

Mid-Term Timber Supply Project
Report for the Minister and Deputy Minister
Forests, Lands and Natural Resource Operations

2012-02-29

Ministry of Forests, Lands and Natural Resource Operations



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Executive summary

The current mountain pine beetle epidemic in interior British Columbia will result in a drastic decrease in timber supply in some areas, with potential for significant negative economic and social effects to the forest industry and forestry-dependent communities. These communities have expressed concerns over the short- and medium-term sustainability of their communities as a consequence of the projected timber supply decline. These concerns are evidenced by the UBCM resolution at the 2010 Annual Convention requesting government attention to the matter.

As part of the provincial government's response to these concerns, analyses were undertaken in four timber supply areas - Lakes, Prince George, Quesnel and Williams Lake - to explore opportunities for mitigating the projected decrease in short- and mid-term timber supply. Some of the opportunities identified required harvesting stands currently considered un-economical due to tree size, volume or species composition of the timber stands. Apart from economics (including a need for investment in harvesting and/or milling technology to handle smaller log sizes), there are no other considerations preventing the harvest of those stands.

Other mitigation opportunities analyzed include:

- i) Forest management practices such as intensive silviculture and stand fertilization which generally have long-term benefits.
- ii) Harvesting in areas managed for non-timber values such as biodiversity, wildlife habitat and scenic areas.

This report primarily quantifies the timber potentially available from harvesting in areas managed for non-timber values and broadly describes those values affected. There are ecological, hydrological, recreation and cultural values associated with existing areas of timber designated under land use plans. Both direct and indirect economic values also flow from these areas including tourism and harvest of botanical forest products such as mushrooms. Specific economic values associated with non-timber uses of forests are not described due to lack of available data. Despite the lack of quantitative assessment of these values their value is acknowledged and timber harvesting would pose some risk to their maintenance. Based on the results of this assessment Government may decide whether it wishes to start the process necessary to enable harvesting in areas managed for non-timber values.

In the short term (2012 to 2020), if no distance from manufacturing facilities or timber quality are considered, there are sufficient quantities of timber available to maintain harvests above the pre-beetle levels in each of the four timber supply areas (TSA) for about ten years. However, most of that timber is pine that has been dead for five to ten years already. Under current lumber market conditions, it is uneconomical to harvest dead pine located at long haul distances from the mills. Licensees have indicated that the economic supply of dead pine varies from 1.5 years in Quesnel TSA to about 5 years in the Prince George TSA. As such, licensees and forest dependent communities in the MBP-affected areas are interested in understanding not only the

mid-term benefit-cost of harvesting dead pine in constrained areas but also the short term benefit-cost of harvesting dead pine in constrained areas closer to manufacturing facilities. Estimates of pine and non-pine volume and their location within the TSAs are available in the detailed analyses done for this project. Estimates of jobs and economic benefits to communities are based on the assumption that current patterns of wood flows would not change significantly.

In the Lakes TSA, the pre-beetle allowable annual cut (AAC) was 1.5 million cubic meters. The current AAC is 2.0 million cubic meters and the mid-term timber supply, without any distance constraint, is projected to be 0.5 million cubic meters per year. It is possible to increase mid-term timber supply to 0.60 million cubic meters per year. This increase is projected to maintain 87 more direct, indirect and induced person years of employment in Lakes TSA communities (potentially limiting the decline from 1,572 pre-epidemic total jobs to 521 total jobs instead of 434). However, this increase in timber supply will require a reduction in visual quality objectives by one class throughout the TSA, harvesting of old growth management areas (OGMA) in all but the southern portion of the TSA, a redefinition of old forest, the elimination of requirements that limit the amount of young forest created, the harvesting of wildlife connectivity corridors and changes to management practices for caribou and moose. While the analysis was done for all tree species in forested stands, it is anticipated that any harvesting in areas managed for non-timber values would be implemented in dead and dying stands before being considered in undamaged stands.

In the Prince George TSA, the pre-beetle AAC was 9.3 million cubic metres. The current AAC is 12.5 million cubic metres and the mid-term timber supply projection is 6.4 million cubic metres per year. It is possible to increase mid-term timber supply to 9.2 million cubic metres per year by removing the Prince George old growth order. This increase is projected to maintain 1,915 more direct, indirect and induced person years of employment (potentially limit the decline from 13,373 pre-epidemic total jobs to 8,763 total jobs instead of 6,848). Alternatively, it is possible to increase mid-term timber supply to 8.9 million cubic metres per year without affecting the Prince George old growth order if licencees are able to harvest stands where the minimum volume is 140 m³/ha and access the entire THLB. As in the Lakes TSA, it is anticipated that any harvesting in areas managed for non-timber values would be implemented in dead and dying stands before being considered in undamaged stands.

In the Quesnel TSA, the pre-beetle AAC was 2.34 million cubic metres. The current AAC is 4.0 million cubic metres and the mid-term timber supply projection without any distance constraint, is 1.15 million cubic metres per year. It is possible to increase mid-term timber supply by 400,000 cubic metres per year by harvesting some OGMAs, removing the requirements for stand-level biodiversity and conservation legacy areas, eliminating some VQOs and modifying others, and harvesting less productive sites. This increase in mid-term timber supply will maintain 377 more direct, indirect and induced person years of employment (potentially limit the decline from 3,321 pre-epidemic total jobs to 2,092 total jobs instead of 1,715). As in the Lakes

TSA, it is anticipated that any harvesting in areas managed for non-timber values would be implemented in dead and dying stands before being considered in undamaged stands.

In the Williams Lake TSA, the pre-beetle AAC was 2.81 million cubic metres. The current AAC is 5.7 million cubic metres and mid-term timber supply projection, without any distance constraint, is 1.9 million cubic metres per year. It is possible to increase mid-term timber supply to 3.08 million cubic metres per year by harvesting stands closer to the minimum merchantability specifications, harvesting portions of OGMA's that do not overlap with other non-timber values, and harvesting one half of the area of steep slopes excluded from the THLB. This increase is projected to maintain 1,144 more direct, indirect and induced person years of employment (potentially limit the decline from 4,626 pre-epidemic total jobs to 2,955 total jobs instead of 1,811) within the Williams Lake TSA. As in the other TSAs, it is anticipated that any harvesting in areas managed for non-timber values would be implemented in dead and dying stands before being considered in undamaged stands.

In addition, in April 2011, before the timber supply analyses were completed in the four TSAs, a survey of primarily those in the recreation sector was undertaken in beetle-affected communities in the four TSA's to assess the recreation sector's preferences for relaxing non-timber values to mitigate timber supply. That survey found that riparian areas and wildlife areas were valued the highest by those in the recreation sector, whereas there was some tolerance for harvesting scenic areas especially if they were not clearcut harvested.

