Timber Management Goals and Objectives

2014/15 Provincial Targets Accomplishments Report

Ministry of Forests, Lands and
Natural Resource Operations

Province of British Columbia

Executive Summary

The purpose of this 2014/15 Accomplishment Report: Timber Targets is to provide information and an initial assessment of the 2014 Provincial Timber Management Goals and Objectives ('2014 document') prepared by the Ministry Forests, Lands and Natural Resource Operations. This report is at the provincial level[1].

Provincial targets were provided for the five timber management goals and objectives:

1. Timber Volume Flow Over Time

Provincial target:

- Based on a 22-million hectare timber harvesting land base (THLB) and projections from Timber Supply Reviews (TSR), for individual management units to produce provincially:
  - a mid-term timber supply[2] of at least 57 million m^3/year, and
  - a long-term timber supply of at least 65 million m^3/year.

2014/15 accomplishment discussion:

Projections based on a roll-up of the results from Timber Supply Review for all TSAs and TFLs in British Columbia (BC) indicate that harvested volumes from 2008 to 2013 averaged 62 million m^3/year (82% of AAC) – slightly above the 57 million m^3/year mid-term harvest forecast projections that are expected to be reached in year 2023.

The Ministry of Forests, Lands, and Natural Resource Operations Service Plan, since 2010, has contained a performance measure specifically related to the timber volume gains from silviculture investments (performance measure #6 in the 2015/16 version) and is tied directly to the provincial timber objectives. As one of the main components, not already contained within the Timber supply reviews (like tree improvement), FFT reforestation activities since 2005, have increased the projected long-term timber supply by approximately 17 million m^3. As well, FFT activities directed at improving the mid-term timber supply (e.g. fertilization) have increased timber supply by about 194,000 m3 per year through the mid-term period of 2015 to 2024.

Continued investments in future forests through programs like Forests for Tomorrow (FFT) and implementation of strategies at the management unit level such as Silviculture Strategies may enable attainment of a higher harvest forecast in the mid- and long-term than identified in the provincial target.

2. Timber Quality

Provincial targets:

[1] Does not include the annual allowable cuts associated with Community Forest Agreements, First Nations Woodlands, or Woodlots licences. These licence types represent another approximately 3.564 miiliom m3 of AAC throughout the province

[2] The mid-term timber supply is the amount of timber available for harvest in the next 20 to 60 years. Timing of the beginning of the mid-term trough caused by the Mountain Pine Beetle will vary by management unit.

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- No reduction in the proportion of provincial forest land made up of high-value tree species.
- To produce a minimum of 10 % premium grades from BC's forests.

2014/15 accomplishment discussion:

High value species: there has been no reduction in the proportion of high values tree species planted since 1987. Nearly all species planted (>90%) in BC since 1987 are high value species.

Premium grades: based on Harvest Billing System reported volumes, the proportion of premium grades as ranged from a high of about 20% in 2007 down about 14% in 2011 where it has approximately stayed till 2014. This reduction is assumed to be a result of the higher proportion of mountain pine beetle killed timber as part of the overall harvest.

3. Tree Species Composition

Provincial targets:

- The proportion of monoculture stands at free growing in BC is no greater than the proportion of monoculture stands prior to harvest (based on the forest inventory).
- Within each management unit, the total number of tree species at free growing is no less than what was present prior to harvest.
- Within each management unit, the proportion of a specific tree species at free growing is no more than 10% greater than what was present prior to harvest unless it increases the proportion of higher value species or specific species diversity targets are approved for the management unit.
- By 2020, all tree seed used to establish a free growing stand is registered and selected in accordance with new climate-based seed transfer standards.

2014/15 accomplishment discussion:

Monoculture: Between 2007 and 2014, about 35% in the interior and about 7% on the coast of the harvested area consisted of monocultures stands. Based on Figure 4b above, since 2007, about 40% in the interior and 20% on the coast of the harvested area are regenerating to be monoculture stands. Slight differences may be because different types of areas were harvested vs regenerated during that time period or due to factors such as choice of species to plant in relation to natural regeneration.

There may be a need to revise this provincial target to examine this indicator at the landscape rather than the stand level as stand management decisions and the influence of natural regeneration can skew the analysis of the stand level indicator when rolled up to a provincial level.

Tree species: Provincial-level establishement data suggests a shift in species composition for some species is occurring. Data indicates that on average the amount of area dominated by pine has decreased while the area dominated by spruce, balsam, and

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broadleaves have increased from that which existed at the time of harvest. Balsam and broadleaf species are not typically considered high value species except in some locations on the Coast.

***Climate-based seed transfer*:** The Climate-Based Seed Transfer (CBST) Project Charter is targeting project completion, including development of the decision support framework to guide implementation of the CBST system, by March 2017. Steps to support this transition over the next five to ten years are underway as part of BC's Ministry of Forests, Lands and Natural Resource Operations Forest Stewardship Action Plan for Climate Change Adaptation (2012-2017).

4. Stand Productivity and Growing Stock

Provincial targets:

- Harvested areas will be reforested with tree species and stocking levels that meet or exceed growth and yield projections assumed in timber supply review.
- By 2020, 75% of all trees planted will be grown from select seed with an average genetic gain of 20%.

