	Visual Quality  (Eliminate Modification and Partial Retention VQO areas and amend Retention VQO to Partial Retention)	All	Land Use Objectives Order Amendment (Land Use Objectives for the Cariboo-Chilcotin Land Use Plan (CCLUP) Area)  Government Actions Regulation Amendment (GAR 7(2)) <sup>1</sup>	Public Consultation  Review/Comment with holders of agreements under the Forest Act or the Range Act (GAR 3 (1)(b))  Consultation with holders of agreements under the Forest Act or the Range Act with whom the order may have a material adverse effect (GAR 3 (2))  First Nations Consultation	Minister of Forests, Lands and Natural Resource Operations  District Manager  By 2019	Reduced aesthetic and spiritual integrity for tourism and recreation  Government studies indicate that the public prefers unaltered landscapes including those impacted by Mountain Pine Beetle
151 000 m <sup>3</sup> /year	Stand Level Biodiversity (remove the requirement for Wildlife Tree Patches and Conservation Legacy)	All	Land Use Objectives Order Amendment (Land Use	Public Consultation  Review/Comment with holders of	Minister of Forests, Lands and Natural Resource	Deterioration of watershed-level hydrological integrity  Loss of structural diversity at the landscape level

	Areas related to accelerated salvage activities)		Objectives for the Cariboo-Chilcotin Land Use Plan (CCLUP) Area)	agreements under the Forest Act or the Range Act (GAR 3 (1)(b))  Consultation with holders of agreements under the Forest Act or the Range Act with whom the order may have a material adverse effect (GAR 3 (2))  First Nations Consultation	Operations  By 2019	Loss of habitat structure and ecosystem services (distribution of species, population and genetic material)  May not reflect patterns of natural disturbances that occur within the landscape
43 000 to 53 000 m <sup>3</sup> /year	Access Low Sites  (Some low sites are currently accessed by licensees. Increased access may require legislation and/or policy changes to improve economic viability of these areas)	All	Possible change to FRPA S.29 and S.30 and FPPR S.16, S.44 & S.45  Potential policy change	Public Consultation  First Nations Consultation	Minister of Forests, Lands and Natural Resource Operations  District Manager for policy change.	Undetermined impacts, however these areas are currently outside the THLB and contribute to overall structural diversity and biodiversity at the landscape level  May impact aboriginal interests
108 000 to 132 000 m <sup>3</sup> /year	Old Growth Management Areas	ERDZ and IRMZ of the CCLUP	Land Use Objectives Order Amendment (Land Use Objectives for the Cariboo-Chilcotin Land Use Plan (CCLUP) Area)	Public Review and Comment (Land Act 93.6 (1))  First Nations Consultation	Minister of Forests, Lands and Natural Resource Operations  By 2019	Loss of old growth  Loss of structural diversity at the landscape level  May impact aboriginal interests  Loss of opportunity for biodiversity conservation  Loss of habitat for old-growth dependent species

<sup>(1)</sup> A number of limitations apply to government actions. One of these limitations is that the decision-maker must be satisfied that (a) the benefits to the public derived from the order outweigh any material adverse impact of the order on the delivered wood costs of a holder of any agreement under the Forest Act that would be affected by the order and (b) undue constraint on the ability of a holder of an agreement under the Forest Act or the Range Act that would be affected by the order to exercise the holder's rights under the agreement.

While there is opportunity to improve the midterm timber access through reductions in non-timber values, it is important to remember that the targets for non-timber values represent a reduction in historic levels of habitat because the land use plan involved trade-offs to reach a social balance. As an example, the biodiversity targets for retention of old and mature forest represent only a portion of the estimated old and mature forest that existed on the land prior to industrial development.

MPB has further affected forest condition in pine stands for both the constrained and unconstrained land base. Impacts to non-timber values from pine mortality vary by stand type, understory condition, LU value, and mortality level. Nevertheless, ecological values do remain in these MPB impacted stands, including residual green trees, intact

understory soils and shrubs, snags and coarse woody debris. Retention of original stands, including dead trees, can be important for conservation values like biodiversity and some wildlife species, especially in a landscape that is increasingly moving towards greater fibre utilization and a more managed forest estate.

The analysis also identified two management practices and administration opportunities that could significantly improve salvage performance and midterm timber access without altering land use objectives for other values.

The first opportunity is the significant volume of pine located in the western supply blocks of the Quesnel TSA, and area that is poorly serviced by access structures and is a significant distance from the processing facilities. The timber is characterized by smaller diameters stands which have a lower impact by MPB and are projected to have a longer salvage opportunity window. This access constraint on timber availability has the potential to significantly reduce the pine salvage period, forcing an early shift into stands expected to support the midterm harvest.

This timber access issue is a key component to achieving the forecast salvage levels and reducing the pressure on the midterm timber supply. The importance of this issue exceeds the influence of any other opportunities identified through changes to land use objectives. Failure to access the western supply blocks effectively reduces the size of the THLB, resulting in a significantly lower AAC across all forecast periods.

The second opportunity is the management of the mature seral objectives of the land use plan. Local licensees believe that the mature seral objectives for each LU/BEC unit are a significant limitation on timber access with the Quesnel TSA. Six of the major TSA LU/BEC combinations are currently in a mature seral deficit. However, removing the mature seral constraint in the analysis had little impact on timber availability as the seral constraints only affected the timing and location of the harvest.

There is a difference between the way mature seral is modeled for TSR and how it is managed operationally. The model determines the mature seral deficit and reserves this amount of area from the next oldest stands in the LU/BEC. Other stands are then allowed to enter the harvest queue once they achieve the specified harvest criteria.

Operationally, once a LU/BEC enters mature seral deficit, the unit becomes closed to harvesting until the mature seral target is achieved regardless of whether there are merchantable and harvestable stands in the unit. This is primarily because there is currently no mechanism to identify and reserve from harvest an appropriate amount of area of the next oldest timber to meet the mature seral target.

The conclusion is that elimination of the mature seral constraint does not provide any significant midterm harvest opportunity to enhance the forecast midterm AAC. However, the current operational management of mature seral will negatively impact the achievement of the forecast timber availability in the midterm period. Effort should be put towards the development of policy or legislation that would allow for the identification and protection of stands to achieve the mature seral targets in those LU/BECs where there is a mature seral deficit projected.



## **OBJECTIVE OF THIS DOCUMENT**

This document provides an overview of various opportunities for mitigating the forecasted mid-term timber supply shortfall in the Quesnel timber supply area (TSA) and explores the timber and non-timber implications related to these opportunities. The document was prepared for the Provincial Midterm Timber Supply Oversight Committee by the Quesnel TSA Technical Working Group as part of the Midterm Timber Supply Project.

## **BACKGROUND**

The recent Timber Supply Review (TSR<sub>4</sub>) set the current allowable annual cut (AAC) for the Quesnel TSA at 4,000,000 cubic metres, of which a maximum of 650,000 cubic metres can be attributed to non-pine coniferous volume. The most recent timber supply projection, completed for this project, shows the harvest level dropping to about 1,150,000 cubic metres per year by 2023 and remaining at that level for 46 years as a result of the mountain pine beetle (MPB) epidemic (Appendix 1). This midterm AAC is an improvement over that projected during TSR<sub>4</sub>, where the midterm was forecast at 720,000 cubic metres, and is a result of updating modeling assumptions used during the TSR<sub>4</sub> process.

A strategy was adopted as part of a MPB control initiative to salvage as much MPB impacted pine as possible while limiting harvest of non-pine to reduce the impact of the MPB salvage actions on the mid-term timber supply. Key to this was constraining the Non-replaceable Forest Licenses (NRFL) issued after the AAC uplifts to stands with at least 70% pine content and having at least 30 % MPB infestation. Another key element of the strategy included a commitment from replaceable license holders to focus harvesting on the salvage of MPB impacted pine. This strategy is considered successful; pine volume salvaged, as a percentage of total volume billed, averaged 81.7% over the ten year period from 2001 to 2010 (source: Harvest Billing System).

Harvest continues to focus on MPB impacted pine, but the harvest will transition to lower levels over the next decade as the MPB impacted pine is either harvested or deteriorates beyond economic value before being salvaged. Significant economic and social repercussions are expected during the transition to a lower AAC, especially compared to the current AAC, the previous uplifted harvest levels, or the pre-MPB AAC. Forest Analysis and Inventory Branch (FAIB) completed a timber supply analysis in 2010 to identify potential opportunities to increase the AAC in the midterm. This analysis revealed potential for decreasing the impacts through the review and modification of the following factors:

- Forest sector management practices and administration: regeneration/reforestation, fertilization, stand merchantability/economics and operating areas;
- Deferral or relaxation of objectives for other forest values: visual quality objectives, wildlife/fish habitat, and biodiversity.

A timber availability analysis was completed to identify potential options to improve the midterm timber availability and examine the effects on non-timber values. This analysis was reviewed by the Quesnel TSA Midterm Timber Supply Technical Working Group (Working Group) and by major licensees operating in the TSA. Following the joint review, the Working Group selected opportunities that have potential to mitigate mid-term timber supply impact and outlined the implications of these opportunities. These are discussed in the following opportunities sections.

## **GENERAL DISCUSSION**

In addition to the practice requirements of *Forest and Range Practices Act* (FRPA), the Quesnel TSA is subject to the Cariboo Chilcotin Land Use Plan (CCLUP), designated as a Higher Level Plan (HLP), a Land Use Objectives Order (LUO) and many Government Actions Regulation (GAR) orders. This hierarchy of plans and orders either removes land from the Timber Harvesting Land Base (THLB) or limits access to timber through time. These reductions in THLB and timber access limitations were reflected in the most recent TSR<sub>4</sub>.