Communities and stakeholders have already started a dialogue about possible options to mitigate the economic and social effects of the MPB on their communities. Assuming that government may wish to engage in the dialogue, this report identified three principal approaches for engagement; i) a Government led engagement process with a political lead, ii) a Government led engagement process with a ministry lead, and iii) a Community/Public led engagement process where ministries have a supporting role. In-depth government discussions and direction is required prior to proceeding with any of the above options. The role of First Nations, stakeholders and the Beetle Action Coalitions will need to be clearly defined. Regardless of the option chosen, a communications strategy will need to be developed. All options require timely action with government decisions required by December 31, 2012 to avoid conflict with May 2013 election.

Background

Timber supply analyses have shown severe mid-term timber supply shortfalls associated with the current mountain pine beetle (MPB) infestation in BC. Unless mitigated, there will be significant negative economic and social ramifications for the forest industry and forestry-dependent communities associated with this projected mid-term timber supply shortfall. At the request of the Chief Forester, preliminary analyses for the Lakes, Prince George, Quesnel, and Williams Lake timber supply areas (TSA) were completed in October 2010 identifying opportunities to potentially mitigate some of the timber supply impacts. These mitigation opportunities fall under two main categories:

1. Forest sector management practices: These include such things as regeneration/reforestation practices, fertilization, and stand merchantability/economics.
2. Relaxation or deferral of objectives for other forest values: These include such things as visual quality objectives, biodiversity and wildlife habitat.

Forest dependent communities have expressed significant concern over the short and medium term sustainability of their communities as a consequence of the potential timber supply decline. At the 2010 Union of BC Municipalities meeting a resolution was passed asking the Minister of Forests, Lands and Mines to undertake a cost/benefit analysis of non-timber constraints, in particular visual quality objectives and wildlife tree patches. On October 27, 2010 the Minister wrote the Chief Forester a letter (Appendix 1) expressing the economic and social objectives of the Crown regarding mid-term timber supply in areas affected by the MPB. In response to that letter and the UBCM resolution, staff have accelerated efforts to examine the cost/benefit of potential mitigation strategies to short- and mid-term timber supply. Appendix 2 contains the terms of reference for the recent work undertaken in the Lakes, Prince George, Quesnel, and Williams Lake TSAs.

Project description

In each of the four TSAs a technical working group was established to examine various options for timber supply mitigation in that TSA. Technical working groups (TWG) solicited licensee input to help evaluate potential mitigation opportunities. Each TWG prepared a report documenting their findings to the Provincial Mid-term Timber Supply Technical Oversight Committee. There were some difference in approach among the TSAs based on the timber supply models available and the options chosen by local licensees.

In addition to the analyses of timber supply mitigation opportunities for each TSA, this project also included:

- 1) a sector specific, preliminary socio-economic analysis (SEA) of the implications to the forest licensees and jobs in the affected communities of the projected decline and mitigation opportunities in timber supply (Appendix 3). Note: a more detailed SEA in future work would allow a better understanding of community effects of the projected timber supply and job declines;
- 2) a pre-timber supply analysis assessment of the importance recreationists placed on the non-timber values being protected in the TSAs; and
- 3) a survey of existing and potential economic development activity in and around communities in the four TSAs analyzed.

The Executive Sponsors for this project, the ADM Stewardship/Chief Forester and the ADM Tenures, Competitiveness and Innovation, Ministry of Forests, Lands and Natural Resource Operations, will present findings and recommendations to the Natural Resource Sector Board of Deputies and appropriate ministers.

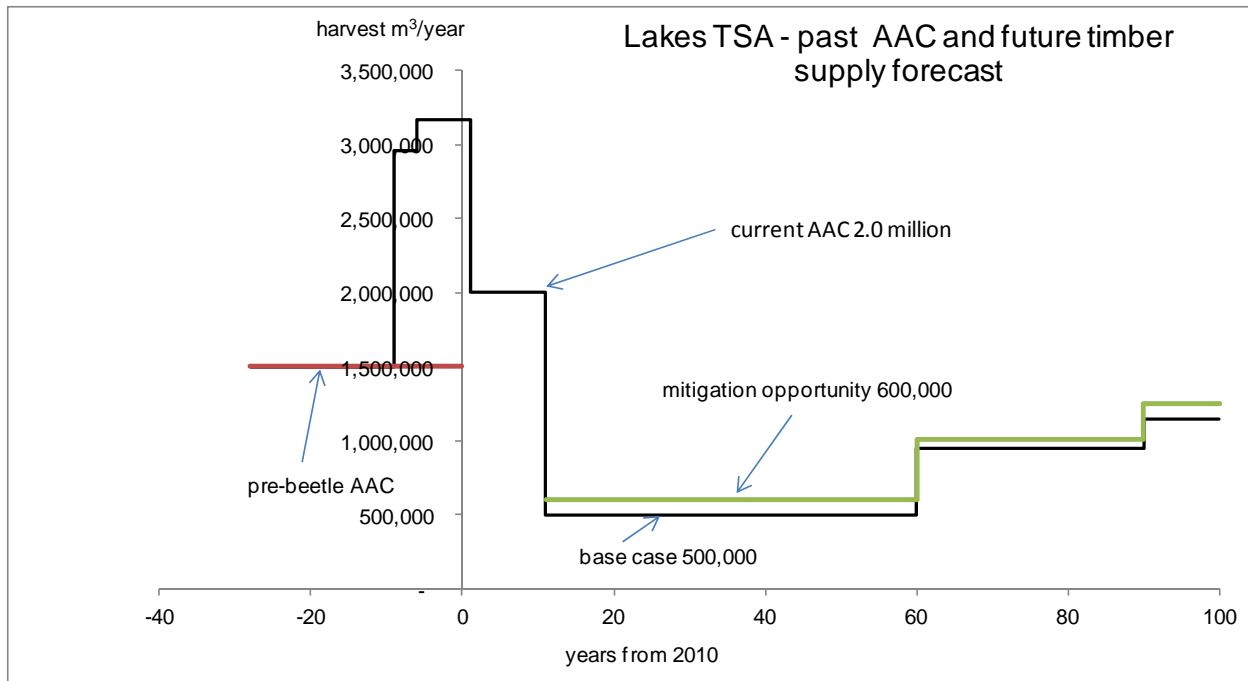
Results

Summary of the Lakes TSA TWG report

Background

The Lakes TSA covers approximately 1.1 million hectares of land, of which about 72 percent is considered productive Crown forest (First Nations reserves, private lands, woodlots, and community forests are excluded). Of that productive forest, about 35 percent is not available for timber harvesting because it is reserved for biodiversity, fish or wildlife or because the site is too poor to grow trees quickly. The current timber harvesting land base (THLB) is approximately 524 000 hectares, which is about 47 percent of the TSA area or 65 percent of the productive Crown forest area. Lodgepole pine comprises about 64 percent of the total mature volume on the THLB in this TSA.

Between 1982 and 1996, the pre-beetle AAC was set at 1.5 million cubic metres. In 2001, the AAC was increased to 2.962 million cubic metres in response to the MPB epidemic, and was further increased to 3.162 million cubic metres in 2004. The current AAC, effective July 2011, is 2.0 million cubic metres. During the period 2001 to 2010, the average harvest was 1.7 million m³/year. Of that volume, about 76 percent was pine indicating excellent licensee and BCTS response to harvesting beetle damaged pine stands on the landbase unconstrained by non-timber values.



