How Serious is the Mountain Pine Beetle Problem?

From a Timber Supply Perspective

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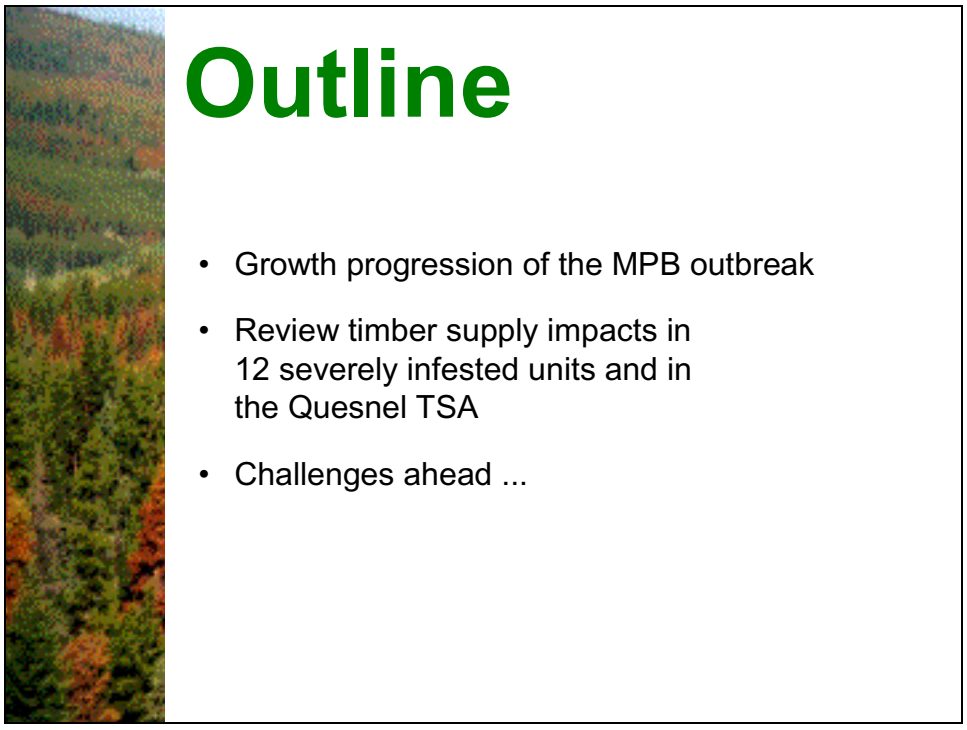
Canadian Forest Service MPB Symposium

Kelowna, October 30, 2003

Slide 1 – Title page

Good morning and thank you for the opportunity to come and speak to you today about the current MPB infestation and how serious the challenge is from a provincial timber supply and forestry perspective.

Much of my presentation today is contained in a report called Timber Supply and the Mountain Pine Beetle Infestation in BC. I have brought copies of this report with me and they will be made available to anyone who is interested. I want to point out that although my talk this morning and the report focus is on timber supply impacts, I absolutely recognise that there will also be a host of environmental and socio-economic values affected by the beetle infestation. The epidemic beetle population, by killing very large numbers of mature pine trees, will inevitably change the structure of our forests, and the supply of various kinds of natural habitats. Clearly, further work will be required on these topics over the coming months and years.

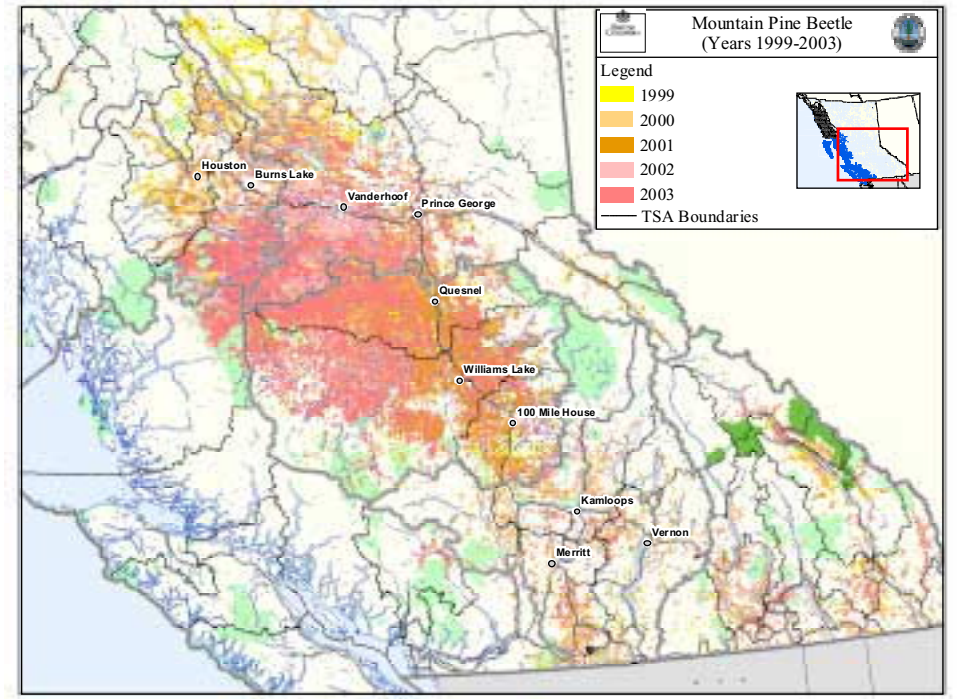


Slide 2 – Outline of presentation

In my presentation, I will briefly:

- Examine the growth progression of the MPB outbreak.
- Review the aggregate timber supply impacts in 12 of the most severely infested units as well as review a detailed case study on the Quesnel Timber Supply Area (TSA).
- Finally, I will close with some comments about the challenges that lie ahead.

As others will be reviewing the beetle's biology and epidemiology this morning, I will not cover these topics at this time.



Provincial map of red attack area.

Slide 3

I want you to watch the animation on this map.

In BC's central interior, the mountain pine beetle infestation has been increasing in size since about 1994. During the last several years, both the rate of spread and the attack intensity have increased exponentially.

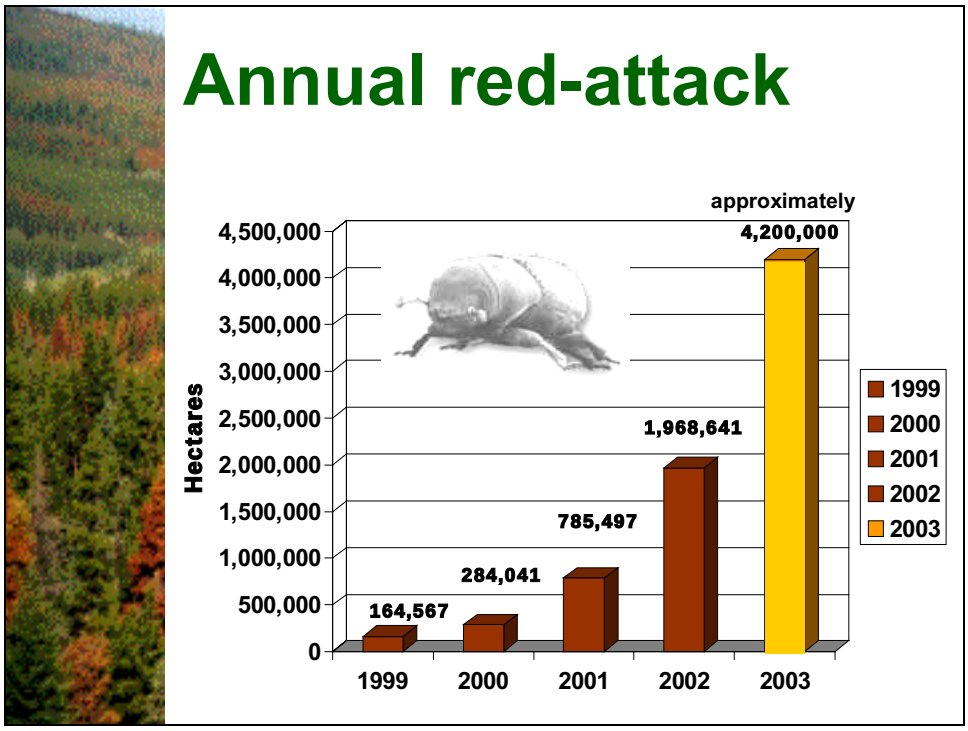
This animated map shows data from the aerial surveys of the red attack each year from 1999 – 2003.