2014/15 accomplishment discussion:

***Stocking levels**:* Suggested stocking standards vary by ecosystem but typical targets are 900 and 1200 trees per hectare (Coast and interior respectively). Planting density since 1987 indicate those targets have generally been met or exceeded.

The average provincial planting density over the period 1987-2013 is over 1300 trees per hectare (1373 sph) in the Interior and slightly over 1000 trees per hectare (1011 sph) on the Coast .

Over the period 1987 to 2010[3], the net area planted has remained relatively constant across the province at a level of about 80%[4] (Coast 86% and interior 77%). The remaining 20% provincially (Coast 14% and interior 23%) is regenerating through the establishment of natural seedlings..

Genetic worth: The Forest Genetics Council of BC projects that the provincial target of 75 % of all trees planted will be grown from select seed with an average genetic gain of 20 % will be achieved by 2020. As of 2014, 70% of the area planted utilized select seed with an average genetic worth of about 17%..

5. Inherent Site Capacity

Provincial target:

[3] Data from 2011 to 2014 is not included as it is still within the regeneration delay period and some areas may yet be planted to meet this legislative milestone.

[4] Planting of at least 50% of the net area to reforest (NAR) is considered to be strategy focused on planting instead of natural regeneration.

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- Currently the province has incorporated explicit maximum percentage limits for site disturbance and construction of permanent access structures into the Forest Planning and Practices Regulation, s. 36. The ministry's target is to have the average site disturbance for the province at less than 5%

2014/15 accomplishment discussion:

Actual site disturbance from 2009 to 2013 has ranged from 3.3 to 3.9%. However, issues related to inconsistent reporting of this factor means some caution should be used when evaluating this accomplishment.

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Introduction

The purpose of this 2014/15 Accomplishment Report: Timber Targets is to provide information and an initial assessment of the 2014 Provincial Timber Management Goals and Objectives ('2014 document') prepared by the Ministry Forests, Lands and Natural Resource Operations.

British Columbia (BC) has the largest and most diverse public forests in Canada. Managing forests for timber, water, wildlife, recreation and other values over the long term is, therefore, very important and complex. Clearly documented goals and objectives for BC's forests assist forest managers in meeting public expectations for the sustainable management and use of this broad array of forest resources.

High-level provincial timber management goals[5] and objectives[6] established in the 2014 document provide context and guidance for planning at the local level. These provincial goals and objectives should also be regularly revisited and refined as necessary in order to address changing forest conditions, climate change, evolving public priorities, and improvements in scientific knowledge.

This report of accomplishments is at the provincial level[7] and provides a framework for possible future reports at the management unit level.

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[5] ***Goals are long-term aims.*** *Goals are more about the grand vision, or everything that should be accomplished on the journey, rather than specifically how to get to that distant point. Goals will often go into undiscovered territory and, therefore, the exact endpoint may be uncertain.*

[6] ***Objectives – are concrete attainments that can be achieved by following certain actions (strategies).*** *Objectives are concrete and can be clearly linked to timelines, budgets, and activities. Timber management objectives define the strategic condition that needs to be attained to achieve the timber management goals. These objectives are linked to a set of management targets.*
Targets numerically specify desired management results to be achieved. *Targets – specify a desired condition that can be measured, tracked and reported –supporting the attainment of the goals and objectives. The targets may be updated over time based on factors such as changing forest conditions and new information.*

[7] Does not include the annual allowable cuts associated with Community Forest Agreements, First Nations Woodlands, or Woodlots licences. These licence types represent another approximately 3.564 miiliom m3 of AAC throughout the province

Goals and Objectives

Provincial targets were provided for the five timber management goals and objectives identified in the 2014 document:

1. Timber Volume Flow Over Time
2. Timber Quality
3. Tree Species Composition
4. Stand Productivity and Growing Stock
5. Inherent Site Capacity

1. Timber Volume Flow Over Time

Timber volume flow over time describes what has traditionally been the focus of sustainable forest management. The provincial aim is not a strict even flow regime, but rather predictable and reliable flows to support economic and social objectives. Timber flow will be managed in an integrated manner with other key forest values.

Provincial Goal

Promote resilient and diverse forest ecosystems that will provide a sustainable flow of economically valuable timber that generates public revenues, supports robust communities, and produces healthy economies that provide an opportunity for a vigorous efficient and world competitive timber processing industry.

Provincial Objectives

1. Timber is managed in an adaptive manner to address the dynamic nature of natural processes and the inherent uncertainty of managing over long time frames.
2. Attainment in the long-term of realized harvest flows that benefit from timber management activities including harvest practices and silviculture investments.
3. Data used to determine timber flows will be continuously improved, to verify assumptions and to reduce uncertainty.