The reference timber supply forecast prepared for this project accounted for all existing land-use decisions, applied all non-timber constraints, focused harvest in pine-leading stands and assumed that pine had economic value for 20 years after death. If no distance economic constraints are applied the forecast shows that a harvest of 2 million cubic meters per year can be maintained for 10 years. After this time, the harvest falls to 0.5 million cubic meters per year and remains at that level for 50 years. The harvest then gradually increases to a long term level of 1.15 million cubic meters per year. However, it must be cautioned that, based on a subsequent canvass of licensees in the TSA, if current economics persist there is a high likelihood of timber supply shortages occurring in early 2014. Licensees further caution that if one considers the planning, authorization and pre-development lead time necessary for operations to occur, any legislative and/or policy change would have to be “implementable” by early 2013 if the anticipated economically viable timber supply shortage for some mills is to be avoided.

Benefits

This project explored opportunities to mitigate the projected decrease in mid-term timber supply. The major mitigation opportunities identified by licensees in this TSA required modifications to objectives for non-timber values. Through these modifications, it is possible to increase mid-term timber supply by 100,000 cubic metres per year (from 0.5 million cubic metres per year to 0.6 million cubic metres per year). This increase is projected to maintain 87 more direct, indirect and induced person years of employment within the Lakes TSA (potentially limiting the decline from 1,572 pre-epidemic total jobs to 521 total jobs instead of 434). While the analysis was done for all stands in the area considered, it is anticipated that any mitigation measures would be implemented in dead and dying stands before being considered in undamaged stands.

Costs

The increased timber supply required relaxation of visual quality objectives throughout the TSA, harvesting of old growth management areas (OGMAs) in all but the southern portion of the TSA near Chief Louis Lake, Uduk Lake and Tetachuck Lake, a redefinition of old seral, the elimination of limits to the amount of early seral forest, the harvesting of wildlife connectivity corridors and changes to management practices for caribou and moose. Some implications of these changes are described under *Non-timber values*. Actual economic losses from existing uses of these areas managed for non-timber values are not quantified.

The full report of the Lakes TSA technical working group is included in Appendix 4.

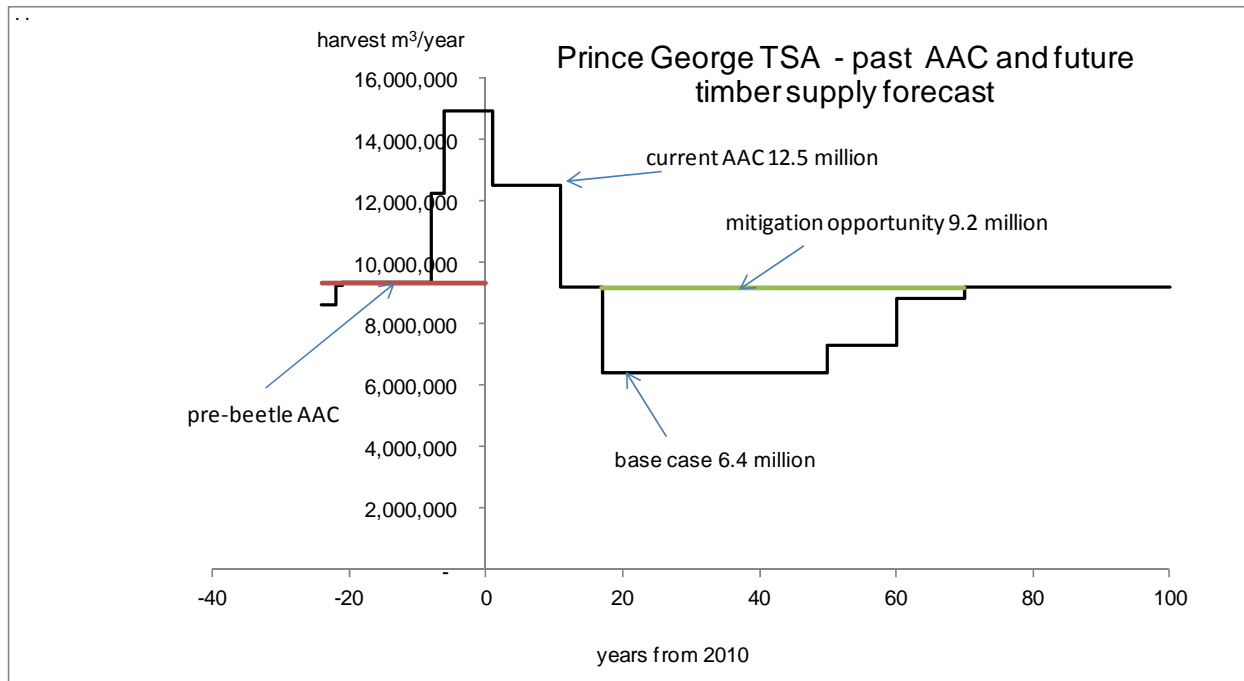
Summary of the Prince George TSA TWG report

Background

The Prince George TSA covers approximately 7.97 million hectares, of which about 66 percent is considered productive Crown forest (First Nations reserves, private lands, woodlots, community forests, research forests and TFLs 30, 42 and 53 are excluded). Of that productive forest, about 22 percent is not available for timber harvesting because it is reserved for biodiversity, fish or wildlife or because the site is too poor to grow trees quickly. A further 18 percent (0.9 million hectares) was removed from the THLB because licencees have not previously harvested in those areas. The current THLB is approximately 3.1 million hectares, which is about 39 percent of the TSA area or 60 percent of the productive Crown forest area. Lodgepole pine comprises about 48 percent of the total mature volume on the THLB in this TSA.

The forest resources of the TSA are administered by the Fort St. James, Vanderhoof and Prince George Forest Districts. Lodgepole pine comprises about 38 percent of the total mature volume on the THLB (approximately 1 million hectares) in the Fort St. James Forest District, 73 percent of the total mature volume on the THLB (approximately 0.7 million hectares) in the Vanderhoof Forest District, and 31 percent of the total mature volume on the THLB (approximately 1.4 million hectares) in the Prince George Forest District.

Between 1982 and 1996, the pre-beetle AAC was set at 9.363 million cubic metres. In 2002, the AAC was increased to 12.244 million cubic metres in response to the MPB epidemic, and was further increased to 14.944 million cubic metres in 2004. The current AAC, effective January 2011, is 12.5 million cubic metres. During the period 2001 to 2010, the average harvest was 10.7 million m³/year. Of that volume, about 69 percent was pine as licensees and BCTS focused on MPB salvage on the landbase unconstrained by non-timber values.