I won't go into details regarding the survey methods as Tim Ebata will be reviewing this survey data in more detail later on in the agenda.

In general the map shows that the most severely infested areas are in the north-central part of BC from near Houston to near Williams Lake. More recently the infestation has spread into the Mackenzie area, from south of Quesnel to

the Kamloops area, as well as into the Okanagan and Kootenay regions of the province.

Also the map shows that the beetle population is growing throughout most of BC's interior mature pine forests.



Slide 4

Let's review the hectares associated with the provincial map.

Since 1996, the Ministry of Forests has completed aerial overview surveys that delineate the annual area of red attack. Prior to 1995, the Canadian Forest Service conducted the aerial surveys.

As Tim Ebata will speak to later, from 1996 to 1998, the data was a bit inconsistent. However, since 1999 as shown in the graph, the data gathering has been standardised and is now compiled every fall for the entire province.

As shown by the first bar, in 1999, the area infested was about 165,000 hectares. Within 4 years it had grown to an annual attack area of over 4.2 million hectares. The first 4 bars (1999-2002) are the confirmed numbers of hectares surveyed; however, the last bar (for 2003) represents our current estimate of the red attack area, which is about ***4.2*** million hectares. The 2003 data is still being quality

assured and should therefore be viewed as preliminary as a result.

The survey methodology of mapping the annual red attack area allows for a valid year over year comparison in the rate of progression of the epidemic. However, I would point out that this annual reporting methodology does not describe the total cumulative impact of the epidemic. That volume or area will of course always be greater than the most recent reported year. Due to the same hectares being affected at varying intensity levels over a number of years, the annual reported areas cannot simply be added as a means of describing the cumulative impact of the epidemic.

So what's the current rate of spread? Can we project this rate of spread into the future? Early in 2001, I examined the Quesnel timber supply as part of my determination of an AAC uplift to manage the MPB infestation. At that time, the rate of spread from 1994 to 2000 was on average about 44% annually. However, as shown on the slide over the last several years (since 2000) the average rate of spread has been over 200 percent per year.

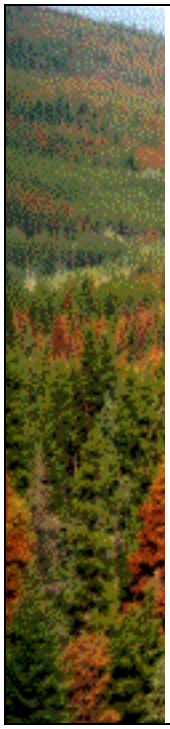
After talking to our favourite Mountain Pine Beetle expert, Dr. Les Sayranyik, I am convinced that the current rate of spread will likely not slow significantly unless either the coming winters are sufficiently cold enough to reduce the population, or the population dynamic changes if the beetles can no longer be sustained by the amount of residual live pine left on the landscape.

Within the 4.2 million hectares of red attack noted in this fall's survey, the level of intensity, as described by the ratio of live to killed trees, varies tremendously. The intensity was rated as 64% light attack(1 to 10% dead trees), 18% moderate attack (11- 29 % dead trees) and about 18% severe attack (over 30% of the trees are dead).

The experts advise that mapping the exact area and intensity is difficult for several reasons: first of all, the affected area is vast; secondly, there are variable rates of infestation within forest stands and often the same areas are repeatedly infested; and finally, the size of the infested area is increasing every year.

Last fall, the Mountain Pine Beetle Task Force reported that the infestation covered an area of more than 9 million hectares. This roughly defines the outer bounds of infestation. Associated with this estimate, the Task Force reported that the epidemic had cumulatively infested 108 million cubic metres of pine.

Although there are various ways to map and report on the infestation, we all agree that this infestation is now the largest in BC's recorded history, if not the largest ever recorded anywhere.



Factors contributing to the expanding epidemic

- Number of hectares with mature pine in BC has increased by about 3 times since 1910
- Warmer climate conditions have expanded the beetle range into previously unsuitable areas such as northern areas and higher elevations

Slide 5

I know that government and the forest industry have been working hard to contain this epidemic.

During previous large-scale Mountain Pine Beetle outbreaks, the population has collapsed due to localized depletion of mature lodgepole pine forests, in combination with the cold weather events.

So, what if anything has changed in current times? Why is it continuing to spread?

First, the number of hectares with mature pine in BC has steadily increased from about 2.5 million hectares in 1910, to about 8 million hectares in 1990. 'Mature' represents susceptible pine older than 80 years, and there is about three times the amount of area a century ago. Therefore, over 50% of our total 14.9 million hectares of pine stands are now at risk.

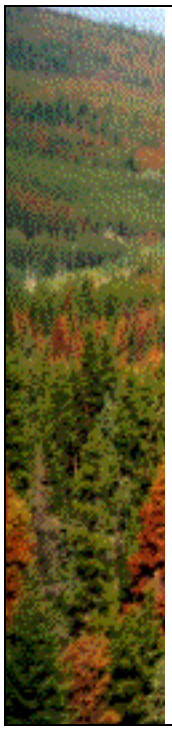
Steve Taylor and his colleagues at PFC have studied this changing pattern, and will present their findings in more detail later this morning.

The other key factor is the weather. Warmer weather has expanded the beetles range into previously unsuitable areas such as into more northerly latitudes as well as into higher elevation stands. Later on, Dr. Allan Carroll will be presenting his research illustrating the shift in climatically benign habitats in B.C.

In addition, as stated in the Ministry of Water, Land and Air Protection report, *Indicators of Climate Change for BC 2002*, the average winter minimum temperatures have increased by 2.2 to 2.6 ºC in the central interior over the past century. Furthermore, the report notes that the climate is projected to continue to increase by 1 to 4 ºC over the next century. Both summer and winter mean temperatures have increased, resulting in more successful brood production and reduced over-wintering mortality in the beetle population.

In summary, the results of these recent studies suggest that the current outbreak will likely not follow past patterns.

This pattern will likely affect other forest pest population dynamics as well.



Uplifts:

6.8 million m^3 year

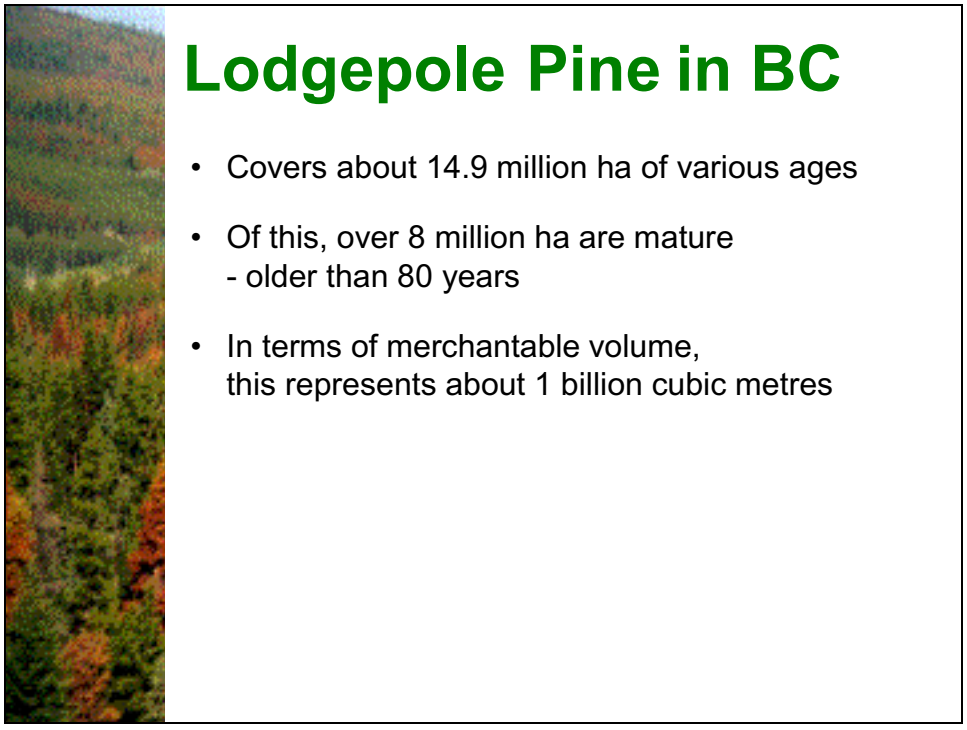
MANAGEMENT UNITS	AAC (m^3/yr)	UPLIFTS
Lakes	2,962,000	1,500,000
Prince George	12,244,000	3,000,000
Quesnel	3,248,000	1,000,000
Williams Lake (since 1980's)	3,768,000	*850,000
TFL 42 (FSJ)	160,000	40,000
TFL 5 (near Quesnel)	300,000	177,200
TFL 53 (near Quesnel)	500,000	261,000

