

How much of British Columbia's forest is not satisfactorily restocked?

And what should be done about it?

Special Report

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Executive Summary	1
Board Commentary	3
Recommendations	4
Detailed Report	5
Introduction	5
What is NSR?	5
What is known and unknown about the status of NSR areas?	7
What are the Forest Industry and Government doing about NSR?	2
Conclusions and Implications	6

Executive Summary

British Columbia is 95 million hectares in size and natural resource management responsibility falls to the provincial government for nearly all of that area. About 55 million hectares of British Columbia is forested and about 22 million hectares of the forest is known as the timber harvesting landbase (THLB); the area where government has expressed the intent to have the trees harvested. This report addresses the issue of restocking forests in the THLB.

Many British Columbians are concerned about forests that have been damaged recently by the mountain pine beetle epidemic (beetles) and large, severe wildfires. There has been substantial debate about what the full extent of this problem is and whether these forests will continue to provide the values we expect from them, now and into the future. This debate has become difficult to follow and part of the reason is that it has been cast in the context of the term 'not satisfactorily restocked' (NSR).

The term NSR has been used by some to describe all of the forests where there might not be a 'satisfactory' number and type of trees. However, government uses a much



more constrained, administrative meaning of NSR. First, government only uses the term NSR to apply to the THLB. Beetles and fire have affected a substantial amount of forest in areas where there is no current intent to harvest, but government does not consider these areas when assessing the amount of NSR. Additionally, government only uses the term NSR to describe areas:

- that do not meet expectations because there are not enough live trees (based on a survey and comparison against a standard); and
- where there is some obligation or intent to correct the situation; that is, to restock the area.

Areas harvested by the forest industry (including by the government-run BC Timber Sales program) meet these criteria for NSR because trees have been removed and there is a legal obligation to restock after harvesting.¹ The forest industry fulfils its legal obligation. At any given time, some areas are being harvested and other areas are being restocked so the area that is NSR because of harvesting remains relatively stable at approximately half a million hectares.

¹ With minor exceptions; notably in the case of some small scale salvage harvesting.

In contrast, there is no specific legal obligation to restock areas affected by natural disturbances, such as beetles and fire.² Government only classifies forests damaged by natural disturbances as NSR if the area is part of the THLB and if they:

- conduct surveys in those areas and find that the area does not meet an approved standard (with respect to the number and type of trees); and
- determine that the area is feasible to treat (primarily based on a return on investment analysis).

Classification as NSR is an indication of government's management intent to restock the area. The amount of area affected by natural disturbances where there is a management intent to restock depends on policy decisions about the level of funding available to government-run reforestation programs. So, similar to industry's obligation, there is a 'rolling balance' of the area that government surveys and classifies as NSR (adding to the area) and subsequently restocks (subtracting from the area). That total amount has remained more-or-less unchanged for the last 10 years at approximately 200 000 hectares.

There is a large area in the THLB affected by natural disturbances, where there may be no viable crop of trees and where natural regeneration of commercially suitable species is expected to occur slowly. Until those areas are surveyed the actual stocking will not be known so they cannot yet be classified as NSR. The Board refers to those areas as 'estimated NSR.' Information provided by government indicates that there is likely on the order of one million hectares of beetle-affected forests that are estimated NSR. There are additional un-surveyed areas of estimated NSR resulting from fires, other natural disturbances and minor amounts of forest harvesting where there is no legal obligation to reforest.

The Board concludes that the combined total area of known NSR (industry's obligation and government's management intent) and estimated NSR (yet to be surveyed) may be as much as two million hectares.

Government has been encouraging the forest industry to harvest the areas affected by beetles and continues to do so. Over a million hectares has been harvested in beetle-affected areas and industry has a legal obligation to restock these areas. It remains to be seen how much more of the beetle-affected areas will be harvested. Government has been funding a reforestation program since 2005 that has treated an estimated total area of just over 50 000 hectares. Most of that treatment has been directed at areas affected by fires and at young managed forests (i.e. plantations) affected by beetles. There has been only a limited amount of reforestation effort directed at mature beetle-affected forests because those areas might still be harvested by the forest industry.

The current situation related to NSR clearly has implications for the future timber supply, particularly in the beetle-affected forests in the central interior of British Columbia. However, substantial work is required to adequately understand the magnitude and timing of those implications.

² Although government has a legal responsibility under the *Ministry of Forest and Range Act* to "encourage maximum productivity of the forest" and to "manage, protect and conserve the forest."

Board Commentary

The recent mountain pine beetle epidemic has no precedent in the management of British Columbia's forests. The consequences of the epidemic go beyond central BC and are national, and perhaps international, in scope. The epidemic may be a bell-weather of things to come across the planet as a result of climate change. The Board is aware that reduced timber supply is only a part of the effect that the epidemic will have on people. Nevertheless, this is the immediate concern that the Board is addressing in this report.

Much of the current debate about the state of BC's forests, as a result of the recent mountain pine beetle epidemic, revolves around how much of the forest is 'not satisfactorily restocked' (NSR). Government is responsible for managing, protecting and conserving the entire public forest³ but it uses the term NSR <u>only</u> in a constrained administrative sense to describe areas that will not meet our expectations for future timber supply because of insufficient stocking <u>and</u> where government has stated a management intent, or industry has an obligation to restock.

Confusion in the NSR debate arises, in part, because this narrow use of the term NSR does not capture the entire area of the forest that people are concerned about. In this report, the Board attempts to clarify the use of the term NSR; quantify the area that may not meet our expectations for future timber supply; identify what needs to be done to decide if it is a problem; and only then, offer suggestions about what to do about it.

Decisions about what to do about areas within the timber harvesting landbase where the mountain pine beetle and fires have killed most of the trees will have an impact on the future timber supply. At a minimum, if nature is left to take its course, the eventual crop of timber in those areas will be delayed, and will be less likely to meet optimum timber production standards.