The reference timber supply forecast prepared for this project accounted for all existing land-use decisions, applied all non-timber constraints, focused harvest in pine-leading stands and assumed that pine had economic value for 15 years after death. This forecast shows that a harvest of 12.5 million cubic metres per year can be maintained for 10 years, followed by a harvest of 9.2 million cubic metres for 5 years. After this time, the harvest falls to 6.4 million cubic metres per year and remains at that level for 35 years. The harvest then gradually increases to a long term level of 9.2 million cubic metres per year. However, it must cautioned that, based on a subsequent canvass of licensees in the TSA, if current economics persist there is a high likelihood of timber supply shortages occurring in mid- to late 2017.

Benefits

The major mitigation opportunities identified by licensees in this TSA required modifications to Prince George TSA old growth order which was established to maintain landscape-level biodiversity. It is possible to increase mid-term timber supply in the Prince George TSA to 9.2 million cubic metres per year (almost the pre-beetle level) by removing the Prince George old growth order. This increase is projected to maintain 1,915 more direct, indirect and induced person years of employment within the Prince George TSA (potentially limiting the decline from 13,373 pre-epidemic total jobs to 8,763 total jobs instead of 6,848 total jobs).

In the reference forecast, merchantable stands in the areas accessible by road contained at least 189 m³/ha, and 246 m³/ha in the areas accessible by rail. If licensees are able to harvest stands where the minimum volume is 140 m³/ha and access the entire THLB, it is possible to achieve a mid-term timber supply of 8.9 million cubic metres per year without affecting the Prince George old growth order. This benefit would only be fully realized if licensees and contractors make

additional investments in harvesting and/or milling technologies to be able to economically handle the lower volumes and smaller piece sizes.

Costs

Removing the requirement for old growth increases the risk of survival for those species and plant associations reliant on old growth habitats and structures.

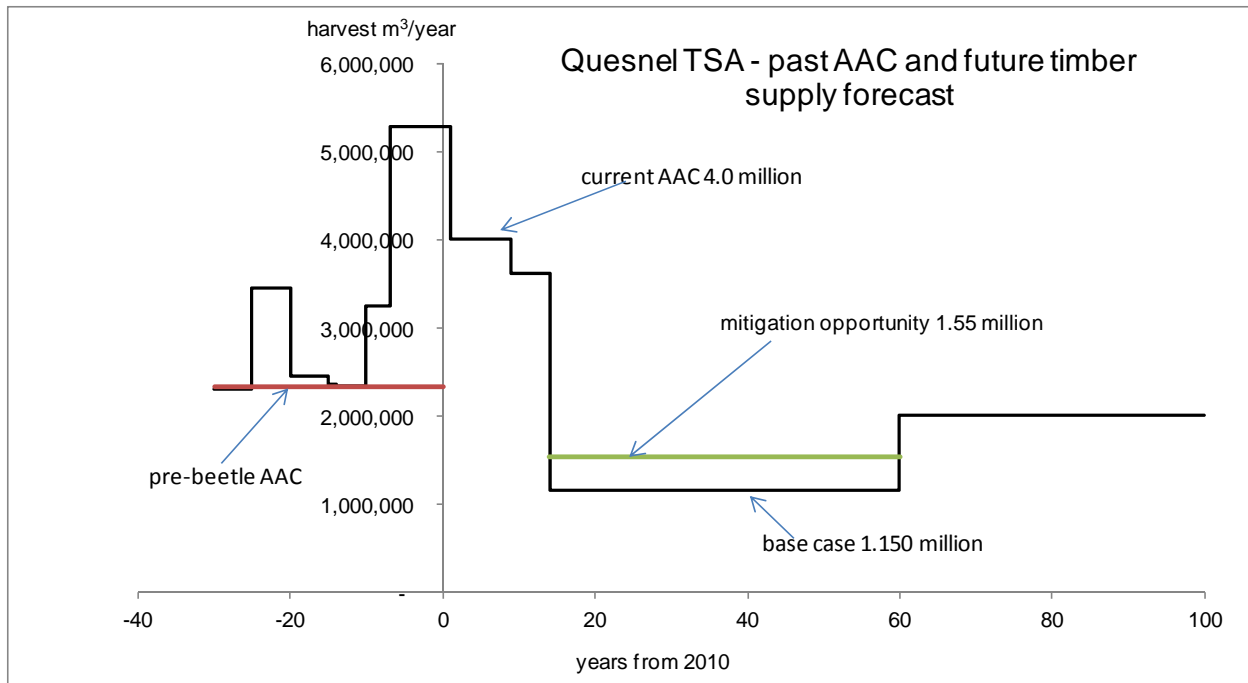
The full report of the Prince George TSA technical working group is included in Appendix 5.

Summary of the Quesnel TSA TWG report

Background

The Quesnel TSA covers approximately 2.1 million hectares of land, of which about 67 percent is considered productive Crown forest (First Nations reserves, private lands, TFL 52, woodlots, and community forests are excluded). Of that productive forest, about 31 percent is not available for timber harvesting because it is reserved for biodiversity, fish or wildlife or because the site is too poor to grow trees quickly. The current THLB is approximately 965,687 hectares, which is about 47 percent of the TSA area or 69 percent of the productive Crown forest area. Lodgepole pine comprises about 70 percent of the total mature volume on the THLB in this TSA.

Between 1982 and 1996, the pre-beetle AAC was set at 2.34 million cubic metres. In 2001, the AAC was increased to 3.248 million cubic metres in response to the MPB epidemic, and was further increased to 5.280 million cubic metres in 2004. The current AAC, effective July 2011, is 4.0 million cubic metres. During the period 2001 to 2010, the average harvest was 3.5 million m³/year. Of that volume, about 82 percent was pine indicating excellent licensee and BCTS response to harvesting beetle damaged pine stands on the landbase unconstrained by non-timber values.



The reference timber supply forecast prepared for this project accounted for all existing land-use decisions, applied all non-timber value constraints, focused harvest in pine-leading stands and assumed that pine had economic value for 20 years after death. If no distance constraints are applied, the forecast shows that a harvest of 4 million cubic metres per year can be maintained for 9 years. After this time, the harvest decreases to 3.6 million cubic metres per year for 5 years. By 2024 the harvest drops to 1.15 million cubic metres per year and remains at that level for 46 years. The harvest then increases to a long term level of 2.0 million cubic metres per year. However, it must cautioned that, based on a subsequent canvass of licensees in the TSA, if current economics persist there is a high likelihood of timber supply shortages occurring in mid- to late 2013. Licensees further caution that if one considers the planning, authorization and pre-development lead time necessary for operations to occur, any legislative and/or policy change would have to be “implementable” by mid- to late summer 2012 if the anticipated economically viable timber supply shortage for some mills is to be avoided.

Benefits

The major mitigation opportunities identified by licensees in this TSA required modifications to objectives for non-timber values and harvesting sites of lower productivity. It is possible to increase mid-term timber supply by 400,000 m³/yr by these modifications and management practices. This benefit would only be fully realized if licensees and contractors make additional investments in harvesting and/or milling technologies to be able to economically handle the lower volumes and smaller piece sizes. This will maintain 377 more direct, indirect and induced person years of employment (potentially limiting the decline from 3,321 pre-epidemic total jobs to 2,092 total jobs instead of 1,715 total jobs). While the analysis was done for all stands, it is

anticipated that any mitigation measures would be implemented in dead and dying stands before being considered in undamaged stands.