Provincial Target

- Based on a 22-million hectare timber harvesting land base (THLB) and projections (see Figure 1) from Timber Supply Reviews (TSR)[8], for individual management units to produce provincially:
    - a mid-term timber supply of at least 57 million m^3/year, and
    - a long-term timber supply of at least 65 million m^3/year[9]

[8] The THLB area and timber supply targets are based on a roll-up of the results from Timber Supply Reviews (TSRs) for all Timber Supply Areas (TSA's) and Tree Farm Licences (TFL's) in B.C. TSRs consider the management of non-timber values and uses. Current TSRs provide local management unit target that can be rolled up for the Coast, Northern Interior and Southern Interior areas.
[9] The 57 million m^3/year mid-term and 65 million m^3/year long-term targets are based on projections from TSRs as identified in Figure 1.

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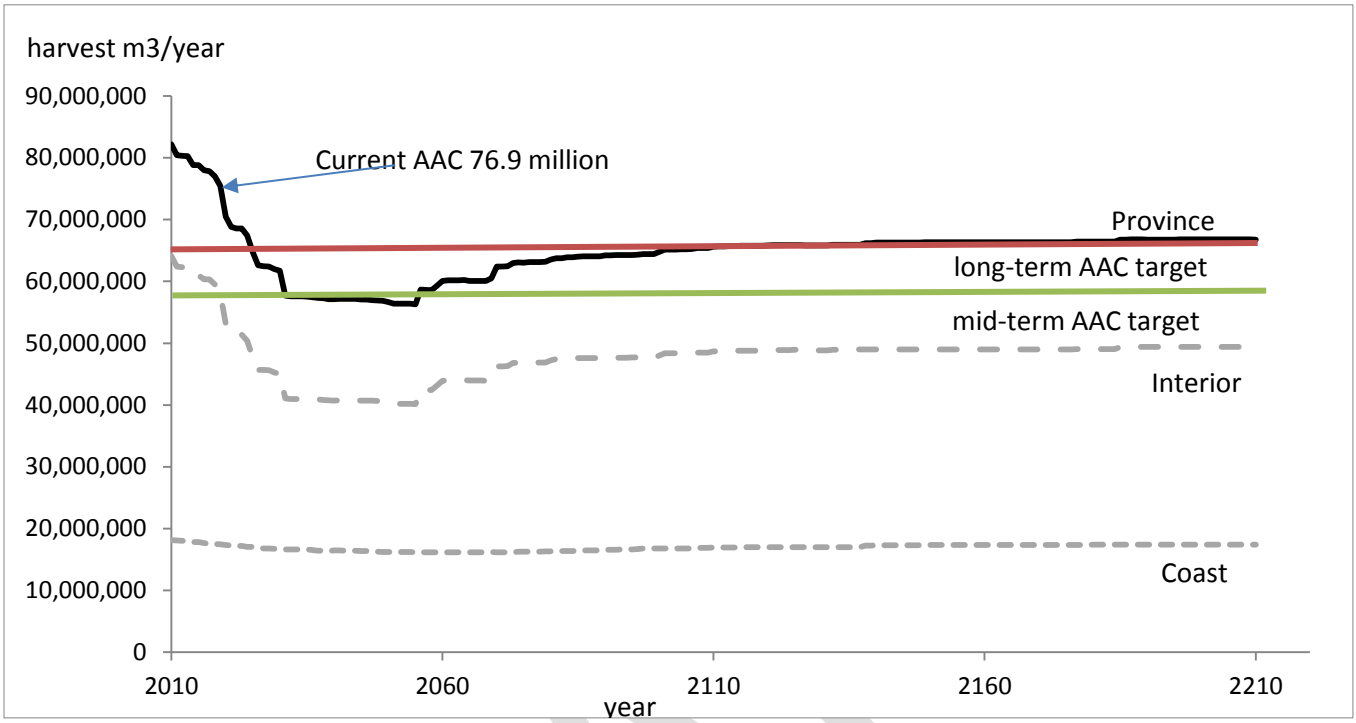
Figure 1: Mid-term and long-term timber supply based on projections[10] from TSR



Harvest performance over recent five-year period

Table 1 shows the approved allowable annual cut (AAC) for Tree Farm Licences (TFL), and Timber Supply Areas (TSA) as compared to billed volumes from the forest industry and BC Timber Sales for TFL, and TSA over the same five years.

	TFL		TSA		Total	
Year	*Approved AAC (m^3)*	*Billed volume(m^3)*	*Approved AAC (m^3)*	*Billed volume(m^3)*	*Approved AAC (m^3)*	*Billed volume(m^3)*
2010	15,919,479	12,187,342	66,972,964	48,795,631	**82,892,443**	**60,982,973**
2011	15,833,959	12,846,836	65,283,568	55,526,180	**81,117,528**	**68,737,016**
2012	15,322,009	13,966,852	65,657,371	52,736,003	**80,979,380**	**66,702,855**
2013	15,291,341	14,868,945	65,657,204	54,971,425	**80,948,545**	**69,840,370**
2014	15,155,361	12,659,431	63,402,527	51,474,908	**78,557,889**	**64,134,339**
Grand Total	77,522,151	66,529,407	326,973,625	263,504,147	**404,495,786**	**330,033,554**

[10] February 2014

Based on Table 1 the ratio of billed volume to AAC for 2010-2014 is:

- 86% for TFL
- 81% for TSA
- **82% in total**

2014/15 accomplishment discussion

The AACs in the recent five-year period from 2010 to 2014 reflect uplifts to allow for the salvage harvest of mountain pine beetle (MPB) killed pine leading stands in the interior of BC. Based on billed volume, the uplifted AACs provided more potential volume than could be harvested due to factors such as market demand and mill capacity. Harvested volumes have averaged 65 million m^3/year over this 5 year period – slightly above the 57 million m^3/year mid-term harvest forecast in Figure 1 that is expected to be reached in year 2023.