Slide 6

In some cases the level of timber harvesting has not been sufficient to keep up with the rate of infestation. Increasing the level of harvesting may be necessary for 2 reasons: first, to remove green-infested trees before the beetle can fly and spread to adjacent trees, and secondly to allow for the timely harvest of dead trees while they are still merchantable.

Over the past 3 years, in response to management efforts to contain the spread of current MPB infestation, the deputy chief forester and I have increased the AAC in 7 separate management units. This includes four TSAs (the Lakes, Prince George, Quesnel and Williams Lake) and three TFLs (TFL 42 near Fort St. James, and TFLs 5 and 53 near Quesnel).

In response to the intensity of the MPB infestation in these seven units, the AACs were increased by a total of 6.8 million cubic metres in order to ensure that harvest levels were not constraining the province's ability to continue with aggressive harvesting and management strategies.



Slide 7

Up until last winter, we had been examining areas in terms of impacts from the infestation and the need for higher harvest levels.

So why did we feel it was necessary to undertake a timber supply analysis over a larger area at this time?

Well, in BC lodgepole pine forest of various ages covers about 14.9 million hectares, and of this, about 8 million hectares are mature (older than 80 years of age). This vast area of pine contains about 1 billion cubic metres of merchantable timber.

So, given this significant amount of lodgepole pine at risk and the noted significant growth of the infestation in recent years, we initiated an aggregate timber supply assessment

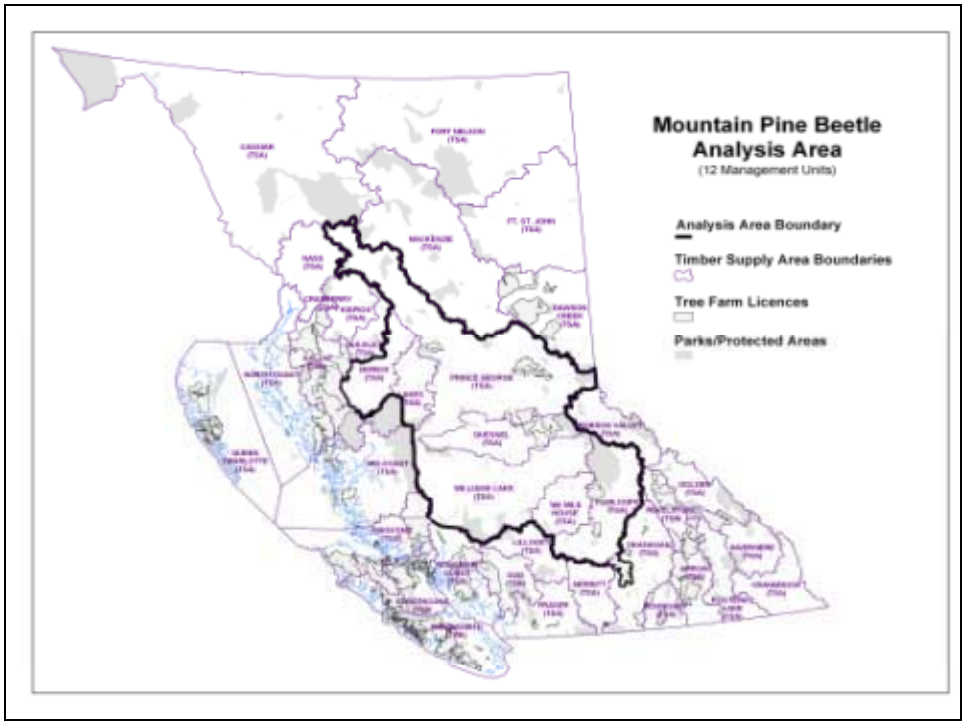
in order to better understand the potential larger scale timber supply risks in the heart of the infestation.

This question is important and seems fairly straight-forward. However, as staff found out, completing a timber supply analysis of the MPB infestation is an extremely difficult task, as it requires some broad forest management assumptions as well as assumptions about the status of the infestation, which I will cover in a minute.

Ultimately, it was determined that a reasonable approach, given the information that is currently available, was to examine the units with the higher percentage of lodgepole pine concurrent with the highest levels of MPB attack as of last fall. This narrowed the study to 12 management units.

The intent of the study was to examine the potential impacts given the current increased rates of spread and to provide information to assist those involved in developing beetle management and mitigation strategies at the local and provincial levels. I believe the study accomplished both goals.

I want to emphasize at this point that when I say *potential* impacts, I mean just that. This is a look ahead. However, if nothing changes over the next 1 to 3 years, then I must also emphasize that these impacts are reasonably foreseeable.



Map of the 12 units.

Slide 8

The 12 units cover an area from Houston to Kamloops. They include seven TSAs - Morice, Lakes, PG, Quesnel, Williams Lake, 100 Mile House, Kamloops, and five TFLs - 5, 42, 49, 52, and 53 (of which 7 have AAC uplifts as discussed a few slides earlier).

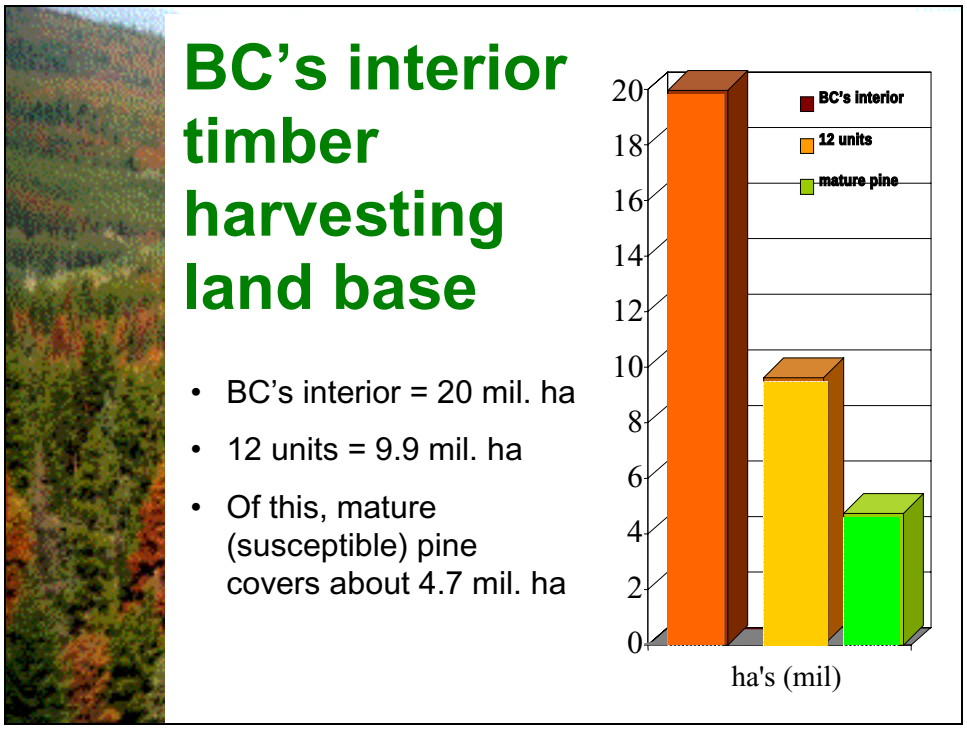
In total, including the recent beetle uplifts, the 12 units have an AAC of 30 million cubic metres. This harvest level represents about 40% of the total provincial AAC of 74.4 million cubic metres.