Costs

The increased timber supply requires harvesting of OGMA's in the ERDZ and IRMZ zones specified in the Cariboo-Chilcotin Land Use Plan. It also requires removing the requirements for stand-level biodiversity and conservation legacy areas, eliminating modification and partial retention VQOs, changing retention VQO to partial retention, and harvesting less productive sites.

The full report of the Quesnel TSA technical working group is included in Appendix 6.

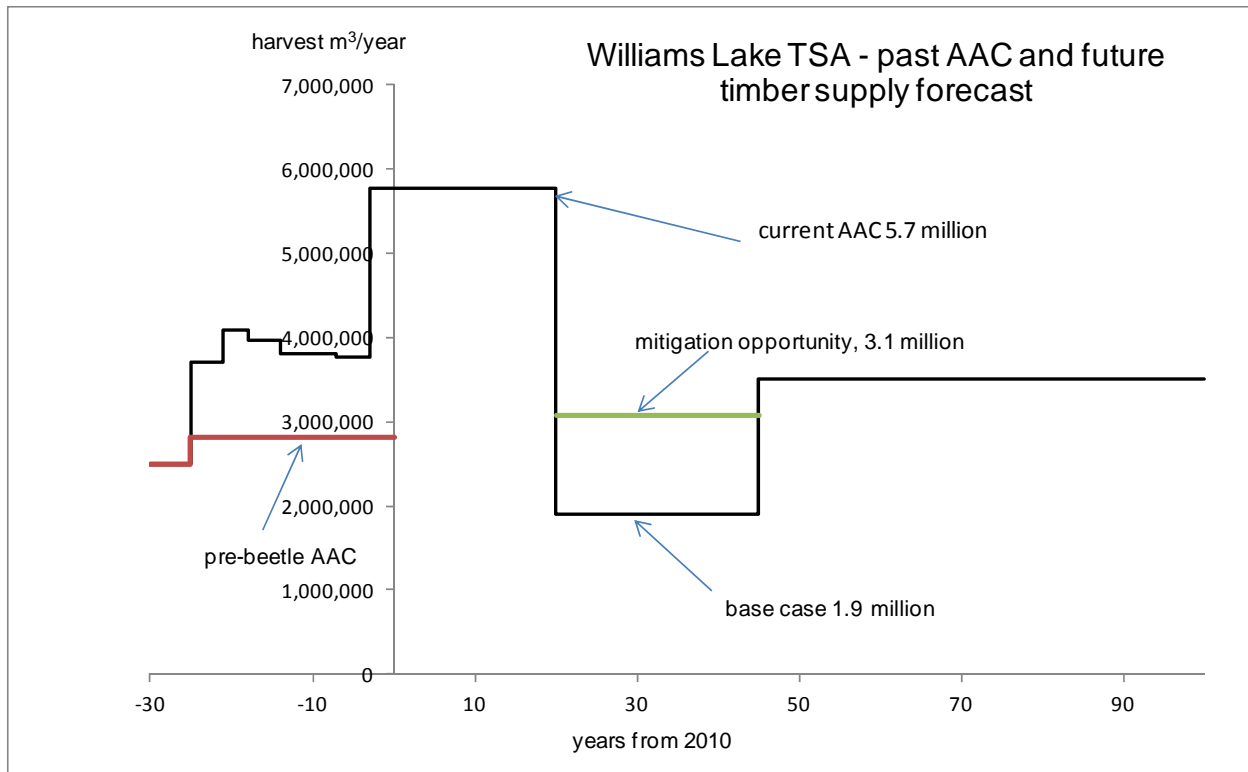
Summary of the Williams Lake TSA TWG report

Background

The Williams Lake TSA covers approximately 4.9 million hectares of land, of which about 58 percent is considered productive Crown forest (First Nations reserves, private lands, non-forest, woodlots, and community forests are excluded). Of that productive forest, about 31 percent is not available for timber harvesting purposes because it is reserved for biodiversity, fish or wildlife or because the site is too poor to grow trees quickly. The current THLB is approximately 1.97 million hectares, which is about 40 percent of the TSA area or 69 percent of the productive Crown forest. Lodgepole pine comprises about 61 percent of the total mature volume on the THLB in this TSA.

This TSA has had a long history of salvage harvesting for MPB mortality. For the last 25 years the pre-beetle AAC was set at 2.81 million cubic metres. The current AAC, determined in 2007 was set at 5.7 million cubic metres in response to the latest MPB epidemic. As stated in the AAC rationale, the determination "is predicated on directing the entire AAC at stands with at least 70 percent pine that are located west of the Fraser River."

During the period 2001 to 2010, the average harvest was 3.4 million m³/year. Of that volume, about 74 percent was pine indicating excellent licensee and BCTS response to harvesting beetle damaged pine stands on the landbase unconstrained by non-timber values.



The reference timber supply forecast prepared for this project accounted for all existing land-use decisions, applied all non-timber value constraints, focused harvest in pine-leading stands and assumed that pine had economic value for 20 years after death. If no distance constraints are applied, the forecast shows that a harvest of 5.7 million cubic metres per year can be maintained for 20 years. After this time, the harvest falls to 1.9 million cubic metres per year and remains at that level for 25 years. The harvest then increases to a long term level of 3.5 million cubic metres per year. However, it must be cautioned that, based on a subsequent canvass of licensees in the TSA, if current economics persist there is a high likelihood of timber supply shortages occurring in late 2014. Licensees further caution that if one considers the planning, authorization and pre-development lead time necessary for operations to occur, any legislative and/or policy change would have to be “implementable” by early-mid 2013.

Benefits

The major mitigation opportunity identified in this TSA requires licensees to harvest stands closer to the minimum merchantability specifications (65 m³/ha for pine-leading stands and 120 m³/ha for other stands). In the reference forecast, stands were harvested at higher volumes but by requesting stands to be harvested closer to the minimum specifications the mid-term timber supply could be increased by 0.6 million cubic metres per year. Areas set aside for OGMA also provide other non-timber values. If just the OGMA portion of those areas (no overlaps) are harvested, mid-term timber supply could be increased by 498,000 m³/year. Licensees suggested that one half of the area excluded from the THLB because of steep slopes could be harvested.

This would increase mid-term timber supply by 85,000 m³/yr. In total, it is possible to increase mid-term timber supply to 3.083 million cubic metres per year. This increase is projected to maintain 1,144 more direct, indirect and induced person years of employment within the Williams Lake TSA (potentially limiting the decline from 4,626 pre-epidemic total jobs to 2,955 total jobs instead of 1,811 total jobs).