The Ministry of Forests, Lands, and Natural Resource Operations Service Plan, since 2010, has contained a performance measure specifically related to the timber volume gains from silviculture investments (performance measure #6 in the 2015/16 version) and is tied directly to the provincial timber objectives.

Continued investments in future forests through programs like Forests for Tomorrow (FFT) and implementation of strategies at the management unit level such as Silviculture Strategies may enable attainment of a higher harvest forecast in the mid- and long-term than identified in the provincial target.

FFT reforestation activities since 2005, have increased the projected long-term timber supply by approximately 17 million m^3. As well, FFT activities directed at improving the mid-term timber supply (e.g. fertilization) have increased timber supply by the following approximate amounts:

Table 2 Increases to timber supply from incremental silviculture

Year additional volume available	Additional mid-term volume resulting from FFT incremental silviculture activities (m^3)
2015	82,400
2016	237,371
2017	196,401
2018	267,993
2019	85,809
2020	233,050
2021	270,976
2022	296,520
2023	-
2024	273,000

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2. Timber Quality

Timber quality is defined by species, log sizes and grades, end use, and economic value that combine to achieve desired characteristics in the marketplace. In order to minimize risks and maintain future options for different products, a diverse portfolio of timber quality is desirable.

Provincial Goal

Maintain a diversity of timber-related economic opportunities through time.

Provincial Objectives

1. Proportions of high-value tree species[11] within each management unit will be maintained at no less than pre-harvest levels (based on the forest inventory).
2. Proportions of lower value species within each management unit will not be increased[12] above pre-harvest levels.
3. To restock new forests with trees which will produce high quality fibre (including sawlogs) as the primary product objective[13].
4. To ensure a proportion of logs are of premium grade[14].

Provincial Targets

- No reduction in the proportion of provincial forest land made up of high-value tree species.
- To produce a minimum of 10% premium grades from BC's forests[15].

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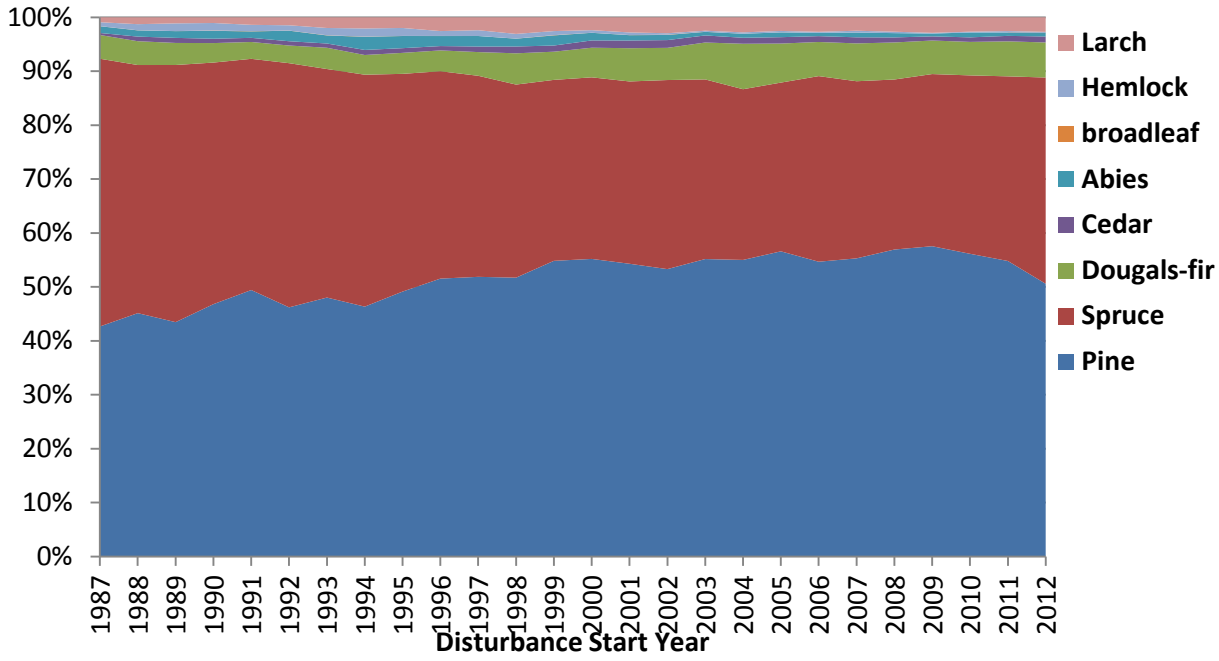
[11] 'High value species' include western redcedar, yellow-cedar, Douglas-fir, western larch, spruce, pine, and other species that have explicit regional or local strategic objectives related to value.
[12] Based on trends over the past 10 years.
[13] 84% of the B.C. annual timber harvest goes to lumber mills, 5% to chip/pulp mills, 8% to plywood and veneer mills, and 3% to panel/mdf mills. Of the volume that goes to the lumber mills, about 47% ends up as lumber. From the scaled harvest plus bark, about 1/3 goes to lumber, 1/3 to bioenergy and 1/3 to pulp, paper, and other products. Dymond, C.C. 2012. Our Logs' Story from Truck to Product. BC Forest Science Program Extension Note 107, Victoria, B.C.. http://www.for.gov.bc.ca/hfd/pubs/docs/En/EN107.pdf
[14] Premium grades are defined as logs having qualities such as larger diameter, narrow ring width, low taper, and few or no knots, such that the particular quality or combinations of qualities commands higher than average prices in a free market. Specifications may vary by tree species and forest region.
[15] Based on the harvest billing system, currently 15% of harvest volume provincially is from premium grades; this can vary considerably by management unit.