There is little doubt that a very large area of forest affected by mountain pine beetles may not meet our expectations for future timber supply. However, there is substantial uncertainty about how much of that area will be salvage harvested and come under the forest industry's legal obligation to restock. Nevertheless, the cost of treating the entire remaining un-salvaged area will undoubtedly be significant. Restocking much of this area will require detailed site prescriptions and tree planting involving road building and site preparation, including snag removal. It is not unreasonable to expect a financial investment approaching \$3000 per hectare, not to mention any potential environmental costs due to these activities.

It is the Board's view that there is little value at this juncture in further refining what the 'actual' area of NSR might be. The important matter is whether it is good public policy to invest the money necessary to mitigate future timber supply impacts and, if so, how will the money be raised and invested? If action is to be taken, the Board believes it must be taken quickly.

³*Ministry of Forests and Range Act* <u>http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/00_96300_01</u>

The Board realizes that much of the public has come to think of restocking disturbed forest as 'the right thing to do' and in the case of logging, it is the law in BC. However, the decision to restock, and the appropriate way to restock, is much more complicated when dealing with beetle-attacked forests where the damage is variable, the area is extensive, and there are considerations other than the timber value, such as effects on wildlife habitat, scenic vistas, and the peak flow of rivers. An informed dialogue on the topic would be helpful. The Board hopes that this report will contribute to that dialogue.

Recommendations

The Forest Practices Board recommends that government:

- 1. confirm its assumptions about how much additional area will be salvage harvested by the forest industry and develop a monitoring system to track whether those assumptions are being borne out;
- 2. use the best information and projections currently available to conduct a broadly framed cost-benefit analysis of options to restock or not restock areas that may be NSR in the beetle affected region; and
- 3. carry out the survey and inventory work necessary to inform the future decisions that must be made; particularly those related to determination of the allowable annual cut in the beetle affected region.

The Board would appreciate a response from government, indicating how it will address these recommendations, by October 1, 2012.

Detailed Report

Introduction

The forests that have been damaged recently by the mountain pine beetle epidemic (beetles) and large, severe wildfires are of concern to many. There has been substantial debate about whether these forests will provide the values we expect, now and into the future. Much of the debate on the topic revolves around very different statements about how much of the forest is not satisfactorily restocked (NSR).

The Forest Practices Board has prepared this special report in an effort to help promote an informed dialogue on the topic of the state of stocking in BC's forests. This report answers three questions:

- what is NSR;
- what is known and unknown about the area that is NSR; and
- what are government and the forest industry doing about NSR?

What is NSR?

Government formalized the definition of 'not satisfactorily restocked' because of amendments to the *Forest Act*, made in 1987, that changed the requirements to restock (or reforest) areas that have been harvested. The current definition of an NSR area is:

"an area not covered by a sufficient number of well-spaced trees of desirable species."⁴

A "stocking standard"⁵ provides precise definitions of the words "sufficient," "well-spaced" and "desirable." The "area" referred to can be NSR for any reason (i.e., logging or natural disturbance) but the stocking standards were originally developed for use in the context of a logged cutblock.⁶

The definition is problematic because it does not include three pieces of context that are fundamental to the way in which government administers NSR. From an administrative perspective an area can only be NSR if:

- 1. it is in the timber harvesting landbase (THLB);
- 2. the area has been surveyed and the results have been compared to a stocking standard; and
- 3. industry has a legal obligation to restock the area or government has determined that the area is feasible to restock (based primarily on return on investment criteria).

⁴ <u>http://www.for.gov.bc.ca/hfd/library/documents/glossary/Glossary.pdf</u> (NOTE: all web links in the footnotes for this report were checked on June 1, 2012)

⁵ Ibid. "The range of healthy, well-spaced, acceptable trees required to establish a free-growing stand ..."

⁶ Although more than one stocking standard may apply within a single cutblock

These three administrative aspects of the meaning of the term NSR are discussed in some detail below.⁷

Government only uses the term NSR in the context of objectives for the timber value as defined in the *Forest Planning and Practices Regulation*. Therefore, the term NSR is only applicable to the portion of the forest where trees are harvested for commercial purposes, such as wood products like lumber and pulp; that is, the timber harvesting land base (THLB). There are about 55 million hectares of forest in British Columbia but the THLB is only 22 million hectares. In the remaining forest there is no current intent to harvest; in some cases because government has decided to not allow harvesting (e.g., in parks and old growth management areas) or because it is not economical to harvest the trees (e.g., because the trees are of low quality or are inaccessible).

Beetles and fire have affected a substantial amount of forest outside the THLB but government does not consider these areas when assessing the amount of NSR.

The forest industry has a legal obligation to restock areas it harvests and government has a legal obligation to restock areas harvested by the BC Timber Sales Program (BCTS).⁸ In general, BCTS is subject to the same forest practices regulations as private licensees and, for the purposes of this report, the Board treats BCTS the same as licensees. However, with minor exceptions,⁹ government has no other specific legal obligation to restock any area. Government uses the NSR classification to keep track of areas where it has a management-intent to restock. Currently, those areas are mainly areas affected by natural disturbances (primarily fires and beetles) where stocking is considered to be inadequate and an analysis has been done to demonstrate that the area is feasible to treat (primarily based on return on investment).

NSR is used to describe an area where there is either a legal obligation or management intent to restock; it is **not** used to indicate the state of stocking in the forest.

An area can be only classified NSR (or conversely, satisfactorily restocked) if it has been surveyed and compared to a stocking standard. For the forest industry this is not problematic; forest companies routinely conduct surveys of harvested areas. However, the notion that an area must be surveyed to be classified as NSR is problematic for government, as there are large areas that may be NSR because of the effects of beetles and fire, but these areas have not been surveyed.

Discussion about how much NSR area there is must be separated into amounts of **<u>known NSR</u>** (where surveys have been conducted) and amounts of <u>**estimated NSR**</u> (where it is likely that a survey would result in the classification of the area as NSR).

⁷ For those who are interested, a reasonably full discussion of the arcane nature of NSR can be found at: <u>http://www.wsca.ca/Media/Multimedia/Feb%203%20-%20NSR%20-%20FPB%20Backgrounder%20-%20Marvin%20Eng.pdf</u>

⁸ Including those areas harvested under the former Small Business Enterprise Program.