As described above, these values/exclusions present two types of harvest constraints. The first type of constraint results from areas removed from the THLB that are unavailable for harvest (e.g. riparian reserve zones, Old Growth Management Areas (OGMA), Wildlife Habitat Area (WHA) no-harvest areas). Areas associated with the second type of constraint are within the THLB and have defined disturbance percentages which restrict the rate of harvest as compared to the unconstrained THLB (e.g. riparian management zones, Visual Quality Objectives (VQO), WHA modified harvest zones, Mule Deer Winter Range (MDWR) areas).

The initial timber availability analysis collated the areas and timber volumes associated with six different spatially explicit non-timber values/exclusions (riparian management, low sites, OGMA, visual objectives, caribou WHA and MDWR). Riparian reserve and management zones were difficult to assess due to the nature of the spatial data. Assessment of the riparian value impact was limited to a minimum resolution of one hectare, which over estimated the area influenced by riparian management. Removal of riparian zones from the assessed values improved the accuracy of the remaining output. This output was then assigned to three geographic hauling zones; East, Six-Hour (cycle time) and West, which are depicted in Figure 1 below.

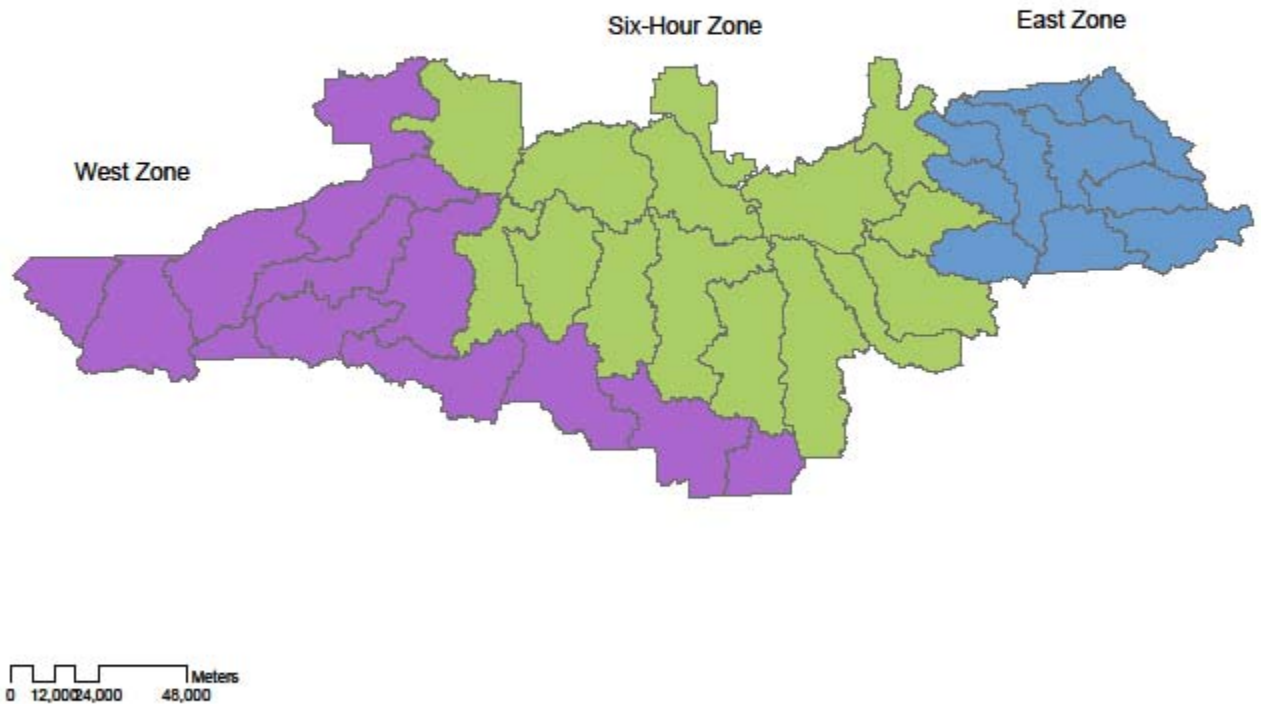
A joint licensee/Working Group review of the initial analysis output concluded that some identified values were considered infeasible for further investigation; these included riparian reserve and management zones, some permanent OGMAs and Caribou WHA areas. Specific values were identified that required additional analysis to identify potential opportunities to enhance timber access while limiting impacts on non-timber values, including OGMAs, VQOs, MDWR areas, Wildlife Tree Patches and Conservation Legacy Areas for stand-level biodiversity (WTP and CLA) and mature seral objectives. Low site exclusions were also identified as a factor that should be assessed for potential harvest opportunity.

The concept of overlapping non-timber values was used during the implementation of the CCLUP in an effort to reduce impacts on timber availability and achieve the timber targets envisioned in the HLP. The analysis results presented in Appendix 2 reveal the level of overlap achieved. TSR<sub>4</sub> calculated the Forest Management Land Base (FMLB) for the Quesnel TSA at 1,400,013 hectares. Appendix 2 also shows that 1,003,839 hectares are unconstrained by any of the assessed values that would result in an exclusion or restricted harvest rate. An additional 351,392 hectares are constrained by a single assessed value and these hectares are the easiest to evaluate when identifying opportunities to enhance the midterm timber availability. The analysis also determined that 42,766 hectares are impacted by two overlapped values, 2,103 hectares by three overlapped values and 3 hectares by four overlapped values.

While overlapping was a useful strategy to balance competing land use objectives, it complicates the assessment of options for improving timber availability, as turning off one value simply leaves another in its place. Another complication is the fact that some values have more than one category with varying levels of impact on timber access (e.g. different VQO objectives). These categories are also presented in Appendix 2 where each value, and its timber volume impact, is presented in more detail.

FIGURE 1: QUESNEL TSA GEOGRAPHIC ANALYSIS ZONES

## Quesnel TSA Hauling Zones



### ***DISCUSSION OF OPPORTUNITIES***

The midterm period is projected to start in 2023 and anticipated to last about 46 years in the Quesnel TSA, during which harvesting will be entirely dependent on existing non-pine stands, advanced pine plantations, and some pine stands that survived the MPB infestation. Annual harvest levels are expected to stabilize at about the 1,150,000 cubic metres for most of the midterm period (Appendix 1). This harvest level is significantly lower than the current AAC of 4,000,000 cubic metres per year and is also significantly lower than the pre MPB sustainable harvest level of 2,230,000 cubic metres per year forecast in TSR1. The long term harvest level is projected at about 1,980,000 cubic metres, starting in the year 2069. This lower long term harvest level is a result of the MPB pine cohort cycling through future rotations. Considerable effort is required to smooth out the growing stock to a sustainable level, and it may never be fully achieved.

Due to the nature of the existing forest inventory, it is possible that modifying management requirements for non-timber values, changing administrative controls, extending the salvage window or enhancing the economic access to timber could improve the near midterm timber availability thus delaying the harvest of green timber into the future and effectively pulling up the timber availability in the middle and latter part of the midterm. This “water bed” effect could increase the mid-term harvest level or reduce the period of lower timber availability. This potential effect is confirmed by timber supply analysis results that show the growing stock starting to recover in the year 2039, and continuing to improve through the projection midterm period (Appendix 3). Any improvement in timber availability at the front end of the midterm would ripple into the future and improve timber availability over the entire midterm period.

The ability to capture this “waterbed” effect is influenced by the shelf life of the MPB impacted pine and the level of pine in the areas managed for non-timber values. Lengthening the shelf life of the MPB impacted pine or extending the salvage period improves the midterm timber availability by extending the salvage period and delaying the transition into the non-pine volume supporting the midterm harvest. Conversely, shortening the shelf life or curtailing the salvage early reduces the midterm timber availability. This relationship is accentuated as the level of pine in the non-timber value areas increases.

### ***SOCIOECONOMIC IMPLICATIONS<sup>3</sup>***

The implication of changes in the allowable annual cut for local communities is an important consideration in any timber supply evaluation. The Quesnel TSA includes the City of Quesnel and the communities of Quesnel Indian Reserve(IR) 1, Wells, Kersley, the Nazko IR, Red Bluff, Barlow Creek, and the Bouchie Lake, Kluskus, Euchiniko and Alexandria IR's.

In 2009, the population of the Quesnel District was about 23,584 people – a decrease of about 5% from 2000. The largest community within the district is the City of Quesnel where 41% or about 9,700 of the total district population reside, indicating a relatively high rural population in the district.

BCStatistics estimates that the population of the Quesnel District will increase by a modest 2% by the year 2020. Census data provides the most recent picture of the Quesnel District labour force. In 2006, the total number of people in the labour force was 11,450 – a decline of about 8% from 2001. The total labour force in the City of Quesnel declined from 5,170 in 2001 to 4,865 in 2006 - a net loss of 305 workers from the area.

In terms of economic activity, the Quesnel District is the third most forestry dependent district in British Columbia with forestry supporting 48 percent of employment. The Quesnel District labour force is supported by the Quesnel TSA, Tree Farm License (TFL) 52 and other forestry activity supported by woodlots and private forest land. In 2006, the number of people employed in the forest sector in the Quesnel District was about 3,130, reflecting a decline of about 6% since 2001. Since 2006 the labour force may initially have continued its rise to meet the demand of the accelerated harvest of pine stands, but the economic recession has likely returned the active labour force to at most 2006 levels.

Between 2005 and 2009, harvest levels in the Quesnel District averaged about 4.9 million cubic metres per year (including harvests from TFL 52, the Quesnel TSA, woodlots and private sources). The 2005-2009 five year average harvest included about 1.7 million cubic metres per year incremental harvest volume over historical non-uplift levels, but was still 20% below the total 6,150,000 cubic metres per year AAC available and administered by the Quesnel District for the period.