The timber supply analysis was conducted using FSSIM, a timber supply model developed by the BC Forest Service.

This dynamic forest estate model projects timber supply over a 250-year period.

The analysis for the 12 units was simply aimed at answering the question, “What happens to timber supply if a substantial amount of our lodgepole pine inventory is killed over the next several years?” It did not involve risk rating of individual stands or rates of spread. However, for the Quesnel TSA, a more detailed examination was completed and it did project incremental growth of the infestation.

Before I get to the timber supply projections, I’d like to review the area and the timber supply in the 12 units.



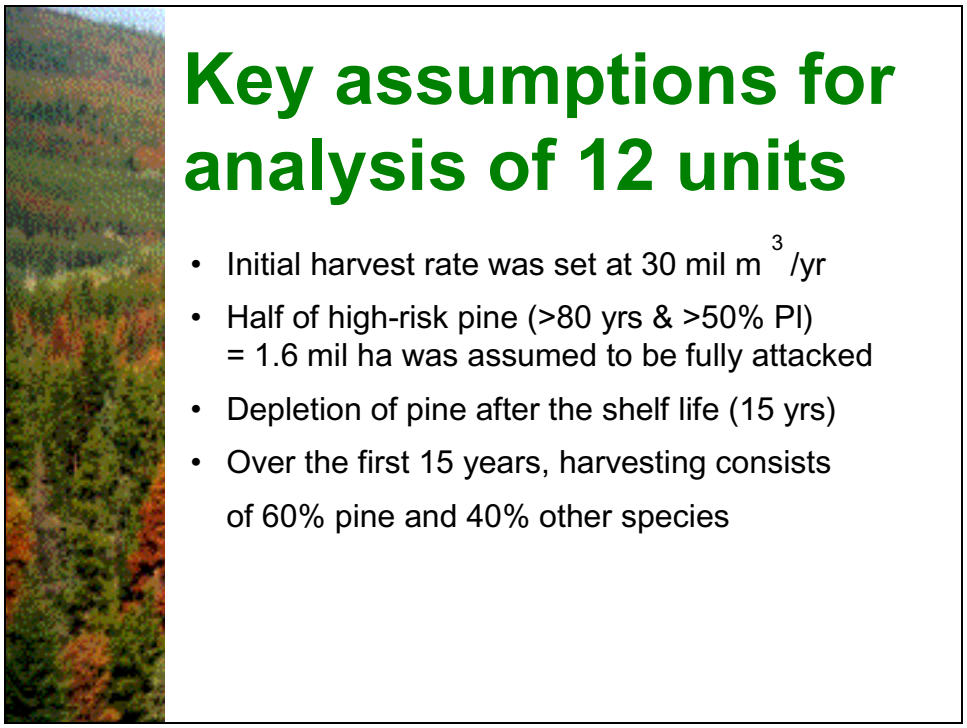
Slide 9

The timber harvesting land base in the interior is about 20 million hectares in size. Of the 20 million hectares, the 12 units cover about one half of this area, or 9.9 million hectares as shown on the slide. This area represents one of the largest contiguous fibre supply bases in the interior of the Province.

Within this area, again, about one-half of the area is forested with susceptible pine stands that are over 80 years of age. This is shown to be about 4.7 million hectares on the slide before you.

This mature pine area comprises 65% of the total mature forest on the timber harvesting land base in our study area.

This summary represents a general overview of what's susceptible, so let's review some other details about the analysis work that was undertaken.



Slide 10

Timber supply modelling is a complex undertaking and as many of you will know, the validity of the outputs is a direct function of the quality of the inputs and key assumptions that are dictated at the outset. Assumptions can be varied and complex or kept simple and clear, depending on the questions being asked and the overall objectives of the study. Given the vast area involved in our study, and the simple fact that the current MPB infestation has increased at such an alarming rate, we kept the critical assumptions as clear and simple as possible.

For the analysis of the 12 units, the 5 key assumptions were:

1) the initial timber harvesting rate was set at 30 million m3/yr, which reflects the current combined AAC for the 12 units inclusive of the uplifts.
2) One half of the stands that were 80 years of age and older, and which contained more than 50% pine, were assumed to be attacked and killed at the start of the

analysis. In reality, we don't know exactly how the current infestation overlaps with the timber harvesting land base, and we don't know exactly how many more hectares will be infested over the next several years. Therefore, we simply assumed that the infestation would affect one half of the highest risk pine-leading stands on the timber harvesting land base and then stop.

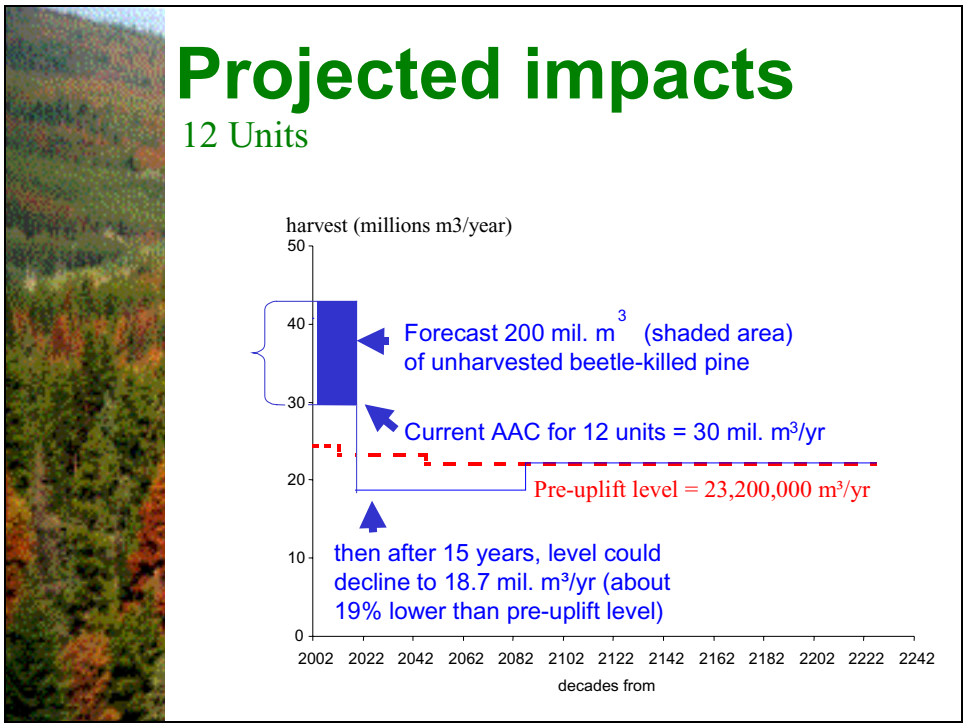
I believe this assumption needs some explanation. The proportion of individual TSAs and TFLs that will be affected by the beetle over time will vary and given the aspatial nature of this analysis, cannot be predicted with certainty. However, the assumptions applied in the analysis are based on observed trends and are informed by data and expert opinion. Generally the expert community does not support the assumption that ALL of the mature pine will be infested over large areas such as our study area by the time the epidemic has run its course. At present, we are observing high levels of attack in many stands in the most severely infested units: the Lakes, Prince George and Quesnel timber supply areas. The other more southerly units are observed to have lower attack levels. Hence, our assumption that about 50% of the high risk pine might be killed on the timber harvesting land by the time the epidemic runs its course. Others may have differing thoughts on this assumption, and I agree the amount could be higher than 50%; however for the current assessment this is what we tested. Based on current growth rates in the epidemic, this could occur over the next 1 to 3 years. It is therefore foreseeable and supportable by current data and trends.