⁹ Those harvested areas harvested under *Forest Planning and Practices Regulation* s. 46, and areas where the silviculture obligation has been transferred to the district manager under *Forest and Range Practices Act* s. 30. Approximately 5 500 hectares of NSR fall into this category (Al Powelson, personal communication, 2012/05/09).

What is known and unknown about the status of NSR areas?

Understanding that NSR is used administratively to keep track of surveyed areas where there are obligations and intentions to restock, rather than to keep track of the state of stocking in the forest, helps to explain what is reported by government about the amount of NSR and how it has changed over time (Figure 1). Government is reporting on the amount of <u>known NSR</u>. After the 1987 amendment to the *Forest Act*, when the forest industry began to take on the legal and financial obligation to restock harvested areas, government stated its intention to restock nearly 1.4 million hectares, which had been previously harvested but was still <u>known NSR</u>.

Industry's obligation grew in size for seven years because there is a lag between the time that areas are harvested and the time they are replanted or successfully regenerate naturally. This lag stabilized around 1993 and since then industry's obligation has fluctuated between 400 000 and 600 000 hectares. This represents a 'rolling inventory,' at any given time, of approximately two to four years of harvesting that is in the process of being restocked.

The area that government intended to restock in 1987 declined steadily from 1.4 million hectares to under 250 000 hectares around 1999. About half the decline was the result of provincial and federally funded reforestation programs¹⁰ and the other half was the result of natural regeneration or reclassification of <u>known NSR</u> areas as non-productive areas (i.e., no longer part of the THLB). Since 1999, there has been little change in the area of <u>known NSR</u> that government has stated its management intention to restock. Additions due to the surveying and classifying of areas as NSR, because they were affected by fires and pests, reforestation failures and harvesting, have approximately equaled reductions due to planting, natural regeneration and reclassification (as non-productive areas).

The levels of additions and deletions show a strong correlation with funding for reforestation efforts, which 'bottomed out' in 2004, just prior to the advent of the current government reforestation program, Forest For Tomorrow (FFT) (Figure 2). Since the beginning of FFT, government's management intent to restock areas (i.e., that it has classified as <u>known NSR</u>) because of fires and pests, has risen from 34 000 hectares to 87 000 hectares. During the same time period, <u>known NSR</u> areas harvested prior to 1987 declined from 170 000 hectares to 89 000 hectares, mostly due to a re-evaluation of the condition of those areas (i.e., they were classified as satisfactorily restocked). Overall, government's stated management intent to restock <u>known</u> <u>NSR</u> has declined from 200 000 hectares on March 31, 2005, to 180 000 hectares on May 1, 2012.

The information presented in Figure 1 and Figure 2 is based on the data from government's Reporting Silviculture Updates and Land status Tracking System (RESULTS) database.¹¹ This system allows reasonably precise and timely statements about the amount of <u>known NSR</u> that is industry's legal obligation (including the BCTS obligation) and the area where government has stated a management intent to restock. On May 1, 2012, these areas were 510 000 hectares and 180 000 hectares, respectively.

¹⁰ Primarily the jointly funded Federal-Provincial Forest Resource Development Agreement program and the provincially funded Forest Renewal BC program.

¹¹ http://www.for.gov.bc.ca/his/results/



Figure 1. Area of <u>known NSR</u> (millions of hectares) showing separately industry's (including BCTS) legal obligation and government's stated management intention.



Figure 2. Additions and reductions to the amount of <u>known NSR</u> that government has stated a management intention to restock.

As stated previously, the fact that the amount of NSR has not changed much during the last 10 years is counter-intuitive, given that there have been very large areas disturbed by beetles and wildfires. Government is obviously aware that these disturbances have taken place, but until it completes the survey work and feasibility analysis required to classify the applicable areas as <u>known NSR</u>, it can only provide areas of <u>estimated NSR</u>.

According to government, the amount of <u>estimated NSR</u> caused by beetles in mature pine forest in the THLB is 0.7 to 1.1 million hectares.¹² The Board believes the order of magnitude of this estimate is correct, but is concerned that the precision of the estimate (nearest 100 000 hectares) substantially overstates the quality of the information that government has at its disposal. The estimate is based on:

- forest cover mapping that is substantially outdated for much of the province;¹³
- a model of the extent and impact of the beetles that is based on information not specifically collected for the purpose and, ever since its inception in 2004, has come with the caveat that "current mortality estimates are ... essentially unverified";¹⁴ and
- an assumption about the proportion of the area affected by beetles that is not NSR¹⁵ that is based on a simple summary of available data that was not specifically collected for the purpose. The authors of that summary conclude that "generalizations about secondary structure abundance based solely on the pre-beetle dominance of merchantable pine are crude at best."¹⁶

An analysis of the information provided by government leads the Board to conclude that the data is reliable only to the nearest million hectares; that is, there may be approximately one million hectares of <u>estimated NSR</u> caused by beetles in mature pine forests in the THLB.

The Board is also concerned that recent public statements by government do not provide explicit estimates for other sources of <u>estimated NSR</u>, some of which may be significant:

• <u>Wildfire:</u> There has been nearly 1.5 million hectares of forest affected by wildfire since 2000, both within and outside the THLB.¹⁷ Government has stated that the nearly half million hectares of large fires that occurred in 2003 and 2004 have been surveyed and

¹² Chief forester's presentation to the Western Canada Silvicultural Contractors Association in 2012 (at minute 13) http://www.youtube.com/watch?v=r80tGl9Tbt8

¹³ <u>http://www.abcfp.ca/publications_forms/publications/documents/Forest_Inventory_2012_FINAL2.pdf</u> at page 8; nearly 75 percent of the province was mapped prior to 1990

¹⁴ This statement was made for the ninth time on page 11 at <u>http://www.for.gov.bc.ca/ftp/hre/external/!publish/web/bcmpb/year9/BCMPB.v9.BeetleProjection.Update.pdf.</u>

¹⁵ <u>http://www.abcfp.ca/publications_forms/BCFORmagazine/documents/BCFORPRO-2011-5_AllArticles/BCFORPRO-2011-5_Snetsinger.pdf</u> states that "70-80% of [beetle affected, pine leading stands on the timber harvesting landbase] have advanced regeneration in quantities that can regenerate these sites successfully."