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<sup>3</sup> This section was taken from the socioeconomic analysis prepared by Product Innovation and Climate Change Branch of the Ministry of Forests, Lands and Natural Resource Operations for TSR4.

**TABLE 1: QUESNEL FOREST DISTRICT TIMBER HARVEST, BY MANAGEMENT UNIT, IN CUBIC METRES, 2005-2009.**

	2005	2006	2007	2008	2009 <sup>1</sup>	2005-09 average
Quesnel TSA	3,820,633	3,664,959	3,680,964	4,303,935	3,407,070	3,775,512
TFL West Fraser	1,125,983	866,120	1,046,020	958,358	897,710	978,838
Woodlots	298,055	102,027	95,442	33,103	20,092	109,744
Private	96,348	39,071	34,113	43,464	19,169	46,433
Quesnel Forest District	5,341,019	4,672,177	4,856,539	5,338,860	4,344,040	4,910,527

1. Harvest figures for 2009 are preliminary estimates.

Source: Revenue Branch, BC Ministry of Forests and Range.

The Quesnel District has a large processing sector with four lumber mills, two pulp mills, a veneer/plywood plant, panel (MDF), log home and pellet mills. The TSA provides about 75% of the round wood processed at local solid wood mills, thus is the most significant source of timber. The remainder comes from TFL52 and a small portion from the adjacent Prince George TSA. Both of these management units are also affected by the MPB. The chips produced at the solid wood mills can supply about 60% of the needs of both pulp mills located in Quesnel. Throughout 2008 and 2009, processing activity in Quesnel has been subject to various temporary and long-term mill closures. Table 2 shows the potential employment implications associated with different levels of timber availability

**TABLE 2: QUESNEL TSA POTENTIAL EMPLOYMENT IMPACTS ASSOCIATED WITH THE TIMBER SUPPLY FORECASTS.**

Forestry sub-sector	Pre-2004 AAC	5-year avg. harvest 05-09	Current AAC	TSR 4 Midterm	Revised Midterm
Timber supply volume (cubic metres)	3,248,000	3,767,289	4,000,000	720,177	1,150,000
Employment (person years)					
Harvesting and silviculture	537	622	661	119	190
Processing	1,328	1,541	1,635	295	470
Direct employment in the Quesnel TSA	1,865	2,163	2,296	414	660
Direct impacts outside Quesnel TSA	127	147	156	28	45
Total direct impacts in BC (TSA plus non-TSA)	1,992	2,310	2,452	442	705
Indirect and induced impacts	1,170	1,357	1,441	259	414
Total direct, indirect and induced impacts	3,162	3,667	3,893	701	1,119

Based on the existing forest sector structure of solid wood and pulp production, unless other economic sources of timber are available once the pine is no longer available, the Quesnel economy will be significantly challenged. Other forest related opportunities may provide alternative economic activity, such as the bio-resource sector through the use of salvage and decayed timber. At this time it is difficult to predict whether or not this will occur.

The City of Quesnel relies on local forestry-related mills for about 66 percent of its municipal tax base. The potential for further mill closures increases the risk that the sector will no longer maintain this historical role in supporting the tax base.

### **NON-TIMBER VALUE IMPLICATIONS**

Apart from the *Forest and Range Practices Act* (FRPA) requirements, land use values in the Quesnel TSA are derived from the CCLUP, established as a higher level plan through a legal order under the Forest Practices Code in January, 1996. This declaration made the CCLUP zones, objectives, targets and strategies legal requirements as they applied to operational forestry planning. Since then, extensive planning was done at the sub-regional level (SRMPs) to further

refine and map the various land use values in consultation with interest groups and First Nations. The CCLUP remains in force under the Forest and Range Practices Act. It has been supplemented by numerous legal objectives for tourism, recreation, and conservation (fish, wildlife and biodiversity) under the Land Use Objectives Regulation and the Government Actions Regulation. Any significant change to these legal objectives requires full consultation with stakeholders and First Nations before amendments can be made.

The legal land use objectives represent a careful balance among all the interests in the region. Assessments were done with respect to the complete package of values and reflect foremost, the achievement of targets across the region. As a result, changes in one place can affect the achievement of targets overall. Many of the LUP values were mapped and, as noted above, achievement of the CCLUP timber target required non-timber values be overlapped where-ever possible. This is especially true for OGMAs. As a result of the overlapping, removal or relaxation of one LU value may not provide much timber benefit because the underlying value would still apply. Changing land use values may also affect embedded site specific environmental and FN cultural values, many of which are not documented.

The targets for non-timber values represent a reduction in historic levels of habitat because the land use plan involved trade-offs to reach a social balance. As an example, the biodiversity targets for retention of old and mature forest represent only a portion of the estimated old and mature forest that existed on the land prior to industrial development.

MPB has further affected forest condition in pine stands for both the constrained and unconstrained land base. Impacts to non-timber values from pine mortality vary by stand type, understory condition, LU value, and mortality level. Nevertheless, ecological values do remain in these MPB impacted stands, including residual green trees, intact understory soils and shrubs, snags and coarse woody debris. Retention of original stands, including dead trees, can be important for conservation values like biodiversity and some wildlife species, especially in a landscape that is increasingly moving towards greater fibre utilization and a more managed forest estate.

Many of the values managed under the CCLUP are used as surrogates for management of species of interest or at risk. From a wildlife habitat standpoint, both the MPB epidemic and the accelerated salvage harvest have impacted habitat supply. A recent habitat supply analysis<sup>4</sup> of the Quesnel TSA provides insight into these impacts.

This report concluded that MPB has a partial (but often significant) effect on forest canopies, a full restoration of canopies over the long term, a delayed and partial expression of early seral characteristics and large amounts of retained dead wood attributes. Harvesting produces much different stand recovery dynamics in that the forest canopies are fully removed, seral stage reverts immediately and fully to early seral characteristics, most dead wood attributes from the original stand are removed (particularly snags, which are removed for worker safety), and there is a more realistic and gradual progression through stand structural stages than within un-salvaged MPB stands.

The following two conclusions from the report provide some insight to forest managers trying to understand and manage the habitat implications of salvage harvesting vs. allowing nature to take its course.

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<sup>4</sup> McNay, R.S., V. Brumovsky, M. Fenger, J. Voller, R. Sulyma, R.K. McCann, and M. Snively. 2011. Multi-species habitat supply in the Quesnel Timber Supply Area, British Columbia: Appendices. Wildlife Infometrics Inc. Report No. 372b. Wildlife Infometrics Inc., Mackenzie, British Columbia, Canada.

In general, rates of changes in habitat supply through time are different for the two major impacts of MPB and harvesting and in as much as this is realistic it may provide managers with management options for habitat supply. A focus on individual habitat elements may be best replaced with a focus on maintaining the full suite of variability in habitat elements across the landscape and through time. The MPB outbreak, however, itself demonstrates that maintaining such variability over space and time may be difficult.

An understanding of which species have benefited from the MPB outbreak and those that have suffered detrimental impacts is of fundamental importance to managers. Future targets for valued species can not generally be derived from their current status if MPB has proven to be beneficial or detrimental to them, but the direction that management should take, relative to current conditions, to approach a desired target that is sustainable over the long term can be determined. Determining long-term sustainable targets and the means to obtain them can be difficult. As in many cases where a need for management arises, it is in response to observed system changes that in themselves preclude the ability to obtain true base line conditions.

### **MAXIMUM TIMBER OPPORTUNITY**

The maximum increase in timber availability is realized by turning off all the selected values that limit the rate of harvest or exclude areas from the THLB. Table 3 presents the timber potential if all the selected values were eliminated. The volumes presented indicate the timber availability potential that would be unconstrained by rate of cut controls or area exclusions.

**TABLE 3: MAXIMUM AVAILABLE TIMBER POTENTIAL**

<b>Non Timber Value or Excluded Area</b>	<b>Pine Volume (m<sup>3</sup>) and % of Total Volume</b>	<b>Total Volume (m<sup>3</sup>)</b>
Old Growth Management Areas	12,322,591 (61%)	20,126,230
Visual Quality Objectives	6,529,503 (54%)	11,989,811
Caribou Habitat	3,347,507 (38%)	8,853,670
Mule Deer Winter Range	1,271,203 (36%)	3,521,961
Low Site Exclusion <sup>5</sup>	868,170 (17%)	5,047,795
<b>Totals</b>	<b>24,338,974 (49%)</b>	<b>49,539,467</b>

<sup>5</sup> Low site is not a constraint but a land removal reflecting current management practice. Including low sites in Table 3 provides the harvest potentially available should these areas be included in the THLB.

For clarity, it should be noted that;

- There are categories within the OGMA, VQO, Caribou and Mule deer values that are currently available for harvest, but are impacted by rate of cut conditions that force timber access into the future. This limits the ability to salvage harvest this volume of MPB impacted timber before the shelf life expires. These MPB impacted pine volumes appear as Non-Recoverable Losses (NRL) in the TSR analysis.
- There is already a significant projected level of NRL in the current analysis, and improving timber access in areas constrained for other values simply moves the NRL volume to some other area in the THLB unless the shelf life period and salvage window are extended.
- The potential volume list in Table 3 includes overlap between the values that results in some level of unquantified inflation in the actual maximum volume that would be realized if all value constraints were removed. An understanding of the impact of this overlap on the volumes is gained by reviewing the details presented in Appendix 2 for each of the values. Further analysis is required to accurately determine the timber availability should all these values be removed.

Table 3 reveals that pine comprises 49 % of the total volume available in these non-timber value areas and this volume would only be available for as long as the economic shelf life period. The remaining 25,200,493 m<sup>3</sup> would provide a potential AAC increase of 547,836 m<sup>3</sup> over the midterm period of 46 years. Accessing these areas ten years earlier (i.e., in 2013 rather than 2023) would result in a potential AAC increase of 450,008 m<sup>3</sup> during a midterm period of 56 years.