Costs

The increased timber supply required harvesting stands closer to the minimum merchantability specifications, harvesting steep slopes and some portions of OGMAs. Licencees caution that it is only possible to harvest limited amounts of stands where the average stand volume is 65 m³/ha. Stands with higher volumes are necessary to offset the losses incurred harvesting lower-volume stands. While the analysis was done for all stands it is anticipated that any mitigation measures would be implemented in dead and dying stands before being considered in undamaged stands

The full report of the Williams Lake TSA technical working group is included in Appendix 7.

Non-timber values – all TSAs

A survey by Meitner and Associates Consulting (Appendix 8) showed the degree of importance the recreation sector in beetle-affected communities (Burns Lake, Fort St. James, Vanderhoof, Prince George, Quesnel and Williams Lake) attached to non-timber values. In order of importance, the recreation sector valued wildlife habitat areas the highest followed by riparian areas, old-growth management areas, recreation sites and visual quality objectives. This order of value was also reflected in their preferences for relaxing non-timber values to mitigate mid-term timber supply.

The non-timber values affected are primarily OGMAs, biodiversity seral stage requirements, stand level forest reserves, scenic areas, and ungulate habitat. For more details, consult the individual technical reports for each TSA and the *Mid-Term Timber Supply: Non-Timber Values Implications, Questions and Answers* document prepared for the Lakes TSA (Appendix 9).

Because of the difficulty of assigning economic value to non-timber products and services, the potential impacts of harvesting in areas managed with a non-timber resource emphasis are discussed in this section rather than explicitly quantified. In the discussion attempts are made:

- i) To identify as best as possible, at this stage, the factors that decision makers should examine in considering which particular value, if any, might be deferred, and the degree and duration of any deferral if such a decision is made to improve short- and mid-term economic stability of resource dependent communities through authorizing harvesting in areas managed for non-timber values;
- ii) To recognize that potential harvesting impacts should be those that would be incremental to the impact to the non-timber value that will result due to MPB damage even if no harvesting was authorized;

1. Underestimate of economic impact: The value of existing ecological and recreational forest assets is only partly reflected through normal market values. Willingness to pay, travel cost and compensation estimates may be used to calculate some economic value but they can fail to capture the full extent of ecosystem services such as water balance (including effects on hydrology, agriculture and fisheries), pollination, pest control, spiritual value and other amenity values. When all these contributing factors are included, the real value of these ecological and recreational assets, even in high mortality pine forests, can be significantly higher than market estimates show. Other real but unquantified economic impacts include loss of hunting and trapping opportunities, especially for First Nations.

2. Impact of long recovery time: Relaxation or removal of non-timber requirements will have effects that last long after harvest. Since forests re-grow, the effects are often regarded as temporary. However, recovery of harvested areas to their former condition will take decades or centuries depending upon the value impacted and the ecosystem involved. The survival and re-colonization of those areas by all the former vertebrate and invertebrate species is not assured due to the long interruption of habitat supply and the shift to managed forests in the remaining forest matrix. This often leads to the prevalence of more generalist species common to disturbed areas.

3. Impact of deviation from biodiversity conservation principles: The essence of management emphasis for biodiversity in B.C. is to try to retain reasonable patches of representative habitat across a variety of ecosystems and landscapes consistent with the natural disturbance regimes. This requires attention to seral distribution, old growth retention, connectivity, patch size/interior forest condition and stand level attributes. As compared to the natural disturbance cycles, even normal forest harvesting rotations tend to be shortened, resulting in accelerated conversion of older stands to young stands on the timber harvesting land base. This shortened rotation is further amplified in the salvage areas. Harvesting within designated land use reserves or reduction of retention objectives can threaten ecological values by removing more of the remaining landscape legacies. Mature and old forest supports diverse communities of species, many of which are not found in younger, managed forests. Therefore, if harvesting is authorized in these areas, conserving remnants of these older forests, consistent with approved land use plans is still extremely important.

Even stands that have high mortality from mountain pine beetle have ecological value, hence short-term harvest of dead pine in constrained areas still represents a loss to biodiversity in the affected landscapes. The dead standing and downed wood provides habitat for invertebrates, small mammals and birds, some of which contribute to pest control. Understory trees and shrubs are often still present and the soil remains intact. Dead overstory trees provide some shade which affects snow melt, soil moisture and tree regeneration. Therefore, the ecological value of remnant pine stands should be considered by determining whether or not the values found in the retention patch can be found anywhere else in the salvaged landscape, not whether the impacted stand retains the same values as it had before attack.

4. Impacts to ungulate winter ranges and movement corridors: Ungulate species such as moose, deer and caribou require forage and cover in reasonable proximity as well the ability to move through the landscape. Suitable winter range is especially critical and only occurs in specific places in the landscape. Therefore, retention of these habitats in acceptable condition is critical to survival. Harvesting that is not consistent with habitat objectives for winter range or movement

corridors between seasonal ranges can significantly compromise habitat and affect populations. Caribou are listed as species at risk and existing no-harvest areas are part of the commitment to maintenance or recovery of identified herds.

5. Impact of removing embedded values: The designated land use values, especially those that are “no-harvest” can contain embedded ecological, recreational and cultural features important to First Nations and other stakeholders. Not all of these embedded values are documented. The impact of harvesting these areas risks damage to these embedded features and undermines the First Nations expectation that these values are protected. Furthermore, loss of existing conservation lands across the landscape may have consequences to treaty negotiations with respect to the balance of settlement lands sought by the First Nation and protection of rights on the remaining land base.

6. Cumulative effects mitigation impact: With increasing pressure on the land base from all forms of development there is movement towards assessment of cumulative effects. This is becoming particularly important with regards to government’s legal obligations to First Nations through consultation. Where existing development is considered to have affected First Nations traditional rights, the network of special management for various land use values provides one of the most significant mitigation tools available for reducing that overall impact. Removal of that tool will in some cases increase the accommodation requirement on government.

Other Considerations

This section of the report will address other related factors such as administrative issues associated with relaxing/removing non-timber constraints; access and infrastructure; potential opportunities in other resource sectors like mining and energy to bolster rural communities; other sources of timber such as woodlots and community forests; and the effect of wood flow between TSAs to mitigate the fall down in mid-term timber supply.

Administrative issues

Whether measures are taken to mitigate the short- and mid-term timber supply impacts of the MPB epidemic or not government needs to be aware of the administrative measures that will be necessary and the need to resource these in a timely and adequate manner in order to minimize negative business-industry continuity and hence employee, family and rural resource dependent community impacts.

All four of the TSAs have legal orders to protect and conserve non-timber resources such as OGMA, biodiversity seral stage requirements, stand level forest reserves, scenic areas, and wildlife habitat.

Quesnel and Williams Lake are two of the TSAs that are included in the Cariboo-Chilcotin Land Use Plan (CCLUP). The CCLUP process struck a balance between the use of natural resources for timber and non-timber values. The CCLUP was designated as a legal higher level plan (HLP) in 1996. Further legal instruments for implementing CCLUP include a Land Use

Objectives Order (LUO) and Government Action Regulation (GAR) orders. This hierarchy of plans and orders either removes lands from the THLB (i.e. riparian reserve zones, OGMAs, WHAs) or limits access to timber through time (i.e. riparian management zones, VQOs, mule deer winter ranges). Changes to the CCLUP in the Quesnel or Williams Lake TSAs would have implications for the 100 Mile House TSA which is covered by the CCLUP.