3) Next, the volume from the killed trees on the 1.6 million hectares was depleted after 15 years, once the timber was assumed to deteriorate to a non-merchantable condition.

The length of time that the dead trees remain merchantable following attack has been called the shelf life. The last large

pine beetle outbreak in BC occurred in the Chilcotin area, and wood from this area was harvested for up to 15 to 20 years after the attack. In terms of the current outbreak in the north central interior, there is concern that due to wetter climates that the attacked trees will deteriorate sooner than in 15 years.

4) For pine-leading stands, the standard forest cover constraints (green up and landscape biodiversity) were only applied after 15 years. This was assumed because the current beetle infestation will not be limited by adjacency or biodiversity constraints.
5) During the first 15 years of the analysis, the harvest profile was specified to consist of 60% pine and 40% other species. This reflects the actual harvesting profile over the 12 units in 2002. In some specific areas like the Quesnel TSA, the current percentage of pine harvest is much higher than 60%, so local variation is accounted for in this average.



Slide 11

For those of you not extremely familiar with timber supply projections this slide shows the projection of available timber supply (in millions of cubic metres per year), given the assumptions noted in the previous slide, over a period of time from 2002 to 2250.

I would like to highlight two key observations: one, the projected decline in timber supply, and two, the potential quantity of beetle-killed timber that is not harvested and utilized.

<u>First observation</u>

After 15 years, once attacked trees lose merchantability, the combined timber supply for the 12 units is projected to decline from the current level of 30 million cubic metres by 11.3 million cubic metres to 18.7 million cubic metres per year.

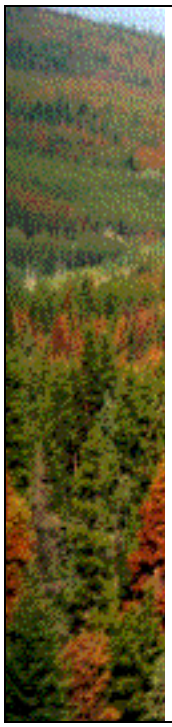
However, I must point out the current AAC level includes 6.8 million cubic metres for uplifts. Since the AAC uplifts were intended to be temporary, the pre-uplift AAC level of 23.2 million cubic metres is the best baseline for measuring the medium-term timber supply impacts. Therefore the timber supply decline relative to the pre-uplift AACs is projected to be about 4.5 million cubic metres per year.

This represents a reduction in mid-term timber supply of 19% relative to the pre-uplift AAC of 23.2 million cubic metres, and a 38% reduction relative to the uplift AAC of 30 million cubic metres.

Second observation

At the uplift harvest level of 30 million cubic metres per year, about 200 million cubic metres of beetle-killed pine is projected to remain unharvested. I must point out that although the forecast reflects the deterioration and loss of affected pine volume after 15 years, it is entirely possible that this timber could continue to be harvested beyond this time, and timber supply could be greater than the projected mid-term levels, if the trees retain merchantability or if some other use is found for the dead trees.

Other scenarios were examined and showed that with more severe infestation and mortality (more than 50 percent) there would be proportionately more severe impacts on mid-term timber supply.



Key observations

- If harvest levels are higher than 30 mil m^3/yr, then unsalvaged losses could be less than the projected 200 mil. m^3.
- If more pine is harvested, rather than the current profile of 60% pine -- 40% other species, then less unsalvaged losses
- If stands with the highest amount of mortality are harvested in the first 15 years, the timber supply impacts are reduced

Slide 12

In summary for the 12 units, some key observations are as follows:

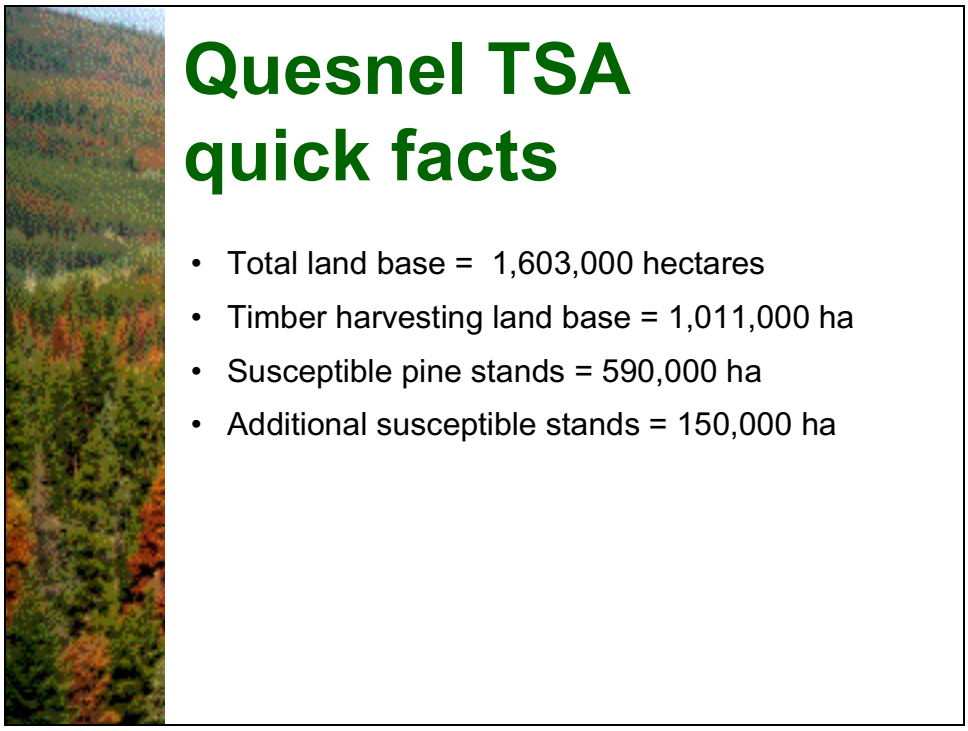
- if the annual harvest level remains at 30 million cubic metres a year, there will be unharvested timber losses of about 200 million cubic metres over the next 15 years. Therefore, if harvest levels were higher than 30 million cubic metres per year, losses could be reduced from 200 million cubic metres.

- On the other hand, without increasing the cut, if more pine is harvested (for example, if the profile was increased to 80% pine and 20% other species), there would be about half the amount of timber losses at the same harvest level of 30 million cubic metres per year. Mid-term timber supply would also be greater.

- Finally, during the analysis it was noted that directing the harvest towards stands with the highest levels of mortality conserves more live trees for the mid-term timber supply and this results in a beneficial impact on overall timber availability in the mid-term than was shown in the base case analysis.

I would like to make two other important points. If killed trees deteriorate more quickly than estimated (that is in less than 15 years), then unharvested losses would be greater and the decline in timber supply would occur sooner. If the shelf life is longer than 15 years, then less volume would remain unharvested and the decline in timber supply would occur later than projected.

If the infested-but-not-harvested area were to become reforested more quickly than the 20 years assumed in the base projection, (although the short-term timber supply would not be affected), then either the mid-term levels could be increased slightly, or the long-term harvest level could be reached about 20 years sooner. Conversely, longer regeneration delays would lead to a lower mid-term level or a longer time to achieve full long-term productivity.