High value species

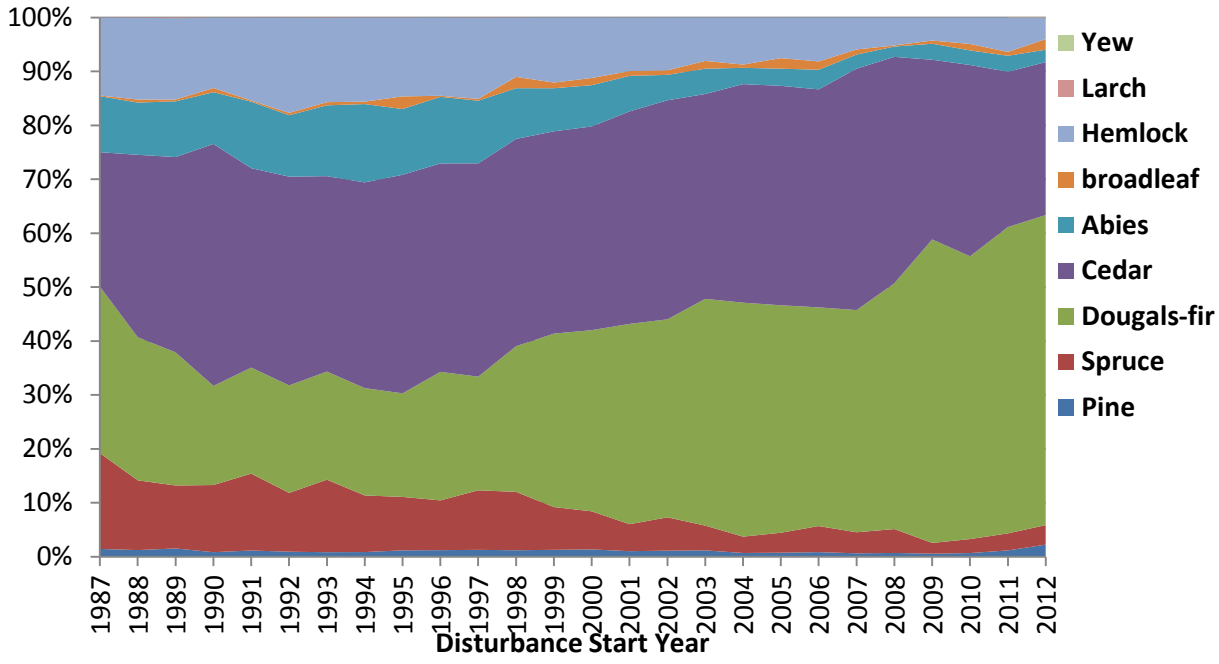
'High value species' include western redcedar, yellow-cedar, Douglas-fir, western larch, spruce, pine, and other species that have explicit regional or local strategic objectives related to value.

Figure 2a: The proportion of high value species planted by year[16] (Interior)



[16] Data only presented to 2012 due to the average regeneration delay for planted areas in BC is about 2 years

Figure 2b: The proportion of high value species planted by year[17] (Coast)



Figures 2a and 2b indicates the provincial target has been achieved with no reduction in the proportion of high values tree species planted since 1987. In fact, nearly all species (>90%) planted in BC since 1987 are high value species. The proportion of western redcedar (Cw), Douglas-fir (Fd) and western larch (Lw) combined has slightly increased from about 10% in 1987 to about 20% in 2012. Since the MPB epidemic began in 1999 there has been an increase in lodgepole pine (Pl) planted and a decrease in spruce (Sx) planted until 2009. The reduction of focused harvest of dead pine-leading stands in some management units as economic opportunities decline has led to a reversal, from 2010 – 2012, of this trend.

Premium grades

Premium grades[18] are defined as logs having one or any combination of the qualities of: larger size, narrow ring width, high specific gravity, low taper, and/or few or no knots, such that the particular quality or combination of qualities commands higher than average prices in a free market. Specifications may vary by tree species and forest region.