The Lakes TSA has three higher level plans in place; the LRMP, the Lakes South sustainable resources management plan (SRMP), and the Lakes North SRMP. The LRMP established protected areas and three resource management zones, while the SRMPs set objectives for seral stage requirements, caribou migration corridors, OGMAs, habitat connectivity, patch size distribution, and wildlife tree retention.

There are three LRMPs within the Prince George TSA, namely the Fort St James LRMP, the Vanderhoof LRMP, and the Prince George LRMP. Subsequent to those plans being approved, the Order Establishing Landscape Biodiversity Objectives for the PG TSA, often referred to as the Prince George Old Growth Order (PG OGO) was developed and approved in 2004.

The process required to change legal designations vary with the plan and the value being changed. For example, under the CCLUP changing a VQO requires amendments to the LUO, whereas under other plans it requires an amendment to the GAR order which is within the authority of the Forest District Manager. Amendments to Land Use Orders would be needed to make changes to such things as patch size distribution, connectivity corridors, definition of old growth, early seral requirements, seral stage targets, old growth management areas. The authority for such changes is vested in the Minister who has delegated that to Regional Executive Directors. Establishing or altering ungulate winter ranges or objectives such as moose management requirements under section 12 of the GAR and setting planning requirements for forest stewardship plans (by issuing notices for species at risk and for ungulate species under the FPPR 7(2)) are both within the authority of the Minister responsible for the Wildlife Act. Changes to GAR orders require review and comment from holders of agreements under the Forest Act or Range Act (GAR3(1)(b)), and consultation with holders of agreements under the Forest Act or Range Act with whom the order may have a material adverse effect. Amending the CCLUP and amendments to the Land Use Objective Order for items like stand level biodiversity, access to low sites, and OGMAs require a decision from the Minister of Forest, Lands and Natural Resource Operations. Since access to low sites may affect the requirements for stocking and/or establishing a free growing stand this may require changes to FRPA S. 29 or 30 and FFPR S. 16, S44 &45.

In addition, changes to land use designation of the kind investigated in this report will likely require extensive consultations with First Nations. Where impacts to rights are determined, accommodation measures will be necessary, and may include cumulative effects of all activities on the land base.

Based on feedback from District staff, unless unusual processes are implemented it is estimated that 9 to 12 months could be required to complete a GAR amendment (e.g. VQOs) or changing a Land Use Order (e.g. WTPs under the CCLUP).

Access and infrastructure

The timber supply analyses assumed that licencees will harvest beetle-killed stands for as long as possible in order to preserve wood for the mid-term. Such stands will only be harvested if their value is greater than their delivered wood cost. One of the major components of delivered wood cost is the access and transportation cost. Dead pine stands that are not near existing roads or are too far from mills will likely be too expensive to harvest. For example, the Kluskus area in western Quesnel TSA is known to have pine stands with useable volumes that meet the minimum merchantable criteria. However, these stands will not be harvested unless a main road is built to the Kluskus.

Other potential economic development opportunities

The following table provides summary information on major projects planned for the near future (1-5 years) and more distant future (5-10 years) in the Skeena, Omineca and Cariboo Regions. The projects include bioenergy and mining projects in the general vicinity of communities that will be impacted by the MPB within the four TSAs. A more detailed table of specific projects is provided as Appendix 10.

It is not known exactly how much an individual project in Appendix 10 will benefit the communities around them. The timing of each project and the associated employment and benefits is dependent on the proponent and markets. However, the table does provide some indication of the potential investment, when projects are expected to go to the Environmental Assessment Office, when permits would be issued, when operations would start with associated employment levels and production rates based on the information available. The table has been assembled to be able to assist in understanding:

- i) How much timber supply mitigation might be necessary; and,
- ii) How soon harvest levels could be reduced to the mid-term in a TSA while still providing community economic stability until additional jobs becomes available in those communities.

Region	Communities affected	Project description	Timing	Scale of project (capital investment and employment)
Skeena	Houston, Granisle, and Burns Lake	Mines-3- Huckleberry Mine Extension, Morrison Mine and Endako expansion. Bioenergy- Ditni Yo	Mines- Current for Huckleberry and Endako, Morrison in EA process. Ditni Yo stalled	Huckleberry employs 260 people. Endako- 527 million expansion to employ 350 (from 280) and Morrison to employ 251 when operating. Ditni Yo to employ 120 if and when operating.
Omineca	Fraser Lake, Vanderhoof, Fort St James, Prince George (Mackenzie)	Mines- 4 to 5- Mt. Milligan, NewGold, Kemess, Angus Frac Sand, Aley Niobium. Bioenergy- Fraser Lake and Fort St James Green Energy.	Mines- Mt Milligan under construction, rest in feasibility. Bioenergy- feasibility and assessments/ permit applications	Mines- in excess of 4 billion in capital investment, 300 plus persons for each mine when operating. Bioenergy- 40 and 140 million in capital investment, and small number of jobs when operating.
Northern Area	Highway 16 corridor	Pipelines –Pacific Trails pipeline (PTP) and Northern Gateway	PTP- OGC permitting in 2012. Enbridge- CEAA JRP panel hearings in 2012/13	PTP- 1.2 billion and Northern Gateway- 4 billion in capital investment. PTP- 1500 construction jobs, and Northern Gateway- 62,000 construction and 1150 operating jobs.
Cariboo	Williams Lake, Likely, Quesnel and Alexis Creek	Mines-6- Mount Polley, Gibraltar, Spanish Mountain, New Prosperity, Bonanza Ledge, and Blackdome. Bioenergy- Tsilhqot'in	Mines- 2 in permitting and close to operating, 2 mines 1-2 years away from operating and 2 mines 4-5 years away.	Mines- in excess of 2 billion in capital investment, extend current employment level of 350 in Mount Polley, and expand Gibraltar's employment by 140 jobs. New Prosperity- 500 jobs, Bonanza ledge- 50 jobs, and Blackdome- 100 jobs.

The table in Appendix 10 in general indicates there are several large projects, especially mines in the vicinity of Williams Lake, Vanderhoof, Fraser Lake and Fort St. James. There are fewer large projects close to Burns Lake and Quesnel. However, there are mines such as the Huckleberry extension or the Endako Mine expansion that could provide employment and associated benefits to residents of Burns Lake or the rural communities around Burns Lake. The Ditni Yo bioenergy project could benefit Burns Lake since it is estimated to need about 250 people during construction and 120 people when operating. The project proponent is waiting for

BC Hydro to reconsider the application. The Bonanza Ledge gold mine is the only mine that may provide an opportunity to mitigate the jobs projected to be lost in the forest sector in Quesnel. However, perhaps some of the large mines closer to Williams Lake (i.e. New Prosperity) can help offset the loss of jobs in Quesnel. The Angus Frac Sand Project located near Bear Lake is the only mine in close proximity to Prince George

Community Forests, Woodlots and TFLs

The volumes associated with the Community Forest Agreements (CFAs), woodlots and TFLs in the four TSAs will continue to provide timber to local processing facilities during the mid-term as they do now.