### ***FEASIBLE OPPORTUNITIES ASSOCIATED WITH NON-TIMBER VALUES***

The following sections focus on the opportunities supported by local licensees on those areas where there is single non-timber value impacting timber availability. These are viewed as being feasible to implement and provide improved timber access while limiting the environmental impacts to that value alone. Each section provides a detailed description of the value, the potential timber opportunity, the possible implications of implementation and the potential policy or legislation changes required for implementation.

Incremental gains in timber availability are possible by selection of areas where more than one value is constraining timber access, and removing all the values impacting timber availability in these areas. This course of action is not investigated in detail in this report.

### ***LANDSCAPE-LEVEL BIODIVERSITY OBJECTIVES***

Landscape-level biodiversity is represented at each landscape unit/biogeoclimatic subzone (LU/BEC) combination by targets for Old and Mature+Old seral forest conditions. Old targets are represented on the land by spatially identified OGMA areas. The Mature+Old target is represented by the combination of the spatial OGMA areas and an aspatial assessment of the mature forest component for each LU/BEC unit.

There are three categories of OGMAs established to meet the CCLUP biodiversity objective. Permanent OGMA-static (OGMA<sub>p</sub>) areas are spatially located in LU/BECs to capture the best possible locations for this old target. Transitional OGMA (OGMA<sub>t</sub>) areas are established to achieve the actual old target in those LU/BECs where some of the OGMA<sub>p</sub> areas have not yet reached an old condition. These OGMA<sub>t</sub> areas are anticipated to return to the THLB when the OGMA<sub>p</sub> attain the appropriate age, or within 20 years of the effective date of the LUO. The third category is Permanent OGMA-rotational (OGMA<sub>r</sub>) areas that are predominantly pine and can be harvested under the conditions specified in the LUO.



The mature seral objective is aspatially managed through monitoring of the amount of mature seral area in the LU/BEC units. Harvesting opportunities become restricted when the mature seral target is in deficit.

### ***ALTERATION OF OLD SERAL OBJECTIVES***

The targeted relaxation of some old seral values is supported by the local licensees as an opportunity to improve timber access during the midterm period, especially in those LU/BEC areas within the Enhanced Resource Development Zone (ERDZ) and the Integrated Resource Development Zone (IRDZ) established under the CCLUP. The analysis results in Appendix 4 present the OGMA coverage for these two CCLUP zones by OGMA category.

The ERDZ covers an extensive area of the Quesnel TSA, encompassing the majority of the East and Six-Hour analysis zones used in this technical analysis. The ERDZ contains a total of 79,737 hectares where OGMA is the single timber constraint, representing 15,970,991 m<sup>3</sup> of timber, of which 10,843,350 m<sup>3</sup> (68%) is pine. The remaining non-pine volume of 5,127,641 m<sup>3</sup> would contribute an additional 111,470 m<sup>3</sup> to the AAC in projected midterm period. OGMA areas cover 15,606 hectares and contain 2,813,308 m<sup>3</sup> of timber, of which 1,879,883 m<sup>3</sup> (67%) is pine. The remaining non-pine volume of 933,425 m<sup>3</sup> would contribute an additional 20,292 m<sup>3</sup> to the AAC in projected midterm period. The combined midterm AAC improvement is 131,762 m<sup>3</sup>. Extending the midterm period by ten years would lower this AAC contribution to 108,233 m<sup>3</sup>.

The IRDZ, which has a fairly small footprint in the western portion of the Quesnel TSA, contains a total of 106 hectares of OGMA, representing 22,586 m<sup>3</sup> of timber, all of which is pine in OGMA areas. There is no non-pine contribution of volume to the AAC in projected midterm period.

#### *Implications to timber availability:*

- The timber availability improvement would depend on the number and size of the targeted OGMAs selected for cancellation or amendment.
- Location of increased timber supply would be within the ERDZ and IRDZ zones of the CCLUP.
- Targeted deletion of OGMAs in the ERDZ and IRDZ would primarily contribute pine to the salvage period ending in 2023. There would be some minor contribution of timber to the midterm period, depending on the number of OGMAs targeted for deletion.
- The time period of increased timber supply availability would be primarily for the salvage window, although there is a small contribution for the midterm period of 2023 to 2069.
- The increased timber supply would primarily be within the Six-Hour and East analysis zones that have more favorable harvest economics.

#### *Implication to non-timber resources/values (i.e., recreation, visual quality, wildlife, old growth, etc.):*

- Spatial OGMAs are a key strategy in achieving the landscape-level biodiversity objectives of the CCLUP and provide support for other ecological and management objectives, including old seral, wildlife habitat, and refugia for old seral obligate species not otherwise managed for.
- There are also embedded environmental, botanical and cultural values for First Nations, the number and location of which are not fully known.
- The proposal is to target specific OGMAs for relaxation of the timber constraint. The impact or degree of change would depend upon the location and number of OGMAs targeted.
- The time period anticipated is from the present through the midterm period of 2023 to 2069

*Implications to administrative changes required:*

- Amendments to the Land Use Order would be required under the *Land Act* to cancel or amend the targeted OGMA's.
- These amendments would require consultation with the public and with First Nations.
- Changes would require government resources and are expected to take at least 9 months to complete once started.

*Implications to work with external experts:*

- The Biodiversity Strategy Committee must be engaged to ensure impacts to the landscape-level biodiversity objectives are minimized to maintain old seral habitat values as much as possible.
- The local licensees believe that restructuring of the Landscape Unit sizes and boundaries may ease the impacts on the CCLUP landscape-level biodiversity targets. However, this was not assessed during this phase of the analysis and would require additional analysis by subject experts to support or refute this belief.

*Summary of stakeholder reactions:*

- The local licensees support a review of the old seral objectives to improve timber access and rebalance the CCLUP targets.

## **MANAGEMENT OF THE MATURE SERAL OBJECTIVES**

The local licensees believe that the mature seral objectives for each LU/BEC unit are a significant limitation on timber access with the Quesnel TSA. The analysis indicates that six of the major TSA LU/BEC combinations are currently in a mature seral deficit. However, removing the mature seral constraint has little impact on timber availability as the seral constraints only affected the timing and location of the harvest.

The current modeling harvest priority is to harvest the highest volume MPB impacted stands first. This focuses the salvage harvest in the high volume stands in the east and six hour zones, before moving into the west zone. The harvest performance of the past, and the recently established AAC level, are too low to capture all the MPB impacted pine before its shelf life expires and this volume appears as NRL. The recent TSR<sub>4</sub> mitigation scenario, selected as a base case for the AAC determination, projected the NRL for MPB impacts at 2,144,805 m<sup>3</sup> for non-pine leading stands and 25,705,614 m<sup>3</sup> for pine leading stands (Appendix 6). Removing the mature seral objective results in an additional 1.6 million cubic metres of pine available for harvest in year 2014, but this volume has been dead for almost 20 years and would become NRL quickly if not harvested.

Further discussions revealed a difference between the way mature seral is modeled for TSR and how it is managed operationally. The model follows current direction described in the CCLUP Biodiversity Conservation Committee (BCC) Updates by determining the mature seral deficit and reserving this amount of area from the next oldest stands in the LU/BEC. Other stands are then allowed to enter the harvest queue once they achieve the specified harvest criteria.

Operational management of mature seral is quite different. Once a LU/BEC enters mature seral deficit, the unit becomes closed to harvesting until the mature seral target is achieved regardless of whether there are merchantable and harvestable stands in the unit. This is primarily because there are multiple licensees exercising their volume-based licenses on the area and there is currently no mechanism to identify and

reserve from harvest an appropriate amount of area of the next oldest timber to meet the mature seral target.

The conclusion is that elimination of the mature seral constraint does not provide any significant midterm harvest opportunity to enhance the forecast midterm AAC. However, the analysis did reveal that current operational management of mature seral will negatively impact the achievement of the forecast timber availability in the midterm period. Effort should be put towards the development of policy or legislation that would allow for the identification and protection of stands to achieve the mature seral targets in those LU/BECs where there is a mature seral deficit projected.

*Implications to timber availability:*

- Alignment of operation management with the BCC Updates for mature seral management provides marginally improved timber access across the midterm period.
- Overall timber availability is only marginally improved in the short term, as the seral constraint only affected the timing and location of the harvest. There would be additional opportunity to salvage pine in non-pine leading stands once the mature seral retention is identified, and this may improve the recovery of pine that would be destined for NRL status.

*Implication to non-timber resources/values (i.e., recreation, visual quality, wildlife, old growth, etc.):*

- There is no implication to non-timber values as the recommended action is to align operational management of mature seral with the current direction in the BCC Updates.

*Implications to administrative changes required:*

- Amendments to the Land Use Order may be required under the *Land Act* to provide for the identification and designation of mature seral reserves in those LU/BEC units in mature seral deficit at the end of the salvage period.
- This amendment would require consultation with the public and with First Nations.
- Changes would require government resources and are expected to take at least 9 months to complete once started.

*Implications to work with external experts:*

- None envisioned.

*Summary of stakeholder reactions:*

- This action is recommended by the forest industry.

## **ALTERATION OF VQO'S**

Changes to VQO requirements have the potential to increase short term to midterm timber availability by removing constraints to the rate of harvest in these areas. The Modification VQO polygons contain 18,448 m<sup>3</sup> in the east zone, 1,027,594 m<sup>3</sup> in the six hour zone and 609,090 m<sup>3</sup> in the west zone. Under the current land use assumptions, 20.5% of this volume (339,302 m<sup>3</sup>) is currently available in the short to midterm. Elimination of the Modification VQO would increase the timber availability by 1,315,830 m<sup>3</sup>.