¹⁶ Coates, D. and D. Sachs. 2012. Current State of Knowledge Regarding Secondary Structure in Mountain Pine Beetle Impacted Landscapes. Unpublished report; MFLNRO.

¹⁷ <u>http://bcwildfire.ca/History/average.htm</u> 2011 estimated

restocked, where required.¹⁸ This leaves just under one million hectares of fires, which occurred in other years, of which possibly 0.2 million hectares may be <u>estimated NSR</u>.¹⁹

- Immature forest affected by beetles: Survey work completed in 2006 showed highly variable damage by beetles in immature, free-growing stands. That damage was severe enough in some cases to render the stands NSR.²⁰ According to government, the amount of <u>estimated</u> NSR in young pine stands might be 80 000 hectares.²¹ The FFT program has added approximately 20 000 hectares of <u>known NSR</u> due to pests (most of which is young stands damaged by beetles). This would leave approximately 60 000 hectares that may need treatment. While this is a relatively small area, compared to the total area of young stands, it may be important to the mid-term timber supply in some management units.
- <u>Small scale salvage</u>: "Small scale salvage has been used as a tool to salvage and utilize timber that would otherwise not have been harvested, as well as addressing forest health objectives for many years."²² One of the consequences for government, of the small scale salvage program, is that licences issued for timber volumes less than 500 cubic metres, under a forest licence to cut (FLTC) tenure carry no licensee obligation to restock. Unfortunately, until 2007, there was no requirement to submit information to the RESULTS database where harvesting was done under FLTC tenures (and it appears that submissions since that time have not been complete). As a consequence, there is an unknown area harvested under this tenure that government is responsible for restocking. Although the last publicly available estimate of the size of that area is 0.3 million hectares,²³ the Board has been informed that government has revised the amount of <u>estimated NSR</u> due to this source down to 0.1 million hectares.²⁴
- <u>Other natural disturbances</u>: There are a variety of natural disturbances, other than beetles and fire, which may be severe enough to cause a forested stand to be classified as NSR (if it were surveyed). These disturbances are, with few exceptions,²⁵ native to

10

¹⁸ http://www.abcfp.ca/publications_forms/BCFORmagazine/documents/BCFORPRO-2011-<u>5 AllArticles/BCFORPRO-2011-5 Snetsinger.pdf</u>

¹⁹ Ibid. 10 percent to 25 percent of the fire affected area.

²⁰ http://www.for.gov.bc.ca/rsi/foresthealth/PDF/Young%20Pine%20Report_CF_final.pdf

²¹ Unpublished Forest For Tomorrow Business Case unpublished; but see <u>http://www.google.ca/url?sa=t&rct=j&q=forest%20for%20tomorrow%20business%20case&source=web&cd=1&sqi=</u> <u>2&ved=0CB4QFjAA&url=http%3A%2F%2Fforestsfortomorrow.ca%2FProgramManagement%2FProgramReview%</u> <u>2FDocuments%2FBusiness_Case(KellyOsbourne).ppt&ei=809jT4iIJOjViAKfqq2iDw&usg=AFOjCNHXo-IE782ccpOpH9_BKF6qAA3QoQ</u> slide 6.

²² http://www.for.gov.bc.ca/ftp/hth/external/!publish/Web/timber-tenures/small-scale-salvage/sss-3-year-strategicplan-2007-08-to-2010-11.pdf

²³ Page 23 at <u>http://www.google.ca/url?sa=t&rct=j&q=key%20silviculture%20statistics&source=web&cd=1&ved=0CCEQFjAA&u rl=http%3A%2F%2Fwww.for.gov.bc.ca%2Fhfp%2Fsilviculture%2Fdiscussion_paper%2FKey%2520Silviculture%25 20Statistics%2520version%25202.ppt&ei=76tjT5vvD6ShiAKrzZ2jDw&usg=AFQjCNF8mS_ul6x7EjYTsy72jKlCT4H5 uQ</u>

²⁴ Personal Communication; Jim Sutherland; May 1, 2012.

²⁵ E.g. white pine blister rust; Gypsy moth.

British Columbia and they have likely always experienced cycles in their effects on forests. However, the recent extent of some of these disturbances is thought to be an unprecedented result of climate change (e.g., *Dothistroma* needle blight²⁶) and in other cases both climate change and forest management activities are implicated (e.g., western spruce budworm²⁷). While government staff has recently expressed concerns about the effects of climate change on natural disturbances,²⁸ no estimates have been provided of the area that might have become NSR as a result of these effects. Substantial effort has been expended in dealing with the *Dothistroma* needle blight infestation in young pine stands in northwestern BC and some of that area remains as <u>known NSR</u>.

In summary, there are a number of sources of <u>estimated NSR</u>, but the area of those sources is poorly known. Given the uncertainty, the Board concludes that the total combined area of <u>known NSR</u> and <u>estimated NSR</u> may be on the order of two million hectares (Table 1).

Table 1. known NSR and estimated NSR area (hectares) by source.	
Source	NSR area ¹
Known NSR (from RESULTS ²)	
Government's Management Intention	180 000
Industry Legal Obligation	510 000
Estimated NSR (see text for explanation)	
Beetles in mature pine stands	1 000 000
Beetles in immature pine stands	60 000
Wildfire	20 000
Small Scale Salvage	100 000
Other natural disturbances	?
Total NSR ³	2 000 000
¹ zeros are not significant; they provided as placehold	ders only.

² on May 1, 2012.

³ because of uncertainty in the areas of the estimated sources, the total must be presented with one significant digit.