[17] Data only presented to 2012 due to the average regeneration delay for planted areas in BC is about 2 years

[18] Logs classed as "B","C","D","E","F","G","H","1" assigned to "Premium Grades"; all others assigned to " Other Grades"

Figure 3a: Proportion of billed volume consisting of premium grades in the Interior

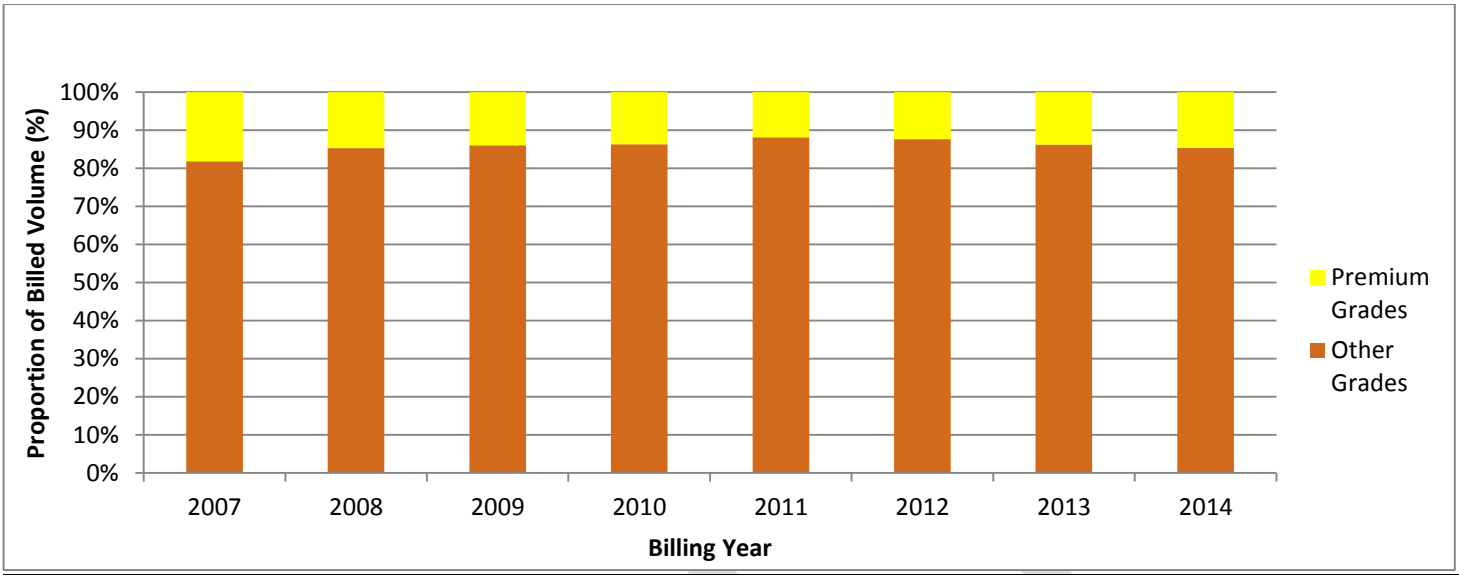
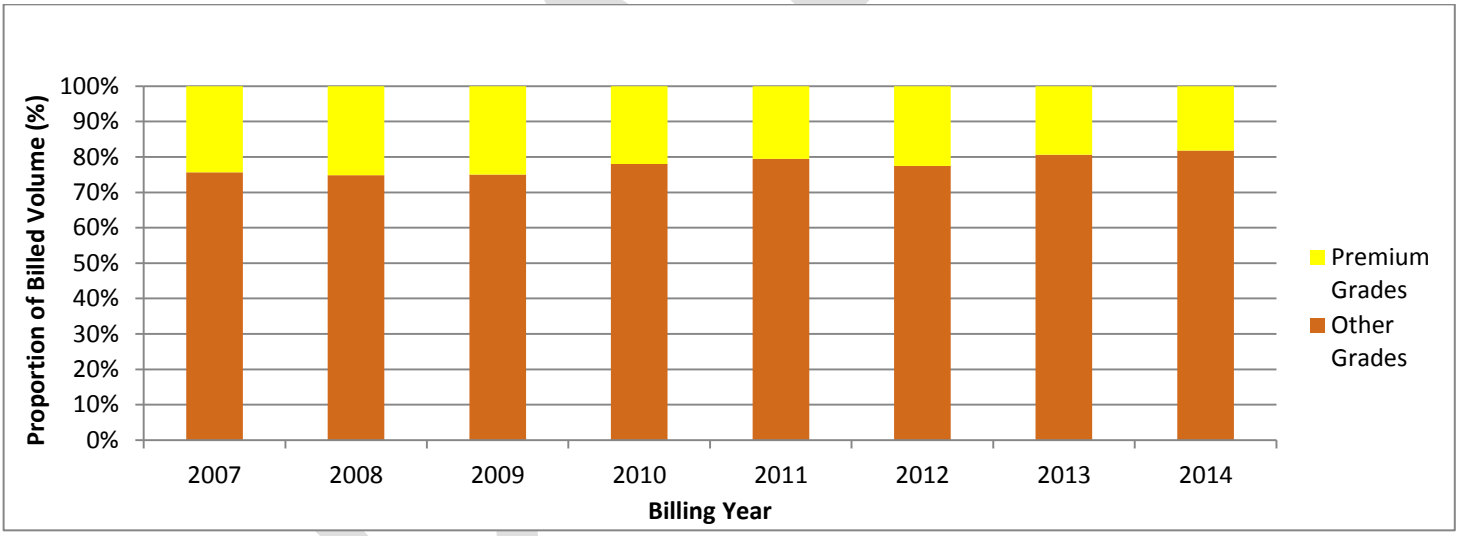