The Partial Retention VQO polygons contain 937,304 m<sup>3</sup> in the east zone, 1,981,847 m<sup>3</sup> in the six hour zone and 1,728,399 m<sup>3</sup> in the west zone. Under the current land use assumptions, 10.1% of this volume (469,942 m<sup>3</sup>) is currently available in the short to midterm. Elimination of the Partial Retention VQO would increase the timber availability by 4,178,147 m<sup>3</sup>.

The combined total increase is 5,493,977 m<sup>3</sup> for this option. However approximately 2,934,164 m<sup>3</sup> (53.4%) of this volume is pine and there is a shelf life limit on how long this timber would remain economically viable.

The licensees also suggested changing the Retention VQO classification to Partial Retention VQO. This would improve access to these VQO areas from 1.9% to 10.1%, providing an additional 206,912 m<sup>3</sup> of timber for harvest in the near midterm period, of which an estimated 146,445 m<sup>3</sup> (70%) is pine.

The overall improvement in timber availability from these changes is 5,700,889 m<sup>3</sup> of which an estimated 3,080,609 m<sup>3</sup> (54%) is pine volume that would only be available for as long as the economic shelf life period. The remaining non-pine volume of 2,620,280 m<sup>3</sup> would contribute an additional 56,927 m<sup>3</sup> to the AAC in projected midterm period. Extending the midterm period by ten years would lower this AAC contribution to 46,791 m<sup>3</sup>.

Another alternative is to suspend the VQO designation for Retention, Partial Retention, and Modification VQO to allow for continued salvage of pine leading stands within these areas. Once this salvage is completed, the VQO would be reinstated to allow for the objective to be achieved in the future. This alternative was not assessed in detail and requires further analysis to determine the timber availability improvement. This alternative is not expected to improve the midterm timber availability, but would allow for increased salvage of pine closer to the processing centre. It is not expected to change the NRL appreciably, but could shift the location of NRL volume on the landscape.

*Implications to timber availability:*

- There are about 3.1 million cubic metres of pine and about 2.6 million cubic metres of non-pine in VQO areas where no other value is represented.
- VQO areas in all geographic zones would be targeted for harvest.
- All pine-leading stands in scenic areas in all geographic zones could be harvested immediately, given sufficient access, allowing the greatest amount of pine salvage as possible while it still holds economic value.
- All non-pine leading stands in scenic areas would be harvested during the early mid-term period.
- There is a midterm AAC improvement of between 46,791 m<sup>3</sup> and 56,927 m<sup>3</sup>.

*Implication to non-timber resources/values (i.e., recreation, visual quality, wildlife, old growth, etc.):*

- VQO areas would be reduced within the TSA.
- Visual management would shift from retention to partial retention, and from partial retention and modification to no management during the midterm period.
- Visual management is an important value to the tourism industry in BC, and there may be resistance from this sector. Tourism sector members have complained in the past over harvesting practices in visually sensitive areas.

*Implications to administrative changes required:*

- Amendments to the Land Use Order would be required under the *Land Act* to cancel or amend the VQOs.
- These amendments would require consultation with the public and with First Nations.

- Changes would require government resources and are expected to take at least 9 months to complete once started.

*Implications to work with external experts:*

- Work with tourism industry representatives would be necessary to assess the impact of relaxing VQO requirements on their revenues and client expectations.

### *Summary of stakeholder reactions:*

- This action is recommended by the forest industry.

### ***ALTERATION OF STAND-LEVEL BIODIVERSITY OBJECTIVES***

There are two stand-level biodiversity objectives modeled in TSR<sub>4</sub>. The first are wildlife tree patches (WTP), which are modeled at the LUO levels for each LU/BEC combination. The level varies from 0 to 11 %, with the majority of LU/BEC areas in the 7 to 8 % range.

The second is an assumption that additional stand-level retention will occur in the pine leading landscape following the Chief Forester's instruction to protect hydrological values when acceleration salvage harvesting is occurring. This additional retention was called Conservation Legacy Areas (CLA), and was assumed to remain in place for 30 years. This additional retention amounted to an average of 13% in the pine leading landscape. The analysis of the WTP and CLA impact on timber availability is presented in Appendix 5.

It is estimated that the removal of the stand-level biodiversity objectives would improve the timber availability by an average of 7 % in the non-pine leading areas, and by an average of 20 % in the pine leading areas impacted by the CLA requirement. This would provide a timber availability opportunity of 14,589,955 m<sup>3</sup> for the pine leading areas during the salvage period ending in 2023. Elimination of the WTP requirement in the midterm period would provide an additional 6,929,740 m<sup>3</sup> of timber or 150,646 m<sup>3</sup> of AAC.

### *Implications to timber availability:*

- Elimination of the stand-level biodiversity objectives would provide an additional 14.6 million m<sup>3</sup> of timber during the salvage window ending in 2023. This would allow an increase in the AAC of 1,326,330 m<sup>3</sup> to 5,326,330 m<sup>3</sup>. However harvest performance has never realized this level and the more likely result is a shifting of NRL volume location in the TSA.
- Elimination of the stand-level biodiversity objectives would provide an additional 6.9 million m<sup>3</sup> of timber during the midterm period from 2023 to 2069. This would allow an increase in the AAC of 150,646 m<sup>3</sup>.
- The increased timber supply would primarily be west of the Fraser River during the salvage period ending in 2023 and TSA wide during the midterm period of 2023 to 2069.

### *Implication to non-timber resources/values (i.e., recreation, visual quality, wildlife, old growth, etc.):*

- Stand-level biodiversity objectives are delivered through the establishment of WTPs and CLAs. WTPs also contribute to meeting the Old and Mature+Old requirements if they are larger than two hectares.
- Like OGMAs, WTPs and CLAs provide support for other ecological and management objectives.
- The impact and degree of change could be significant on heavily salvaged LU/BEC units, particularly if harvesting of existing WTPs and CLAs is allowed.
- The time period of impact is expected to be one rotation before WTP's are again prevalent on the landscape.
- Ecological and wildlife impacts are anticipated but unquantified at this time.

### *Implications to administrative changes required:*

- Amendments to the Land Use Order would be required under the *Land Act* to cancel or amend the Wildlife Tree Retention objectives.

- Changes to the Chief Forester *Guidance on Landscape- and Stand-level Structural Retention in Large-Scale Mountain Pine Beetle Salvage Operations* dated December 2005 would be required.
- These amendments would require consultation with the public and with First Nations.
- Changes would require government resources and are expected to take at least 9 months to complete once started.

*Implications to work with external experts:*

- The Biodiversity Strategy Committee must be engaged to ensure impacts to the stand-level biodiversity objectives are minimized to maintain desired habitat values as much as possible.

*Summary of stakeholder reactions:*

- The forest industry supports a review of some targeted reductions or a re-assessment of the stand-level biodiversity requirements.

***MULE DEER WINTER RANGE OBJECTIVES***

The local licensees believe that the current management strategy for MDWR is disproportionately constraining timber access in these areas. The licensees believe that there is an opportunity to enhance timber access while still achieving the MDWR objective of the CCLUP.

Local licensees wish to engage the local Mule Deer Management Committee to explore management options to improve timber access while being neutral or beneficial to Mule deer. The Mule Deer Management Committee should be encouraged to engage the licensees in an exploration of alternative Mule deer management strategies.

*Implications to timber availability:*

- The timber availability improvement is unquantified at this time and would be confirmed during further analysis once an alternative management strategy is developed.
- It is anticipated that the improved timber contribution would primarily be Douglas-fir available in the midterm period of 2023 to 2069.
- The timber contribution could extend into the long term period if the alternative management strategy is successful in achieving the Mule deer objectives specified in the CCLUP.

*Implication to non-timber resources/values (i.e., recreation, visual quality, wildlife, old growth, etc.):*

- The licensees believe that an alternative management strategy would be neutral to the management of Mule deer, and would achieve the Mule deer management objectives stated in the CCLUP.

*Implications to administrative changes required:*

- Amendments to the MDWR GAR orders would be required, depending on the selected management strategy.
- Changes would require government resources and are expected to take at least 9 months to complete once started.

*Implications to work with external experts:*

- The Mule Deer Strategy Committee must be engaged to ensure any alternate management strategies are considered neutral or positive to maintain MDWR habitat values.

*Summary of stakeholder reactions:*

- This action is recommended by the forest industry;
- It is anticipated that interest groups, such as the BC Wildlife Federation and the Guide/Outfitters of BC, would want to engage in this process should it move forward.

**LOW SITE INCLUSION**

The TSR<sub>4</sub> analysis removed some 38,344 hectares of land from the THLB because the site index was too low to produce a minimum required volume of timber within a set timeframe (150 m<sup>3</sup> in 150 years). The site index used for this exclusion was the Site Index Adjusted (SIA) value for the BEC site series, as opposed to the often lower inventory site index, in order to maximize the THLB for MPB salvage opportunity.

Inclusion of this land resulted in a harvest opportunity of 5,047,795 m<sup>3</sup>, of which 868,170 m<sup>3</sup> (17%) is pine. Low site is overlapped with some other value on 16,015 hectares, leaving some 22,329 hectares available for possible inclusion in to the THLB if there is an interest in assessing the harvest opportunities on these areas. This area has a total volume of 3,221,010 m<sup>3</sup>, of which 761,848 m<sup>3</sup> (23%) is pine. The remaining non-pine volume of 2,459,162 m<sup>3</sup> would contribute an additional 53,460 m<sup>3</sup> to the AAC in projected midterm period. Extending the midterm period by ten years would lower this AAC contribution to 43,913 m<sup>3</sup>.