This represents about 9 percent of the approximately 22 million hectares in the THLB. To place this in context, nearly 40 percent of the THLB (8 million hectares) is currently in 'managed' stands; resulting principally from forest harvesting. These stands are in one of three categories: <u>known NSR</u>, satisfactorily restocked immature stands, or free growing young stands (Figure 3). Note that industry is legally obliged, after harvesting, for both creating a satisfactorily restocked stand and seeing that stand through until it is free growing; when the responsibility reverts to

²⁶ Woods, A, K.D. Coates, and A Hamann. Is an Unprecedented Dothistroma Needle Blight Epidemic Related to Climate Change? Bioscience 55:761-769.

²⁷ Maclauchlan, L.E. and J.E. Brooks. 2009. Influence of past forestry practices on western spruce budworm defoliation and associated impacts in southern British Columbia. BC Journal of Ecosystems and Management 10(2):37–49.

²⁸ Woods, A., D. Heppner, H. Kope, J. Burleigh, L. Maclauchlan 2010. Forest health and climate change: A British Columbia perspective. The Forestry Chronicle, 2010, 86(4): 412-422.

government. Government estimates that approximately five million hectares of 'unmanaged' (i.e., not yet harvested) THLB area is in pine leading forest affected by beetles²⁹ and the Board concludes that perhaps one million hectares of that is <u>estimated NSR</u>. This leaves just over ten million hectares of 'unmanaged' (un-harvested) forest dominated by tree species other than pine, or pine dominated forests that are not yet affected by beetles.

It is important to remember three points about this estimate of the area of NSR and the context provided:

- The estimate is only applicable to the THLB. There is a large and un-quantified area of forest affected by recent natural disturbances that is outside the THLB where government has the responsibility to manage for forest values other than timber.
- The context is provincial in scope. The proportions of the forest affected are much higher in some regions.
- Both the estimate and the context are an assessment of the current situation. While it is possible to speculate on what might happen in the future, such speculation should be clearly separated from an assessment of the current situation.

Figure 1. Proportions of the timber harvesting land base in categories relevant to questions about NSR (notes: minor sources of estimated NSR in Table 1 are not shown; industry obligation includes BCTS; government has a responsibility for that portion of the forest where there is no industry obligation).

²⁹ <u>Chief forester's presentation to the Western Canada Silvicultural Contractors Association in 2012</u> (at minute 11) http://www.youtube.com/watch?v=r80tGl9Tbt8.

What are the Forest Industry and Government doing about NSR?

The Forest Industry

The Board is confident that the forest industry is meeting the legal obligation to satisfactorily restock harvested areas. This confidence is based primarily on the results of the Board's audit program. However, there are two caveats in this context:

- 1. The Board has previously reported that government may not be fully aware of the extent of industry NSR because of late reporting to the RESULTS database.³⁰
- 2. The Board is aware of concerns that restocking of harvested areas to stocking standards established³¹ in forest stewardship plans may not be sufficient to create a resilient forest consistent with public expectations and assumptions. There are many other considerations such as tree species diversity, use of select seed versus natural regeneration, post-free growing performance of stands, etc.

The forest industry is continuing to harvest pine forests affected by beetles. During the 2011/2012 fiscal year, nearly 60 percent of the volume harvested in the interior of BC was pine.³² If continued, this harvesting will reduce the area that is <u>estimated NSR</u> because of beetles, since the forest industry will assume the legal obligation to restock those areas. However, there are two sources of uncertainty:

- It is not clear whether the continued harvest of pine stands is being directed solely or principally at areas that would otherwise be classified NSR; that is, areas not 'recovering on their own,' although the *Forest Planning and Practices Regulation* does contain a section that attempts to prevent harvesting of pines stands affected by beetles that have sufficient stocking to contribute to the mid-term timber supply.³³
- The amount of salvage harvesting that will occur in the future is very uncertain. There are indications that the salvaging of beetle affected timber to produce traditional products (e.g., lumber) is beginning to wind down.³⁴ Conversely, the Board is aware of instances of specific market conditions that have contributed to the continued salvage of beetle-affected pine. These include power co-generation opportunities and increased demand for wood pellets and pulp that have, in some cases, enabled the harvesting of otherwise uneconomical stands.

³⁰ http://www.fpb.gov.bc.ca/SIR33 Reporting the Results of Forestry Activities.pdf

³¹ These standards are usually default standards provided by government that are adopted by the authors of the Forest Stewardship Plans.

³² Based on information obtained from the Harvest Billing System.

³³ Section 43.1 - Secondary structure retention in mountain pine beetle affected stands. <u>http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/12_14_2004#section43.1</u>

³⁴ Notably; declines of more than 10 percent in the contribution of pine to harvest in 2010, compared to the peak in pine contribution for 9 of 29 beetle impacted management units (average decline 23 percent). (<u>http://www.for.gov.bc.ca/hts/pubs/Monitoring%20Harvest%20activity%20AP(July_20_2011)_AN.pdf</u>); allowable cut determinations for TFL 35 and TFL 49 where cuts have been decreased to pre-salvage levels; and the small number of active cutting permits in some areas most severely affected by beetles such as south of Ootsa Lake, the southern portion of the Prince George District.

Government

For the past 12 years, government has used a variety of policy levers³⁵ to encourage the forest industry to harvest areas affected by beetles, and thus to take on obligations to restock those areas. Approximately 1.3 million hectares of pine leading stands have been harvested since the beginning of the outbreak in 1999.³⁶ However, it is unknown how much of this area would have been classified as NSR had it not been harvested.

As mentioned above, salvage harvesting for lumber production is beginning to decline. Government is attempting to encourage continued harvesting (and associated restocking obligations) for other purposes; specifically through a bioenergy industry,³⁷ partnerships in forest carbon restoration projects³⁸ and, more generally, through the promotion of a "bioeconomy."³⁹ It remains to be seen how successful these endeavors will be.