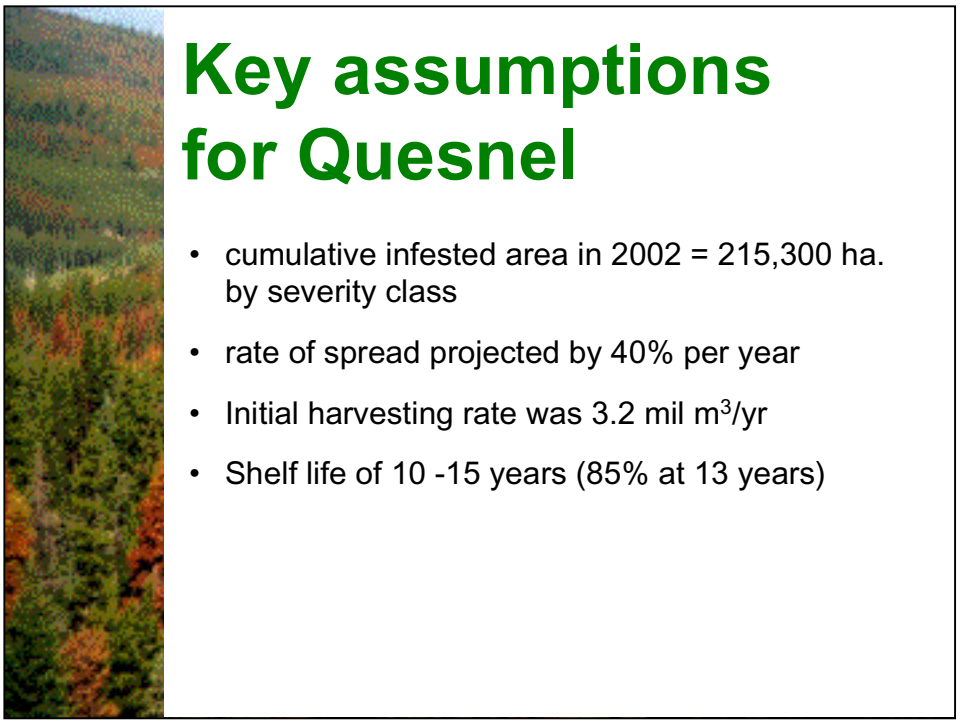


Slide 13

To allow for a more detailed examination of one of the more severely infested units, a separate analysis was completed for the Quesnel TSA. The Quesnel TSA was examined due to concerns about the current AAC and timber supply given the increased rate of beetle attack in the fall of 2002. In addition, we had more detailed data available for this area as I will explain in a moment.

Let's just quickly review the timber harvesting land base in the Quesnel TSA. Of the total TSA area of 1.6 million hectares, about 1 million hectares is within the timber harvesting land base. Of this area, 590,000 hectares are comprised of high-risk pine stands, which are defined as pine stands older than 60 years and containing more than 50% pine. In addition, there are a further 150,000 hectares of mixed species stands that contain between 25 and 50% pine.

Historically, susceptible pine forests were considered to be those older than 80 years; however, in the Quesnel district the beetle attack is now being observed in stands as young as 60 years of age. This is believed to be as a result of the beetle population becoming so astronomically large in a concentrated area.



Slide 14

Let's review the key assumptions for the analysis of the Quesnel TSA.

- An important starting point was to determine the initial area infested. The beetle flight of 2001 is documented as having infested about 215,300 hectares at varying degrees of intensity on the timber harvesting land base.

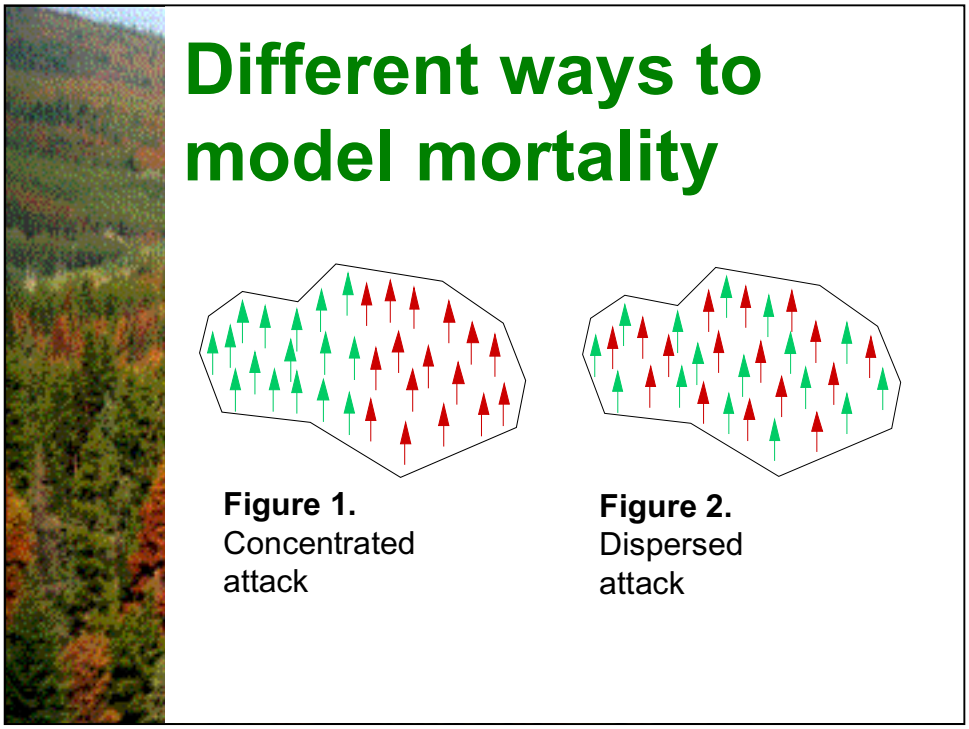
Similar to the analysis of the 12 units, the other key assumptions were as follows:

- the initial timber harvesting rate was set at the current AAC level of 3.2 million cubic metres, which includes a beetle uplift of about one million cubic metres.
- the killed trees were projected to remain merchantable for about 10 to 15 years after they were attacked. The modelling of this assumption was more refined than in the 12 unit study, as the shelf life assessment was correlated

to specific biogeoclimatic subzones. Shelf life averaged 13 years overall in the analysis.

- For pine-leading stands, no forest cover constraints were applied as the beetle infestation will not be limited by adjacency or biodiversity constraints.
- If stands were heavily infested and not harvested, then an extended regeneration delay of 20 years was applied.

I should point out that modelling the pine mortality for the 12 unit study was done differently than it was for the Quesnel TSA study. For the 12 units, the analyst projected 100 percent mortality on one-half of the susceptible area. For the Quesnel TSA, the approach used was to reduce the stand volume by a certain amount on all of the susceptible area.

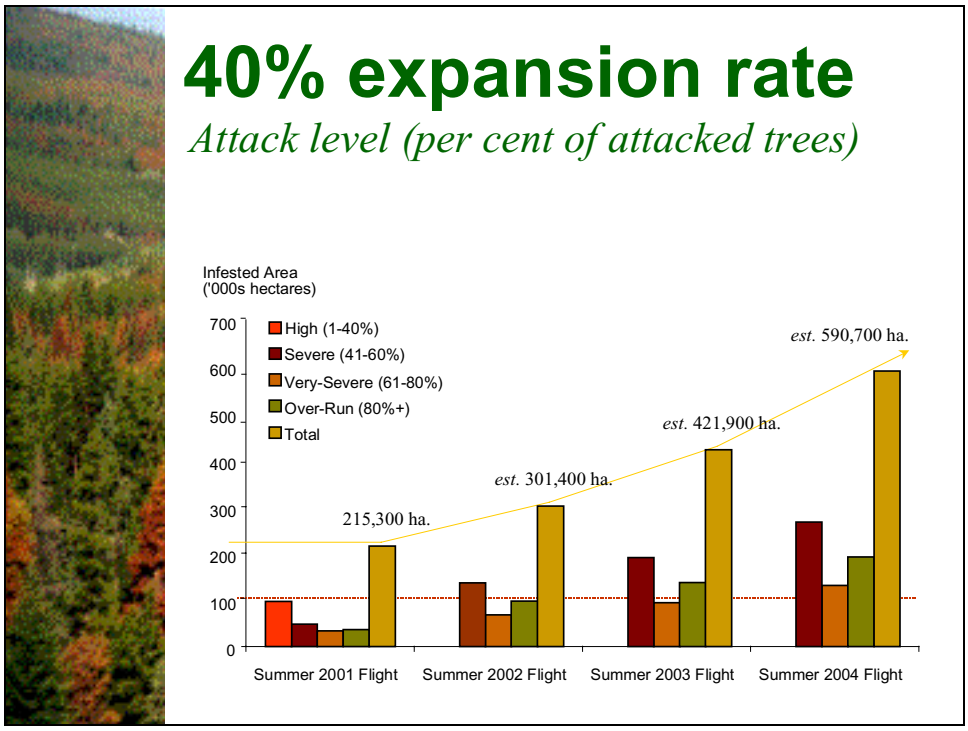


Slide 15

The following may be a difficult point to follow, and I would also draw your attention to the appendix in the main report that summarizes the approaches and the reasons that they differ.