*Implications to timber availability:*

- There are about 0.76 million cubic metres of pine and about 2.5 million cubic metres of non-pine in low site areas where no other value is represented.
- Low site areas in all geographic zones would be targeted for harvest.
- All pine-leading stands in low sites in all geographic zones could be harvested immediately, given sufficient access, allowing the greatest amount of pine salvage as possible while it still holds economic value.
- All non-pine leading stands in low sites would be harvested during the early mid-term period.
- There is a midterm AAC improvement of between 43,913 m<sup>3</sup> and 53,460 m<sup>3</sup>.

*Implication to non-timber resources/values (i.e., recreation, visual quality, wildlife, old growth, etc.):*

- No impacts to non-timber resources are anticipated by this action.

*Implications to administrative changes required:*

- No legal amendments or policy choices/changes are anticipated. These areas are currently available for harvest. There is simply a lack of current performance on these areas.
- No consultation requirements are anticipated, but engagement with First Nations is advised as these areas could overlap with potential pine mushroom sites that are utilized by First Nations.

*Implications to work with external experts:*

- Work is anticipated with local licensees to evaluate the economics of accessing these sites.



*Summary of stakeholder reactions:*

- There is limited support from license holders to pursue these low sites based on current mill infrastructure needs.

**OTHER OPPORTUNITIES**

**IMPROVED ACCESS TO EXISTING PINE STANDS IN THE WESTERN SUPPLY BLOCKS**

The recent TSR<sub>4</sub> mitigation scenario, selected as a base case for the AAC determination, projected the salvage opportunity window would extend for 14 years to 2013. As stated above, at the end of that period it projects the NRL for MPB impacts at 2,144,805 m<sup>3</sup> for non-pine leading stands and 25,705,614 m<sup>3</sup> for pine leading stands (Appendix 6).

However, licensees are expecting the salvage window to be considerably shorter than the analysis projections and emphasize that the lack of infrastructure in the western portion of the TSA is a limiting factor in realizing the modeled salvage period.

There is a significant volume of pine located in the western supply blocks of the Quesnel TSA. The area is poorly serviced by access structures and is a significant distance from the processing facilities. The timber is characterized by smaller diameters stands which have a lower impact by MPB and are projected to have a longer salvage opportunity window. This access constraint on timber availability has the potential to significantly reduce the pine salvage period, forcing an early shift into stands expected to support the midterm harvest.

It is critical for maintenance of the projected harvest levels in short term to early midterm period that solutions can be found to improve the economic access to these stands before the useable shelf life of the pine expires. Focusing harvesting efforts to salvage this timber would reduce the immediate harvest pressure on stands more suitable for supporting midterm harvest level. This timber access issue is a key component to achieving the forecast salvage levels and reducing the pressure on the midterm timber supply. The importance of this issue exceeds the influence of any other opportunities identified through changes to land use objectives. Failure to access the western supply blocks effectively reduces the size of the THLB, resulting in a significantly lower AAC across all forecast periods.

*Implications to timber availability:*

- Protect the projected midterm harvest levels by maintaining salvage levels for as long as possible.

*Implication to non-timber resources/values (i.e., recreation, visual quality, wildlife, old growth, etc.):*

- Enhancement of access structures will benefit resource management, exploration and extraction, improve the Crown's ability to manage wild fires in this area and improve public safety by providing alternative escape routes for remote communities.
- There is a potential impact to caribou habitat in the west of the TSA, depending on the location and nature of any access structures developed.

*Implications to administrative changes required:*

- Amendments to the Caribou WHA and GAR orders may be required, depending on the selected location for the main access structure.

- Changes would require government resources and are expected to take at least 9 months to complete once started.

*Implications to work with external experts:*

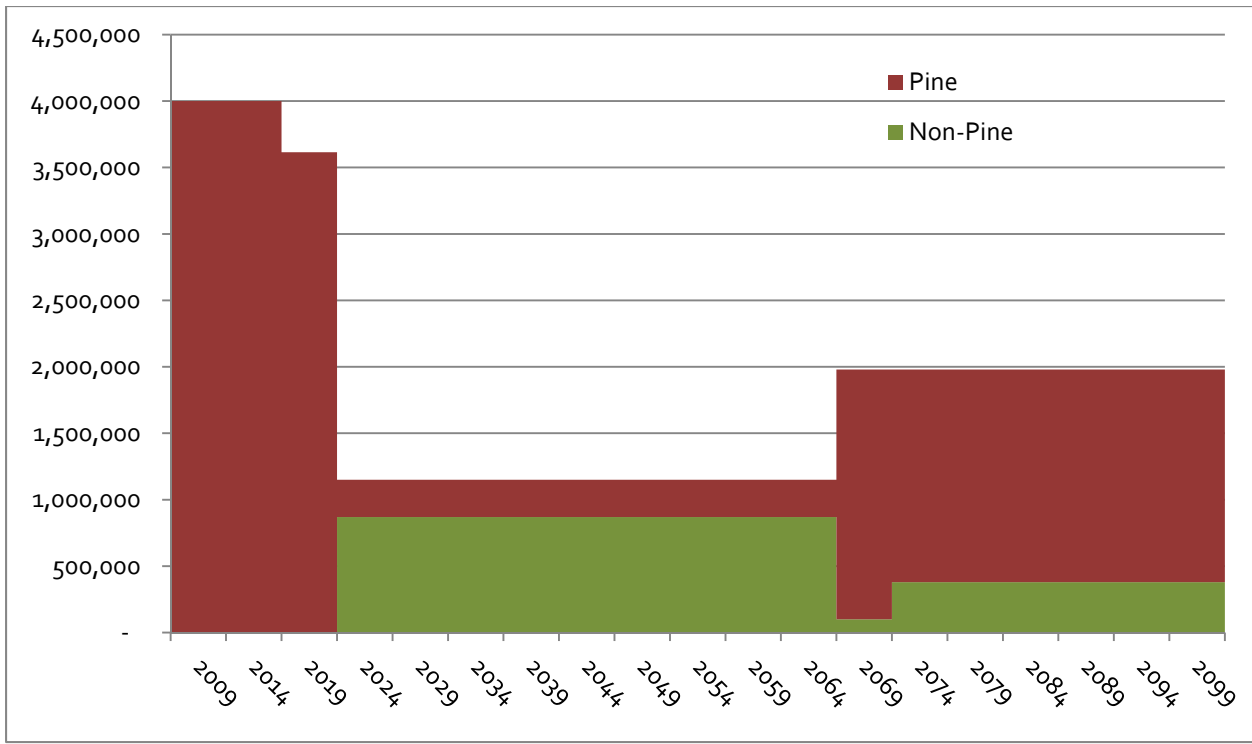
- The Caribou Strategy Committee must be engaged to ensure all resource access structures are located to best maintain caribou habitat values.

*Summary of stakeholder reactions:*

- There is varied support from stakeholders.
- The Caribou Strategy Committee has previously opposed major road construction within the Caribou WHA, or the development of a loop road connecting to the Anahim Lake road network.

**APPENDIX 1 - QUESNEL MID-TERM ANALYSIS BASE CASE**

<b>Base Case - April 14, 2011</b>				
		Cubic Metres	Cubic Metres	
<b>Year</b>	<b>Step</b>	<b>Non-Pine</b>	<b>Pine</b>	
2009	5	150	4,000,113	
2014	10	173	4,000,078	
2019	15	173	3,614,851	
2024	20	870,037	280,008	
2029	25	870,009	280,027	
2034	30	870,042	280,015	
2039	35	870,003	280,008	
2044	40	870,005	280,021	
2049	45	870,009	280,016	
2054	50	870,005	280,027	
2059	55	870,020	280,010	
2064	60	870,007	280,036	
2069	65	100,002	1,880,008	
2074	70	380,016	1,600,026	
2079	75	380,001	1,600,021	
2084	80	380,020	1,600,017	
2089	85	380,008	1,600,021	
2094	90	380,011	1,600,028	
2099	95	380,020	1,600,019	



**APPENDIX 2 – NON-TIMBER VALUES OVERLAP ANALYSIS**

Overlap	Haul Zone	Low Site	OGMA	Visual	Caribou	MDWR	FMLB AREA
0	east	0	0	0	0	0	95,625
0	sixhour	0	0	0	0	0	490,011
0	west	0	0	0	0	0	418,203
<b>0</b>							<b>1,003,839</b>

1	east	0	0	0	1	0	13,967
1	east	0	0	1	0	0	3,874
1	east	0	1	0	0	0	3,189
1	east	1	0	0	0	0	8,232
<b>1</b>	<b>east</b>						<b>29,262</b>

1	sixhour	0	0	0	0	1	28,846
1	sixhour	0	0	0	1	0	3,060
1	sixhour	0	0	1	0	0	34,076
1	sixhour	0	1	0	0	0	51,649
1	sixhour	1	0	0	0	0	1,549
<b>1</b>	<b>sixhour</b>						<b>119,180</b>

1	west	0	0	0	0	1	1,422
1	west	0	0	0	1	0	124,577
1	west	0	0	1	0	0	33,659
1	west	0	1	0	0	0	30,744
1	west	1	0	0	0	0	12,548
<b>1</b>	<b>west</b>						<b>202,950</b>

<b>1</b>							<b>351,392</b>
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2	east	0	0	1	1	0	909
2	east	0	1	0	1	0	399
2	east	0	1	1	0	0	39
2	east	1	0	0	1	0	4,148
2	east	1	0	1	0	0	30
2	east	1	1	0	0	0	157
<b>2</b>	<b>east</b>						<b>5,682</b>

2	sixhour	0	0	1	0	1	2,699
2	sixhour	0	0	1	1	0	321
2	sixhour	0	1	0	0	1	6,008
2	sixhour	0	1	0	1	0	278
2	sixhour	0	1	1	0	0	5,122
2	sixhour	1	0	0	0	1	201
2	sixhour	1	0	0	1	0	146
2	sixhour	1	0	1	0	0	91
2	sixhour	1	1	0	0	0	579
<b>2</b>	<b>sixhour</b>						<b>15,445</b>