Government is meeting its management intention to restock areas of <u>known NSR</u> through its Forests For Tomorrow (FFT) program, funded as a portion of the Landbase Investment Program.⁴⁰ The FFT program began operating in 2005. The 2007 FFT business case used an amount of 400 000 hectares of <u>estimated NSR</u> in mature beetle affected pine, young beetle affected pine and fire affected areas. A 20-year program of reforestation, that addressed 20 000 hectares per year, was proposed with an estimated cost of 60 million dollar per year. In the four intervening years⁴¹ the FFT program has planted an average of 9 700 hectares and has been funded at an average of 41 million dollars. Planting tree seedlings is intended to produce a crop of trees suitable for harvest more quickly than natural regeneration would. The rate at which government is pursuing these activities means that much of the area of <u>estimated NSR</u> will regenerate naturally before it is treated.

To date, the FFT program has been largely focused on rehabilitating young (but free growing) forests affected by fires and beetles. The FFT program has also rehabilitated some areas of mature beetle affected forest through partnerships with the BCTS, where BCTS removes the timber and FFT undertakes the reforestation.⁴² However, work on rehabilitating mature pine stands affected by beetles will not begin in earnest until it is clear that the forest industry will not be salvage harvesting the relevant areas.

³⁵ The most obvious was increases in the allowable annual cut but various forms of "administrative relief" have also been used.

³⁶ <u>http://www.youtube.com/watch?v=r80tGl9Tbt8</u> at minute 13.

³⁷ <u>http://www.for.gov.bc.ca/pab/nfw/bioenergy-guide-2010.pdf</u>

³⁸ http://www.newsroom.gov.bc.ca/2012/01/province-seeks-pine-beetle-reforestation-partners.html

³⁹ <u>http://www.gov.bc.ca/jti/down/bio_economy_report_final.pdf</u>

⁴⁰http://www.for.gov.bc.ca/ftp/hfp/external/!publish/LBIS_web/2011/2011_12%20Prov%20LandBased%20Investm%20 Progr%20REPORT%20final.pdf

⁴¹ 2008/09 to 2011/12 – last fiscal estimated. Estimated total area planted since the beginning of the program in 2005 is 51 000 hectares – source is RESULTS.

⁴² Through collaboration in the use of Innovative Timber Sale Licences (ITSLs) in conjunction with FFT forest rehabilitation activities http://www.for.gov.bc.ca/ftp/hfp/external//publish/fft_standards_on_cms_web/overstorev_removal/FFT_BCT

http://www.for.gov.bc.ca/ftp/hfp/external/!publish/fft standards on cms web/overstorey removal/FFT BCTS M OU[1].pdf

Some FFT resources have been devoted to <u>known NSR</u> areas created by small scale salvage and some to the assessment (and reclassification) of <u>known NSR</u> areas created before 1987. Additionally, FFT resources are used where government has agreed to fund restocking of immature plantations, created by the forest industry, that have been affected by natural disturbances (under section 108 of the *Forest and Range Practices Act*). Finally, some FFT resources are required to maintain the stocking status of areas planted under the program (e.g., brush control activities).

Government has begun to engage in a number of projects that could provide some better information about the stocking status of the forests. These include:

- MPB Impacted Stands Assessment Project.⁴³ The goal of the project is to characterize the future growth potential of mature, beetle affected pine stands if left to naturally develop. A review of existing plot-based data has been completed. As part of this project, government intends to resample 60 beetle affected permanent sample plots during the summer of 2012 and another 500 plots over the next three years.
- Framework for Implementing Young Stand Growth Monitoring In British Columbia.⁴⁴ A sampling protocol has been developed to allow an assessment of the state of the free-growing forest relative to timber supply expectations. The protocol will be tested this coming year in the Morice and Kootenay Lakes Timber Supply Areas (TSA).
- **Pilot project to investigate a low cost forest cover inventory approach**. A project using satellite image interpretation, which has been completed for the western portion of the Quesnel TSA. An additional project in the portion of the Williams Lake TSA affected by beetles is planned for 2012.
- Focused re-inventory of beetle affected management units. This has been initiated in the Quesnel, Williams Lake, 100 Mile, and Lakes TSAs and the Vanderhoof Natural Resource Operations Districts.

⁴³ Coates, K.D. and D.L. Sachs 2012. MPB Impacted Stands Assessment Project: Current State of Knowledge Regarding Secondary Structure in Mountain Pine Beetle Impacted Landscapes; unpublished MFLNRO document.

⁴⁴ <u>http://www.for.gov.bc.ca/hts/vri/monitoring/dowloads/monitoring-framework_13Jan2012_ver2-2.pdf</u>

Conclusions and Implications

NSR was a useful indicator for government to track its progress in addressing a 25-year old problem that has now been largely solved: government's dissatisfaction with regeneration of the 1.4 million hectares of forest harvested before 1987. Tracking efforts to resolve that problem required an indicator (NSR) with a narrow and specific administrative meaning. While NSR continues to be a useful administrative tool for tracking current obligations and intentions to restock, we need indicators that actually track the status of the current problems in the forest, both within and outside the THLB.

Developing such indicators requires us to ask the question 'what is satisfactory?' That is, what are we trying to achieve with forest management specifically and, more generally, with natural resource management? These questions go directly to our objectives for timber and other values. The Auditor General of BC has recently concluded that government does not have clearly defined, provincial-scale objectives for the timber value.⁴⁵ In 2011, the Board raised concerns about the need for government to articulate natural resource management objectives for the entire landbase.⁴⁶ Articulating these objectives in the context of the NSR debate requires answering questions that include:

- Where in the forest do we expect to produce the timber (or perhaps the fibre) value?
- What amounts and qualities of timber can we reasonably expect to produce; in the short, medium, and long term?
- What are the risks that our expectations will not be met, and what is our risk tolerance and risk mitigation strategy?
- How should government measure or indicate sustainability of timber management?

There is no single, right answer to these questions. The best we can hope to achieve is a consensus that is acceptable to the people of BC. That consensus will not be static; it will require an ongoing process of engagement with those who have an active 'stake' in the forest.