What we did learn is that the timber supply forecast can change dramatically depending on the approach taken. Either approach has strengths and weaknesses, however, and a true reflection of reality likely lies somewhere in between. Without going into detail, I would simply point out that switching the approach used in the analysis would exacerbate the timber supply decline forecasted in the 12 unit study and improve the timber supply projection for the Quesnel TSA.

This is but one example of the uncertainty associated with modelling. That said, I support the separate approaches taken as reflecting our best understanding of the different outcomes expected across a vast area, as compared to a more local or concentrated area.



Slide 16

Let's review the rate of spread and area infested projection for the Quesnel TSA.

For the analysis, the initial starting point was the 215,300 hectares of timber harvesting land base that was mapped as infested in the fall of 2002.

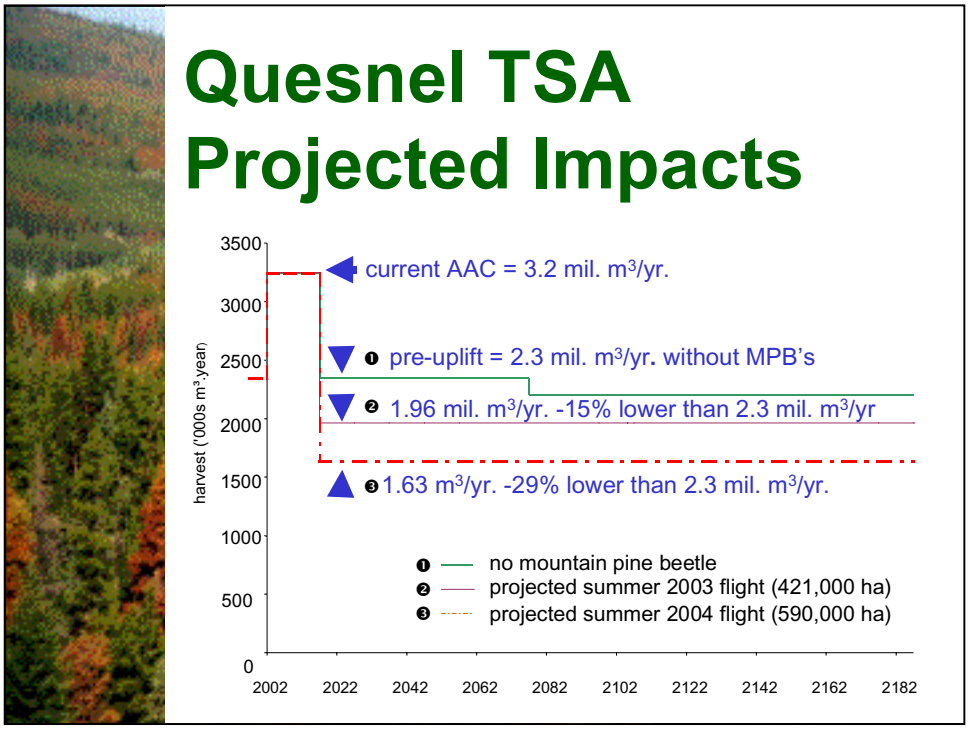
An important difference in this analysis was that in addition to examining the amount of infested area, four levels of attack severity were also included, as shown by the shaded bars. This refined information shows the categories of high, severe, very severe, and overrun, each of which reflects a noted level of stand mortality.

From the starting point of 215,300 hectares, the infestation was projected to increase yearly by 40% until all 590,700 hectares of the high risk pine stands became affected at varying intensity levels. It is startling to note that this occurred as early as 2004, given that the 40%

expansion rate is considered to be quite a conservative estimate for this area.

As I've noted earlier, the rate of spread over the last four years has actually been much higher than 40%. Although there may be some discrepancy between the assumptions in the analysis and recent trends, as the graph shows the high-risk stands will all be infested within a short period regardless of the exact rate of spread. In the case of the Quesnel TSA, staff have already observed that as a result of this summer's beetle flight, most of the pine-leading stands have been infested at some level and the beetles are simply attacking the few remaining unattacked trees within specific stands.

Another point to make, is the unfortunate fact that the beetle is no longer containable in the Quesnel TSA, and extensive suppression efforts are no longer part of the MPB management strategy for this area. The current challenge now and through the next decade will be to recover economic value from the dead pine to the maximum extent possible.



Slide 17

This graph shows three possible timber supply forecasts for the Quesnel TSA, all starting at the current harvest level of 3.248 million cubic metres per year.

1) the first forecast shows the pre-epidemic AAC of 2.3 million cubic metres, which is the baseline that we can use for comparing beetle impact scenarios.

2) the second forecast shows the impact projected by this fall (2003). It assumes the total area infested is now about 421,900 hectares, which reflects a 2-year expansion from the initial area of 215,300 hectares given the conservative expansion rate of 40%.

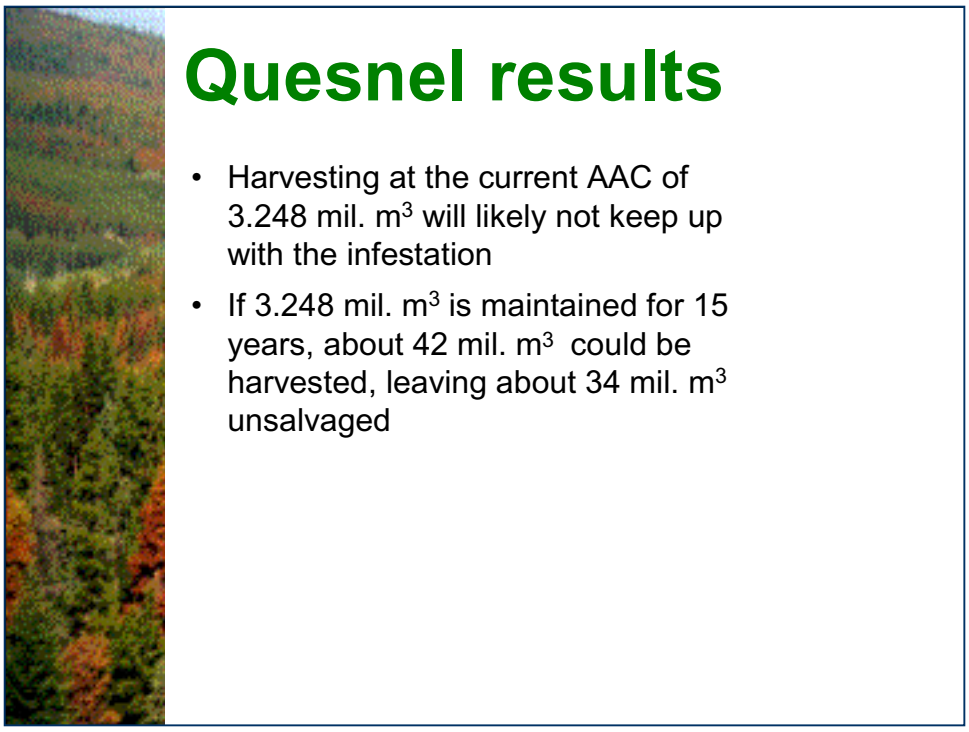
In this scenario, with a very cold 2003/2004 winter and no further spread of the infestation, the harvest level would decline after about 15 years from its current AAC uplift level of 3.248 million cubic metres, to about 1.96 million cubic

metres per year. This is about a 15% reduction relative to the pre-uplift AAC of 2.3 million cubic metres.