The following table summarizes CFA, woodlot and TFL volumes for the four TSAs as of 2011. AACs do not include uplifts or other exceptions and all woodlots will soon require new inventories and AACs due to MPB salvage.

TSA	CFA Volume	Woodlot volume	TFL Volume	Total Volume
Williams Lake	127,000	65,850	0	192,850
Quesnel	25,000	61,524	1,000,000	1,086,524
Prince George	205,007*	422,345	549,000	1,176,352
Lakes	276,313**	58,717	0	335,030**

*includes Tanizul CFA

** Burns Lake CFA to be reduced to 100,000 from 260,000 m3 in 2013.

First Nation Woodland Licenses (FNWLs) is a form of tenure that will be contributing to the timber supply in the mid-term. However, the number and location of these tenures and how they will change the timber supply picture are unknown at this time.

Wood Flow between TSAs

Analysis of existing fibre flow between Fort St James, Prince George, Vanderhoof, Nadina and Quesnel Forest Districts, and areas immediately outside of these units, indicates a relatively tight fibre market. Approximately 92% of the total volume of timber harvested was scaled and likely processed in the five districts. Three percent flowed to the rest of the Cariboo (i.e. Central Cariboo, Chilcotin and 100 Mile House), 2% to the rest of north (i.e. Mackenzie and Peace), and 2% to the west (i.e. Skeena and North Coast). The largest outflow appears to be from Quesnel to the rest of the Cariboo.

Only two percent of the timber scaled between 2000 and 2010 originated from outside the five districts. At present, outflows exceed inflows of fibre from the five districts, and the Cariboo appears to be benefiting the most from the outflow of fibre.

This information suggests that in the recent past wood flow between TSA's is not generally economically viable. It should be noted however, that government does not currently mandate where wood must be milled and no longer requires wood harvested in a particular TSA to be milled in that TSA.

However, it is prudent to at least understand the possible mitigation opportunity represented by wood flow between TSA's but also urge that many more factors, economic and otherwise, would need to be examined before any public policy changes are decided upon on this aspect.

Given that Prince George and Williams Lake TSAs appear to have a relatively better timber supply picture in the mid-term relative to both the pre-beetle and existing harvest levels, and potentially more options to mitigate the mid-term, it would make sense to consider if economics would allow surplus volume to flow to Quesnel and/or Burns Lake. Quesnel is situated between Prince George and Williams Lake, and so surplus wood made available through mitigation measures may flow north or south and help mitigate Quesnel's situation. In addition to wood flowing south to Quesnel, there may be the potential for wood to move from Mackenzie south to the PG or Quesnel TSA. Economic realities may make it less probable that wood will flow west to mitigate Burns Lake's mid-term situation. If surplus timber exist in the adjacent Morice and Bulkley TSAs it might help mitigate the mid-term situation in Lakes TSA. An analysis of wood flows across the larger region would probably assist understanding the economics of any such possibilities.

Summary of Options

The analysis indicated that without mitigation, timber supply would decline by 67% in the Lakes TSA, 51% in Quesnel TSA, 32% in Prince George TSA and 32% in Williams Lake TSA compared to pre-beetle timber supply levels. Regionally (all TSAs combined) these reductions would lead to a timber supply that could support about 53% less employment in the area than pre-beetle. Furthermore, while each of the TSAs analyzed is unique, the results showed that most of the opportunities for mitigating these shortfalls in timber supply required harvesting in areas managed for non-timber values such as biodiversity, wildlife habitat and scenic areas. The analyses also showed that in the TSAs with a high proportion of pine, such as the Lakes and Quesnel, harvesting the areas managed for non-timber values did not significantly improve timber supply. In larger, more diverse TSAs, such as Prince George and Williams Lake TSAs, the mitigation opportunity is greater.

Although the work over the last year was focused on determining if government should engage the communities on opportunities to mitigate the timber supply shortfall, the dialogue with communities and stakeholders has already begun in an informal way. For example, the Lakes TSA has initiated a public review of some scenic areas to assess community acceptance of increased harvesting; the Association of BC Forest Professionals (ABCFP) has consulted with its members and other experts and published a report with recommendations for the Chief Forester to consider regarding the mid-term timber supply; and the Wilderness Tourism Association has responded to the ABCFP. It is clear from these activities that the communities and stakeholders are already engaged and the issue now is to develop a strategic approach for engaging communities, First Nation and stakeholders to discuss mitigation options. The recent fire at Babine Forest Products sawmill in Burns Lake will exacerbate the employment situation in that community and add urgency to the search for mitigation options.

Options:

Assuming the government wants to engage in a dialogue, there are three principal approaches of engagement; i) a Government led engagement process with a political lead, ii) a Government led engagement process with a ministry lead, and iii) a Community/Public led engagement process where ministries have a support role.

Option 1: Politically led engagement process in partnership with communities

- Government establishes a Parliamentary Secretary reporting a Minister to lead the community engagement process and regionally focused teams to support the process.
- The teams would consist of Beetle Action Coalitions, locally elected community leaders, First Nations and a government (FLNR, JTI) team.
- The teams would produce recommendations that will advise government's decision making.

Option 2: Ministry led engagement process in partnership with communities

- Ministries (FLNR, JTI) would establish a team that would lead an analysis of all mitigation options and the engagement process.
- Task Team would consist of Beetle Action Coalitions, locally elected community leaders, First Nations and ministry (FLNR, JTI) staff.
- Ministries could implement some recommendations directly and present other recommendations to government for decision where appropriate.

Option 3: Community led Local/Regional Economic Development Forum

- Community leaders or the Beetle Action Coalitions, supported by a government staff, would lead community forums to examine the full range of economic development opportunities that optimized community stability (including timber/forest management).

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- Recommendations would be presented to the Ministries (FLNR, JTI) and based on the recommendations the Ministries would determine the appropriate decision making processes.

Option 4: Independent organization led community engagement process

- An independent organization equivalent to the Fraser Basin Council would lead a community engagement process and provide recommendations to government.
- Recommendations would be presented to the Ministries (FLNR, JTI) and based on the recommendations the Ministries would determine the appropriate decision making processes.

Option 5: Do not engage with communities at this point

- Engagement with communities and stakeholders would continue in informal, ad hoc basis.

It is not clear how to engage the various First Nations who also have an interest in both the stability of their communities as well as the non-timber values. Some preliminary conversations with FNs may be helpful in determining which options might work best to engage them in the dialogue.

There are risks and opportunities associated with any of the above options. The role of FN's, stakeholders and the Beetle Action Coalitions will need to be clearly defined. In depth government discussions and direction is required prior to proceeding with any of the above options. Regardless of the option chosen, a communications strategy will need to be developed. All options require timely action with government decisions required by December 31, 2012 to avoid conflict with May 2013 election.