In the meantime, the most pressing issue related to the topic of NSR is: what is the impact of the recent beetle outbreak on the future timber supply for the central interior of British Columbia? It is clear that if there is approximately one million hectares of NSR resulting from natural disturbances and if government intends to rehabilitate those areas at the current rate that the FFT program is operating (approximately 10 000 hectares per year) there will be substantial areas that will regenerate naturally before they are treated. Compared to replanting the entire area promptly, this will have negative consequences for the future timber supply in the area affected by beetles. What is not clear, however, is what, if anything, should be done to ameliorate the timber supply consequences?

Part of the problem with answering that question is the significant uncertainties related to the issue. Notably; what is the current state of the mature pine forest affected by beetles in the most severely impacted areas⁴⁷ and how might that forest perform in the future with respect to the

⁴⁵ <u>http://www.bcauditor.com/files/publications/2012/report_11/report/OAGBC_FLNRO-Management-Timber.pdf</u>

⁴⁶ http://www.fpb.gov.bc.ca/SR39 Cumulative Effects From Assessment Towards Management.pdf

⁴⁷ The Sub-Boreal Spruce, Sub-Boreal Pine Spruce and portions of the Montane Spruce Biogeoclimatic zones.

objective of producing timber? Resolving these uncertainties requires, at a minimum, a program of ground-based field sampling designed to meet the needs of the growth and yield models used by government in the timber supply review process. Government's proposal to re-measure permanent sample plots partly answers that question; however, the Board is concerned that, given the level of uncertainty and the immediacy of the question, the proposed program will be 'too little, too late.' Another principal uncertainty is how much beetle-affected forest will be harvested by the forest industry and therefore will not require rehabilitation by government. While these uncertainties cannot be completely resolved, reasonable efforts should be made to reduce them.

Finally, although this report is concerned with NSR, in the context of the timber value, there are many other values, both inside and outside the THLB, that need to be considered when making decisions about whether to rehabilitate areas. Monetary value (return on investment) is part of the Forests For Tomorrow program's decision-making process for each forested stand that is surveyed. However, making stand-level decisions alone leaves more general questions unanswered about how many public funds should be devoted to rehabilitation of forests damaged by natural disturbances. Such broader policy questions require broader cost-benefit analyses incorporating landscape level considerations about both timber and non-timber values, and a comprehensive risk-based approach designed to inform decision-making about whether treatment would be useful.

PO Box 9905 Stn Prov Govt Victoria, BC V8X 9R1 Canada Tel. 250.213.4700 | Fax 250.213.4725 | Toll Free 1.800.994.5899 For more information on the Board, please visit our website at: www.fpb.gov.bc.ca

NEWS RELEASE

Embargoed until June 26, 2012

Timely decisions about restocking BC forests for future timber supply needed

VICTORIA – The total area of BC's provincial forests that may need to be restocked with healthy young trees could exceed current reforestation efforts by more than one million hectares, according to a Forest Practices Board report released today.

The report indicates that almost two million hectares of Crown forested land could potentially be "not satisfactorily restocked" (NSR). Of that, nearly half a million hectares will be restocked by industry and government has current plans to restock about a quarter of a million hectares.

"Decisions about whether to replant areas where mountain pine beetle and fire have killed most of the trees will have an impact on the future timber supply in the BC interior," said Al Gorley, board chair. "At a minimum, if nature is left to take its course, the eventual crop of timber in those areas will be delayed."

Government has a reforestation program for these areas, but to date it has only directed limited effort at re-stocking mature, beetle-affected forests because those areas might still be harvested – and eventually restocked – by the forest industry.

"There is a lot of debate about exactly how much forest has been damaged by fire and beetles," said Gorley. "But the important question is, should we invest money now to ensure a healthy timber supply into the future, and, if so, how will we raise and invest it? But if action is to be taken, it must be taken quickly."

The Board has made recommendations to government that it hopes will promote a useful dialogue on the topic of restocking British Columbia's forests.

The Forest Practices Board is B.C.'s independent watchdog for sound forest and range practices, reporting its findings and recommendations directly to the public and government. The board can investigate and report on current forestry and range issues and make recommendations for improvement to practices and legislation.

- 30 -

More information can be obtained by contacting:

Helen Davies Forest Practices Board Phone: 250 213-4708 / 1 800 994-5899

Backgrounder

British Columbia's forests and the issue

- British Columbia is 95 million hectares in size; about 55 million hectares is forested and government is responsible for managing almost all of that forest.
- About 22 million hectares of the forest is the timber harvesting landbase (THLB).
- There has been substantial debate about how much of the THLB will not meet expectations for timber supply because of damage caused by beetles and fire. The debate has been put in the context of the term "not satisfactorily restocked" (<u>NSR</u>) which has led to confusion about the size of the issue.

What does the term NSR mean?

- NSR is an administrative term that government only uses to keep track of areas on the THLB where there is an obligation or an intention to restock:
 - The forest industry is legally obliged to restock NSR areas created by harvesting.
 - Government is responsible for managing almost all the forests damaged by fire and beetles, but they do not classify those areas as NSR unless they have surveyed them and intend to restock them.
- NSR is not used to keep track of (inventory) the stocking status of the entire THLB.

How much NSR is there?

- Known NSR: 700 000 hectares at any given time in the last 10 years (more-or-less):
 - o 500 000: industry's legal obligation to reforest areas they harvest.
 - o 200 000: government's stated intent to reforest areas damaged by beetles and fires.
- Estimated NSR: 1 000 000 hectares:
 - The area that government may classify as NSR, because of beetles and fire, is poorly known (not surveyed, only estimated) but is on the order of 1 000 000 hectares.
- Total NSR: 2 000 000 hectares:
 - Because of uncertainty in the area of estimated NSR the total can only be expressed to the nearest million hectares; that is, 2 000 000 hectares may be NSR.

What is being done about NSR?

- The forest industry is fulfilling its legal obligation to reforest areas they harvest. Government has:
 - Encouraged the forest industry to harvest mature forest affected by beetles and therefore take on the legal obligation to reforest those areas. Approximately 1 000 000 hectares of beetle affected forest has been harvested since the year 2000.
 - Funded a reforestation program since 2005 that has treated an estimated total area of just over 50 000 hectares; mostly fire damaged forest and young beetle damaged forests.