3) the third forecast shows the impact if the beetle continues to spread during the summer of 2004 and infests all 590,000 hectares of pine-leading stands older than 60 years to varying degrees of severity. This forecast suggests that after about 15 years the harvest level could decline to about 1.63 million cubic metres per year. This is about a 29% decline in available future timber supply relative to the pre-uplift level of 2.3 million cubic metres per year. In this scenario roughly two thirds of all of the pine over age 60 will have been killed by 2004.

If the infestation continues beyond next summer and the attack continues to intensify at the stand level until all of the pine is killed, then available timber supply is projected to decline to a low of about 1.17 million cubic metres per year. In this analysis, this is projected to occur by 2006 based on the 40% expansion rate. To be clear, no one knows if all of the pine could or would be killed in an area of this size.

The analysis also shows in the 2004 flight scenario, that by the end of 2004, about 76 million cubic metres of the 105 million cubic metres of mature pine in the Quesnel TSA will have either been harvested or infested.



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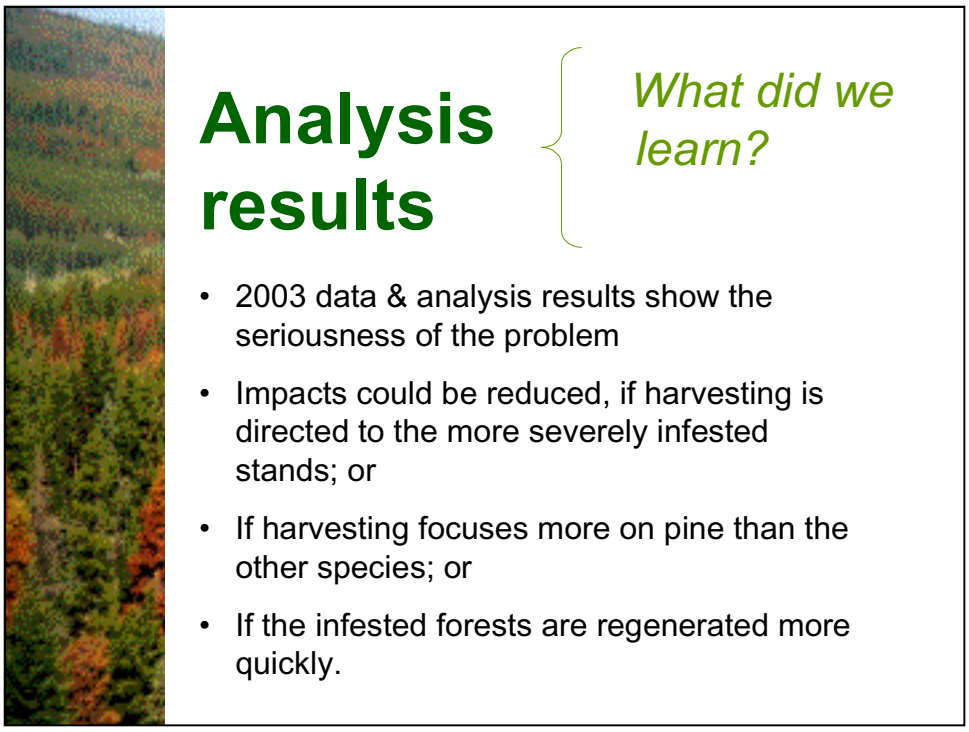
To briefly summarize, the key points from this analysis are similar to the analysis for the 12 units. Harvesting at the current AAC level cannot keep up with the infestation.

As well, if the current AAC of 3.248 million cubic metres is maintained for the first 15 years, about 42 million cubic metres of timber would be harvested, but this leaves a staggering 34 million cubic metres unharvested. This volume is projected to be unsuitable for sawlog production at that time. Again, I emphasize that if alternative uses can be found for this large volume of wood, it could still be used to generate economic activity thereby improving the mid-term forecast.

Nonetheless, with higher harvest levels, timber losses could be reduced. The district manager in Quesnel has asked me to once again review the AAC to determine if a higher level would be appropriate. I will be reviewing this request in the

next few months, along with similar requests in other areas of the province.

It is not possible to predict the weather or the exact rate of future spread of the infestation. If next winter is sufficiently cold or if the pine remains merchantable for longer than assumed for the analysis, the projected declines may not be as large as shown in the Quesnel analysis. Drawing reference to the various ways to model the volume loss, if more stands survive the epidemic and losses are confined to specific areas rather than within each stand, again the declines may not be as large as projected. Both analyses indicate that once significant amounts of lodgepole pine are killed, the timber supply declines after about 15 years, coinciding with the assumed deterioration of the pine to an unmerchantable condition.



Slide 19

Getting back to the question – "How serious is the problem from a timber supply perspective?"…well I'd say about as serious as we've ever seen. I have said before, this is an epidemic of catastrophic proportions. We continue to be astonished by its rate of progression over such a vast area as the interior.

The timber supply analyses indicates that the infestation will have an impact on the available timber supply over the mid-term, (that is in about 15 years), after merchantability declines in the severely infested stands.

While the analysis estimates are generalized, they are predicated on existing survey information and expert opinion. However, risk-rating and predictive modelling of the epidemic were not part of the analyses; hence, the analysis did not involve sophisticated projection of the dynamics of the infestation. Nevertheless, the best available information

was employed, and the analyses provide useful information on potential timber supply impacts and potential practices related to forest management and salvage of killed timber.

With all of that said, after accounting for uncertainties associated with the analysis, there are clearly three factors that deserve further consideration. If harvesting is directed to the more severely infested stands; or, if harvesting focuses more on pine than on other species; or, if the infested forests are regenerated more quickly than assumed…then timber supply impacts could be reduced.

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We must continue to take aggressive action and to better understand how we might reduce the impacts of the ongoing epidemic on the future economy and the important ecological services provided by our forests.

This will ensure we have tackled all the possible options regarding the short-term harvesting challenges and minimize impacts on future timber supplies. This aggressive action is necessary to protect the economic interests of workers, communities, the forest industry and the province.

The Forest Industry and the Ministry of Forests through the MPB Emergency Task Force have been collaborating on the development of a strategic framework for bark beetle management for the past several years. The epidemic continues to grow and we must continue to engage communities and other stakeholders to ensure we have a

common understanding of the problem and develop strategies that work in both the short term and long term.

A symposium is being planned for late November, where industry, community, government and other stakeholders will come together in Quesnel to work on solutions and I hope that this work will help to inform those discussions. Work is also ongoing to enusre that the provincial bark beetle strategy is revised, and kept current and informed by new information whenever it becomes available. A further iteration of that strategy is expected to be finalized soon, to guide this winter's and next year's efforts. With these upcoming actions, operational plans and priorities will be well coordinated and reflect our best understanding of next steps.

In closing, I would like to make a few high level comments. First of all, no person and no thing can forecast the future with certainty….not me, not models…no one. However, we can learn about cause and effect relationships through modelling and we can responsibly extend past trends into the future to assess specific outcomes. Undoubtedly in the years ahead we will have plenty of opportunity to continue to refine our analyses and projections and test whether we made reasonable assumptions and predictions about where this epidemic will go. Don't misunderstand. This isn't a full disclaimer of the findings from this work. I do believe that we are facing unprecedented levels of losses in mature growing stock in the interior of the province. Only the future holds the answer to the question of whether it will be less than or more than we are able to project at this time. What is not known at this time is how we could or should respond in the near future with respect to a legacy of dead trees. How much volume can we realistically recover in the coming years? How fast will the trees really deteriorate? What alternative uses will they have if they are not suitable for sawlogs? What innovations will big and small business come forward

with to help us continue generating economic wealth from our forest resources….dead or alive?

For everything we think we know at the present time, there's still a host of unknowns. The results of this analysis certainly confirm for me that there's no shortage of challenges that lie in the days ahead.

Thank you for the opportunity to speak to you here today.