Figure 3b: Proportion of billed volume consisting of premium grades on the Coast



Figures 3a and 3b indicates the provincial target has been achieved in that a minimum of 10% premium grades have been harvested in BC each year from 2007 to 2014 based on the Harvest Billing System (HBS) reported volumes. In fact the proportion of premium grades provincially has ranged from about a high of about 20% in 2007 down to 14% in 2011. This reduction is assumed to be a result of the higher proportion of mountain pine beetle killed timber as part of the overall harvest.

3. Tree Species Composition

Tree species composition is an important overall forest resource consideration as it influences timber values, health, resilience, and non-timber values. Tree species diversity is a fundamental climate change adaptation strategy. Tree species composition overlaps with other timber management goals such as timber quality and stand productivity.

Provincial Goal:

To maintain or enhance timber and non-timber values, forest health, and resilience, through the management of tree species composition.

Provincial Objectives:

1. Where it is ecological feasible, reliable and productive, a resilient mix of species at both the stand and landscape scales will be used to reduce long-term forest risks and maintain future options.
2. Promote reforestation of species compositions that reduce vulnerability from climate change and forest health impacts on timber and other forest values.
3. Management will reduce the occurrence of species where future risks (ecological and economic) are disproportionately high compared with other species.
4. Seedlings planted are grown from source-identified and genetically-diverse tree seed that is climatically-suitable to the planting site.

Provincial Targets:

- The proportion of monoculture stands[19] at free growing in BC is no greater than the proportion of monoculture stands prior to harvest (based on the forest inventory).
- Within each management unit, the total number of tree species at free growing is no less than what was present prior to harvest.
- Within each management unit, the proportion of a specific tree species at free growing is no more than 10 % greater than what was present prior to harvest unless it increases the proportion of higher value species or specific species diversity targets are approved for the management unit.
- By 2020, all tree seed used to establish a free growing stand is registered and selected in accordance with new climate-based seed transfer standards.

[19] 'Monoculture stands' means at least 80% of trees in a stand are one species.

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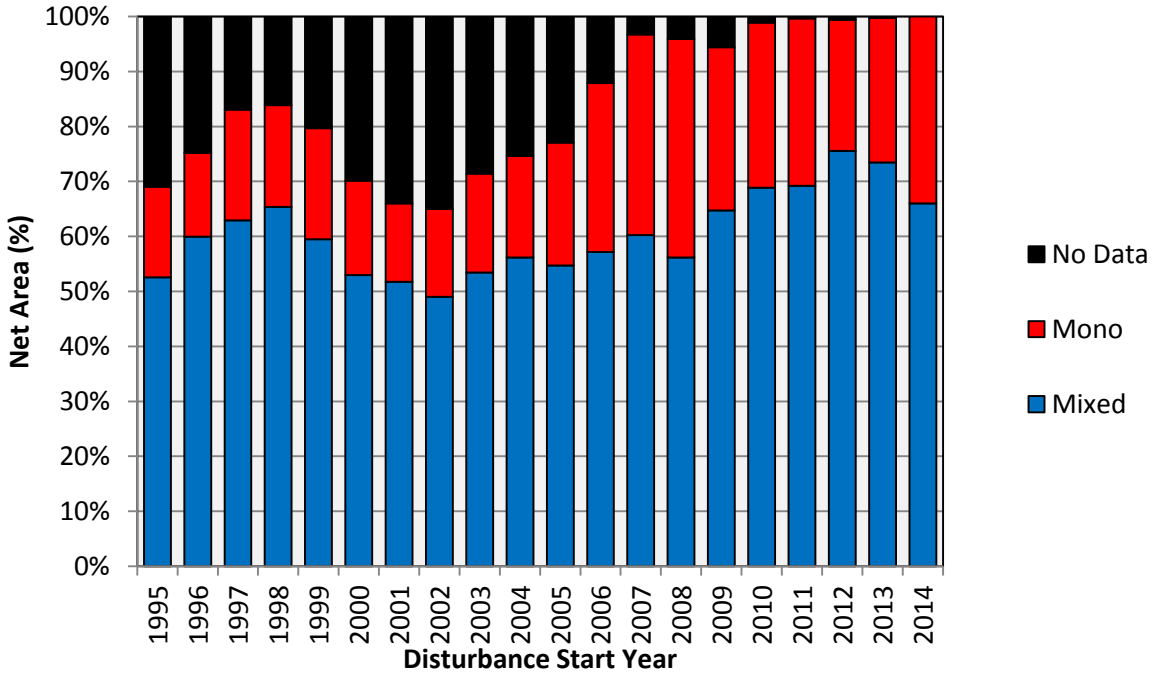
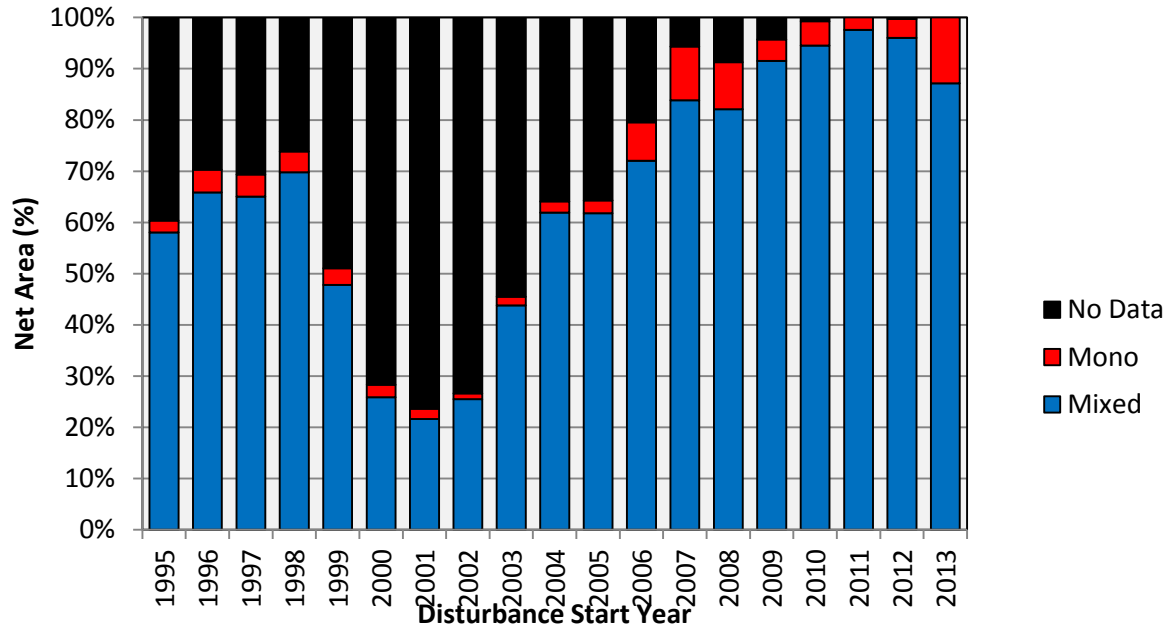
Monoculture stands[20]