Backgrounder

Source	NSR area
<u>Known NSR</u> (on May 1, 2012)*	
Industry legal obligation	510 000
Government's management intention	180 000
Estimated NSR	
Beetles in mature pine stands	1 000 000
Beetles in immature pine stands	60 000
Wildfire	20 000
Small scale salvage	100 000
Other natural disturbances	unknown
Total NSR (total is only approximately known)	2 000 000

Proportions of the timber harvesting land base in categories relevant to questions about NSR.

Notes: minor sources of estimated NSR are not shown; industry obligation includes BCTS; government has a responsibility for that portion of the forest where there is no industry obligation.

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File: 18040-03 Ref: 191590

October 1, 2012

Al Gorley Forest Practices Board 3rd Floor, 1675 Douglas Street P O Box 9905 Stn Prov Govt Victoria, British Columbia V8W 9R1

Dear Al Gorley:

RE: Special Investigation Report 42 – How much of British Columbia's forest is not satisfactorily restocked and what should be done about it?

On behalf of the Ministry of Forests, Lands and Natural Resource Operations (FLNRO), please accept this letter as government's response to the recommendations and findings in the Forest Practices Board's Special Investigation Report 42 – *How much of British Columbia's forest is not satisfactorily restocked and what should be done about it? (June 2012)*

Recommendation 1:

Government confirm its assumptions about how much additional area will be salvage harvested by the forest industry and develop a monitoring system to track whether those assumptions are being borne out.

Response by Government

The ministry has reviewed its salvage harvest projections and found them, with minor refinement, to be reasonable given the many market variables that will influence the actual amount of Mountain Pine Beetle (MPB) impacted stands that will be salvage harvested. As the Board states in the report there is "substantial uncertainty on how much…area will be salvaged harvested".

In order to reduce the uncertainty associated with projected salvage harvesting, the ministry has established two possible scenarios: the low is based on projections of 10 years beyond the peak attack as determined by the model BCMPB v.09 and the high is based on 15 years past peak attack but not going past 2024. In both cases, the current average salvage harvest level from the period 1999 to 2010 was projected to each of these future dates to determine the low and high potential salvage harvest.

Mailing Address: PO BOX 9532 Stn Prov Govt Victoria, BC V8W 9M1 Through the continuation of the change detection mapping process as part of FLNRO forest inventory updating process, the assumptions regarding the contribution of salvage harvesting to the rehabilitation of areas impacted by MPB will be refined as the ministry reforestation response progresses.

Recommendation 2:

Government use the best information and projections currently available to conduct a broadly framed cost-benefit analysis of options to restock or not restock areas that may be NSR in the beetle-affected region.

Response by Government

The ministry is nearing the completion of a project to update our estimates of the stocking status and potential investment opportunities in areas impacted by pine beetle and wildfire. An initial report is expected later this fall.

Recommendation 3:

Government carry out the survey and inventory work necessary to inform the future decisions that must be made; particularly, those related to determination of the allowable annual cut in the beetle-affected region.

Response by Government

The report's recommendation regarding forest inventory is being addressed. Major inventory projects are underway in each region of the province, with an emphasis on forests impacted by the mountain pine beetle.

In addition to approximately 150,000 hectares (ha) ground and aerial surveyed and assessed each year for reforestation potential, the ministry is also taking advantage of new tools using satellite technology for improved forest inventory information, as well as to reduce inventory costs. In that light, the ministry will convene a meeting to (1) review the state of knowledge about assessing and classifying beetle-damaged stands; (2) consider what new technology and approaches might be able to contribute (LiDAR, high resolution air photos, etc), and on the basis of this; (3) determine the most cost-effective means of assessing and classifying these stands. The outcome of the report referenced under the ministry response to recommendation 2 will also assist in narrowing the area for survey and assessment.

Finally, the ministry would like to thank the Forest Practices Board for preparing this report, which helps clarify some of the complexities around the Not Satisfactorily Restocked (NSR) issue. We were pleased to see that the report acknowledged several ministry programs and projects that are directly addressing the NSR issue.

We trust the Board will be satisfied with the initiatives and action plans we have in place to address the key issues identified by the Board.

Al Gorley

If the Board has any questions regarding this response or requires more information, please contact Allan Powelson at (250) 812-5054.

Yours truly,

Doug Konkin Deputy Minister

File: 97350-20/2011-02

November 13, 2012

Doug Konkin Deputy Minister Ministry of Forests, Lands and Natural Resource Operations 780 Blanshard Street Victoria, BC V8W 2H1

Dear Doug Konkin:

Re: Special Report FPB/SR/42 How much of British Columbia's forest is not satisfactorily restocked? And what should be done about it?

Thank you for your letter of October 1, 2012, responding to recommendations in the above report. The Board appreciates the timely reply and is pleased to see the Ministry is working on this issue. Following are specific comments in regard to your response to our recommendations in the report.

<u>Recommendation 1</u> - The Board's first recommendation was for government to confirm assumptions about the area that would be salvage logged. Your response provides added assumptions regarding shelf-life and projected harvest levels. The Board believes a more spatially explicit projection of areas that might be salvage harvested is also required.

We are concerned about the strength of current assumptions for shelf-life and salvage harvest. We also have reservations about the ability of the mapping process to adequately track harvesting (please refer to report FPB/SIR/33 - *Reporting the Results of Forestry Activities* for details) and distinguish salvage logging from harvesting of green timber. Perhaps the report referred to in your response to recommendation 2 will address this. Doug Konkin November 13, 2012 Page 2

<u>Recommendation 2</u> - We are pleased that this work is being done, and we look forward to seeing the report you refer to before the end of the calendar year 2012. We trust the report will address our request for a broadly framed cost-benefit analysis of options for restocking NSR land.

<u>Recommendation 3</u> - We are aware that the ministry has major inventory projects underway and are encouraged to know that you are planning additional work to assess the nature of beetle killed stands. The Board will follow up on progress that has been made on this recommendation in November 2013.

Yours truly,

Kg Dorh

R. A. (Al) Gorley, RRF Chair