2	west	0	0	1	0	1	166
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2	west	0	0	1	1	0	3,429
2	west	0	1	0	0	1	700
2	west	0	1	0	1	0	2,825
2	west	0	1	1	0	0	4,838
2	west	1	0	0	1	0	8,318
2	west	1	0	1	0	0	404
2	west	1	1	0	0	0	959
<b>2</b>	<b>west</b>						<b>21,639</b>
<b>2</b>							<b>42,766</b>

3	east	0	1	1	1	0	4
3	east	1	0	1	1	0	5
3	east	1	1	0	1	0	193
3	east	1	1	1	0	0	7
<b>3</b>	<b>east</b>						<b>209</b>
3	sixhour	0	1	1	0	1	1,014
3	sixhour	0	1	1	1	0	65
3	sixhour	1	0	1	1	0	27
3	sixhour	1	1	0	0	1	45
3	sixhour	1	1	1	0	0	114
<b>3</b>	<b>sixhour</b>						<b>1,265</b>
3	west	0	1	1	0	1	41
3	west	1	0	1	1	0	260
3	west	1	1	0	0	1	1
3	west	1	1	0	1	0	296
3	west	1	1	1	0	0	31
<b>3</b>	<b>west</b>						<b>629</b>
<b>3</b>							<b>2,103</b>

4	sixhour	1	1	1	1	0	3
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Appendix 2 – cont'd

Overlap	Haul Zone	OGMA	FMLB Area	Pine Vol (m <sup>3</sup> )	Total Vol (m <sup>3</sup> )
1	east	perm	1460	19,783	290,020
1	east	trans	1729	1,925	377,410
1	sixhour	perm	36355	4,275,563	8,053,694
1	sixhour	rot	6368	1,344,650	1,364,793
1	sixhour	trans	8926	850,755	1,639,940
1	west	perm	17576	2,520,658	3,049,957
1	west	rot	5269	906,259	914,003
1	west	trans	7899	1,122,691	1,383,952
2	east	perm	184	1,135	40,471
2	east	trans	411	242	84,033
2	sixhour	perm	8343	368,030	1,093,804
2	sixhour	rot	458	95,134	95,863
2	sixhour	trans	3186	195,583	550,662
2	west	perm	5112	208,186	405,256
2	west	rot	566	65,683	69,093
2	west	trans	3644	321,197	572,505
3	east	perm	74	653	14,018
3	east	trans	130	-	23,813
3	sixhour	perm	1032	17,656	37,708
3	sixhour	trans	206	3,109	31,067
3	west	perm	328	-	29,089
3	west	rot	25	3,096	3,096
3	west	trans	16	604	1,477
4	sixhour	perm	3	-	507
			109300	12,322,591	20,126,230

Appendix 2 – cont'd

Overlap	Haul Zone	VQO	FMLB	Pine Vol (m <sup>3</sup> )	Total Vol (m <sup>3</sup> )
1	east	M	93	5,830	18,448
1	east	P	3	217	933
1	east	PR	3202	116,456	937,304
1	east	R	576	21,621	169,117
1	sixhour	M	13565	651,984	1,027,594
1	sixhour	PR	14451	799,347	1,981,847
1	sixhour	R	6060	489,553	946,697
1	west	M	5614	527,902	609,090
1	west	P	5096	377,605	714,207
1	west	PR	11985	1,299,458	1,728,399
1	west	R	10964	1,084,757	1,407,510
2	east	M	24	2,445	4,538
2	east	PR	786	2,280	189,658
2	east	R	168	318	37,907
2	sixhour	M	1575	137,670	294,808
2	sixhour	PR	2536	224,653	522,587
2	sixhour	R	4122	228,914	467,562
2	west	M	513	54,746	74,482
2	west	P	712	57,073	96,908
2	west	PR	4813	124,601	258,629
2	west	R	2799	292,919	407,319
3	east	M	11	653	2,203
3	east	PR	3	-	558
3	east	R	2	-	339
3	sixhour	M	76	-	19,274
3	sixhour	PR	101	2,033	15,820
3	sixhour	R	1043	18,732	36,227
3	west	PR	260	4,033	11,232
3	west	R	72	3,700	8,106
4	sixhour	M	3	-	507
			91228	6,529,503	11,989,811



Appendix 2 – cont'd

<b>Overlap</b>	<b>Haul Zone</b>	<b>Caribou Zone</b>	<b>FMLB</b>	<b>Pine Vol (m<sup>3</sup>)</b>	<b>Total Vol (m<sup>3</sup>)</b>
1	east	MtnCarModHarv	4929	8,501	1,067,442
1	east	MtnCarNoHarv	9038	44,880	1,793,276
1	sixhour	MtnCarModHarv	785	-	148,304
1	sixhour	MtnCarNoHarv	2275	4,478	468,438
1	west	NorCarModHarv	78037	1,709,509	2,023,159
1	west	NorCarNoHarv	46540	1,418,806	1,432,838
2	east	MtnCarModHarv	2641	1,842	506,700
2	east	MtnCarNoHarv	2815	1,961	571,902
2	sixhour	MtnCarModHarv	376	7,464	78,429
2	sixhour	MtnCarNoHarv	369	489	79,944
2	west	NorCarModHarv	9320	87,718	396,599
2	west	NorCarNoHarv	5252	57,173	189,971
3	east	MtnCarModHarv	197	653	36,594
3	east	MtnCarNoHarv	5	-	923
3	sixhour	MtnCarModHarv	92	-	22,032
3	west	NorCarModHarv	487	383	32,594
3	west	NorCarNoHarv	69	3,650	4,017
4	sixhour	MtnCarModHarv	3	-	507
			163230	3,347,507	8,853,670

Appendix 2 – cont'd

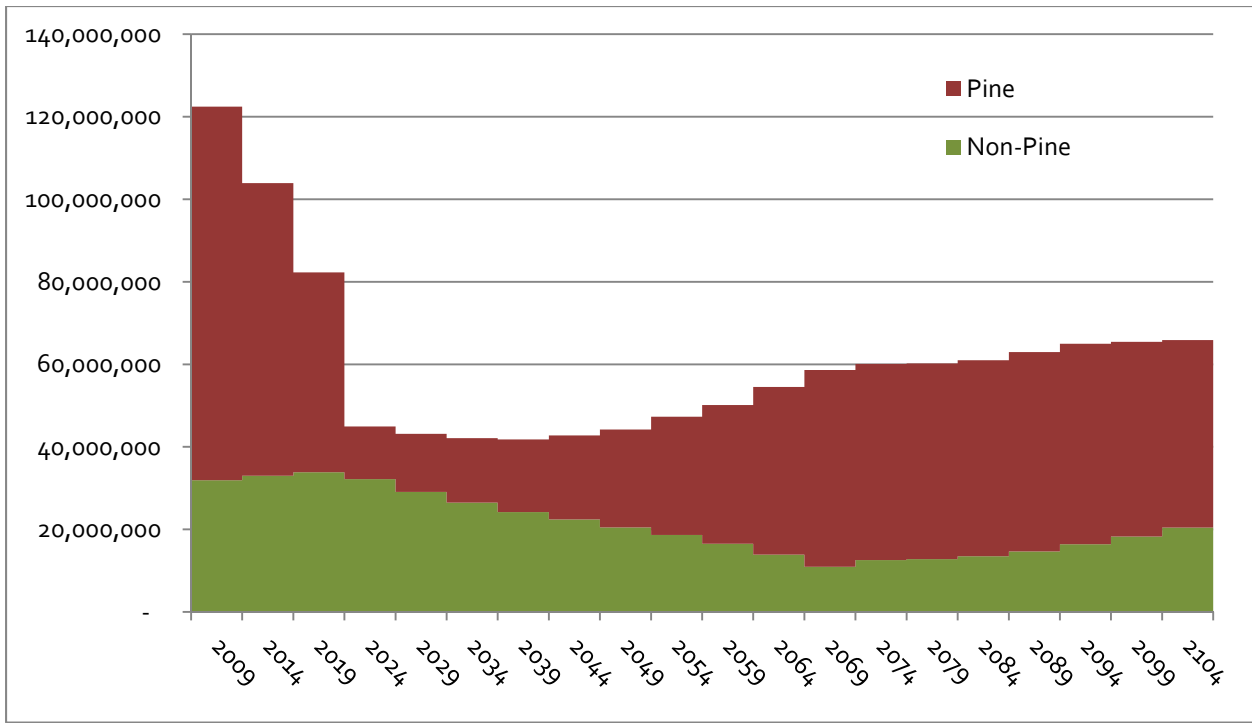
Overlap	Haul Zone	MDWR	FMLB	Pine Vol (m <sup>3</sup> )	Total Vol (m <sup>3</sup> )
1	sixhour	deep_verydeep_H	2203	89,190	259,947
1	sixhour	deep_verydeep_L	1427	50,936	85,375
1	sixhour	deep_verydeep_M	1552	112,688	168,555
1	sixhour	moderate_H	781	3,234	104,740
1	sixhour	moderate_M	188	-	24,504
1	sixhour	shallow_BG	2	-	2
1	sixhour	shallow_H	458	-	56,878
1	sixhour	shallow_L	4	-	731
1	sixhour	shallow_M	118	-	12,408
1	sixhour	transition_H	11256	279,266	721,164
1	sixhour	transition_L	3082	123,858	278,396
1	sixhour	transition_M	7775	209,881	803,706
1	west	moderate_H	170	875	1,979
1	west	moderate_M	6	-	1,031
1	west	shallow_H	273	4,225	18,108
1	west	shallow_M	5	-	293
1	west	transition_H	879	24,350	34,489
1	west	transition_M	89	14,721	14,944
2	sixhour	deep_verydeep_H	455	24,653	43,508
2	sixhour	deep_verydeep_L	39	-	2,766
2	sixhour	deep_verydeep_M	393	19,794	37,304
2	sixhour	moderate_H	153	304	27,939
2	sixhour	shallow_H	62	-	7,084
2	sixhour	shallow_M	8	-	524
2	sixhour	transition_H	4165	112,101	278,895
2	sixhour	transition_L	1445	55,704	194,640
2	sixhour	transition_M	2188	83,781	233,858
2	west	shallow_H	59	867	7,409
2	west	shallow_L	9	-	1,356
2	west	shallow_M	24	1,535	3,959
2	west	transition_BG	14	2	1,077
2	west	transition_H	622	10,259	24,242
2	west	transition_M	138	25,121	25,121
3	sixhour	deep_verydeep_H	36	2,351	2,786
3	sixhour	deep_verydeep_M	2	-	217
3	sixhour	transition_BG	1	-	215
3	sixhour	transition_H	620	6,509	12,855
3	sixhour	transition_L	136	2,661	3,172
3	sixhour	transition_M	264	9,245	21,606
3	west	transition_BG	7	1,351	1,351
3	west	transition_H	16	-	908
3	west	transition_M	19	1,745	1,920
			41143	1,271,203	3,521,961

Appendix 2 – cont'd

<b>Overlap</b>	<b>Haul Zone</b>	<b>Low Site</b>	<b>FMLB</b>	<b>Pine Vol (m<sup>3</sup>)</b>	<b>Total Vol (m<sup>3</sup>)</b>
1	east	1	8232	-	1,475,168
1	sixhour	1	1549	16,723	125,096
1	west	1	12548	745,125	1,745,717
2	east	1	4335	445	792,851
2	sixhour	1	1017	2,810	127,387
2	west	1	9681	98,429	685,121
3	east	1	205	-	37,815
3	sixhour	1	186	-	17,243
3	west	1	588	4,638	40,890
4	sixhour	1	3	-	507
			38344	868,170	5,047,795

**APPENDIX 3 – QUESNEL MID-TERM ANALYSIS BASE CASE GROWING STOCK ANALYSIS**

<b>Growing Stock</b>				
<b>Year</b>	<b>Step</b>	<b>Non-Pine (m<sup>3</sup>)</b>	<b>Pine (m<sup>3</sup>)</b>	
2009	5	31,900,505	90,544,954	
2014	10	33,018,320	70,893,597	
2019	15	33,847,642	48,435,412	
2024	20	32,172,187	12,758,558	
2029	25	29,068,757	14,098,775	
2034	30	26,472,835	15,633,759	
2039	35	24,199,513	17,613,211	
2044	40	22,403,476	20,378,656	
2049	45	20,493,516	23,730,643	
2054	50	18,642,548	28,646,213	
2059	55	16,512,915	33,614,730	
2064	60	13,869,209	40,642,832	
2069	65	10,940,072	47,682,612	
2074	70	12,550,314	47,552,365	
2079	75	12,795,125	47,421,680	
2084	80	13,503,381	47,490,255	
2089	85	14,648,183	48,337,782	
2094	90	16,388,614	48,598,221	
2099	95	18,283,198	47,172,716	
2104	100	20,429,861	45,436,749	



**APPENDIX 4- OGMA REPRESENTATION IN THE CCLUP ENHANCED RESOURCE DEVELOPMENT ZONES  
AND INTEGRATED RESOURCE DEVELOPMENT ZONES**

Overlap	Haul Zone	OGMA	CCLUP Zone	FMLB	Pine Vol	Total Vol
1	east	perm	Enhanced_Resource_Development_Zone	111	-	25,669
1	east	perm	Protected_Areas	1	-	266
1	east	perm	Special_Resource_Development	1,348	19,783	264,085
1	east	trans	Enhanced_Resource_Development_Zone	59	-	6,179
1	east	trans	Special_Resource_Development	1,670	1,925	371,232
1	sixhour	perm	Enhanced_Resource_Development_Zone	35,108	4,229,496	7,844,330
1	sixhour	perm	Special_Resource_Development	1,247	46,068	209,364
1	sixhour	rot	Enhanced_Resource_Development_Zone	6,166	1,324,367	1,342,494
1	sixhour	rot	Special_Resource_Development	202	20,283	22,299
1	sixhour	trans	Enhanced_Resource_Development_Zone	8,017	807,236	1,494,239
1	sixhour	trans	Special_Resource_Development	909	26,360	128,542
1	west	perm	Enhanced_Resource_Development_Zone	17,472	2,503,345	3,031,187
1	west	perm	Special_Resource_Development	104	17,313	18,770
1	west	rot	Enhanced_Resource_Development_Zone	5,269	906,259	914,003
1	west	trans	Enhanced_Resource_Development_Zone	7,530	1,072,647	1,312,890
1	west	trans	Integrated_Resource_Management_Zone	106	22,586	22,586
1	west	trans	Special_Resource_Development	263	34,006	55,023
				85,582	11,031,673	17,063,158
2	east	perm	Enhanced_Resource_Development_Zone	86	-	20,732
2	east	perm	Special_Resource_Development	98	1,135	19,739
2	east	trans	Enhanced_Resource_Development_Zone	31	-	1,756
2	east	trans	Special_Resource_Development	380	242	82,276
2	sixhour	perm	Enhanced_Resource_Development_Zone	7,119	328,677	918,427
2	sixhour	perm	Special_Resource_Development	1,224	39,352	175,377
2	sixhour	rot	Enhanced_Resource_Development_Zone	412	91,549	92,279
2	sixhour	rot	Special_Resource_Development	46	3,585	3,585
2	sixhour	trans	Enhanced_Resource_Development_Zone	1,478	105,872	217,714
2	sixhour	trans	Special_Resource_Development	1,708	93,314	336,550
2	west	perm	Enhanced_Resource_Development_Zone	3,586	133,973	286,966
2	west	perm	Special_Resource_Development	1,526	74,213	118,290
2	west	rot	Enhanced_Resource_Development_Zone	333	49,491	52,901
2	west	rot	Special_Resource_Development	233	16,192	16,192
2	west	trans	Enhanced_Resource_Development_Zone	631	43,166	98,187
2	west	trans	Special_Resource_Development	3,013	284,583	480,869
				21,904	1,265,343	2,921,840

3	east	perm	Special_Resource_Development	74	653	14,018
3	east	trans	Special_Resource_Development	130	-	23,813
3	sixhour	perm	Enhanced_Resource_Development_Zone	1,012	17,656	36,258
3	sixhour	perm	Special_Resource_Development	20	-	1,450
3	sixhour	trans	Enhanced_Resource_Development_Zone	74	3,109	5,414
3	sixhour	trans	Special_Resource_Development	132	-	25,653
3	west	perm	Enhanced_Resource_Development_Zone	309	-	27,423
3	west	perm	Special_Resource_Development	19	-	1,666
3	west	rot	Enhanced_Resource_Development_Zone	25	3,096	3,096
3	west	trans	Special_Resource_Development	16	604	1,477
				1,811	25,118	140,267
4	sixhour	perm	Special_Resource_Development	3	-	507
				218,597	24,644,267	40,251,038

**APPENDIX 5 – WTP AND CLA IMPACT ON TIMBER AVAILABILITY**

Year	Non-Pine	Pine	WTP 7%	CLA 20%
2009	122	4,000,154	9	1,000,039
2010	175	4,000,242	13	1,000,061
2011	84	4,000,282	6	1,000,070
2012	309	4,000,046	23	1,000,011
2013	334	4,000,160	25	1,000,040
2014	295	4,000,192	22	1,000,048
2015	232	4,000,000	17	1,000,000
2016	2	4,000,065	0	1,000,016
2017	167	4,000,165	13	1,000,041
2018	129	4,000,068	10	1,000,017
2019	166	4,000,059	13	1,000,015
2020	283	4,000,098	21	1,000,025
2021	376	4,000,162	28	1,000,040
2022	209	4,000,059	16	1,000,015
2023	128	2,358,066	10	589,517
2024	860,023	215,480	296,431	53,870
2029	860,033	300,470	387,820	-
2034	860,038	326,524	415,835	-
2039	860,039	502,124	604,652	-
2044	860,019	640,020	752,927	-
2049	860,028	344,811	435,498	-
2054	860,011	505,993	608,811	-
2059	860,024	640,021	752,927	-
2064	579,472	640,018	731,808	-
2069	100,016	1,800,019	1,943,032	-
2074	380,023	1,680,021	1,835,078	-
2079	380,027	1,680,036	1,835,095	-
2084	380,026	1,680,020	1,835,077	-
2089	380,009	1,680,020	1,835,076	-
2094	380,032	1,680,014	1,835,071	-



**APPENDIX 6 – TSR 4 BASE CASE NON RECOVERABLE LOSSES**

Mitigate Scenario (selected as base case for TSR 4 AAC determination)

Year	NRL Non-Pine Leading	NRL Pine Leading
2009	- 154	- 725
2010	5	- 813
2011	- 103	- 2,149
2012	- 164	- 2,769
2013	- 131	- 1,385
2014	- 165	- 1,158
2015	- 179	- 1,558
2016	- 128	- 3,588
2017	- 335	- 2,213
2018	77,655	217,399
2019	105,416	318,931
2020	137,840	657,893
2021	297,623	1,649,016
2022	514,384	4,049,105
2023	542,945	6,358,306
2024	333,608	7,250,258
2025	81,817	3,345,685
2026	24,244	1,451,295
2027	2,123	240,526
2028	25,786	152,400
Total	2,144,805 m <sup>3</sup>	25,705,614 m <sup>3</sup>