Figure 4a: Monoculture stands prior to harvest

Interior



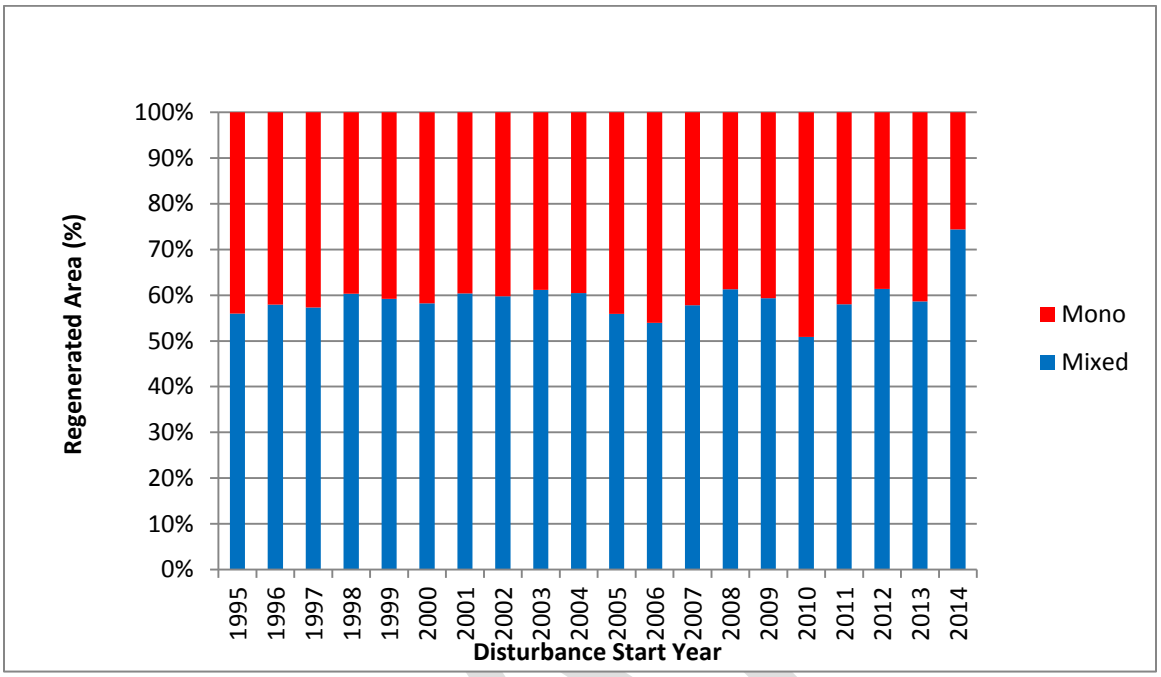
Coast



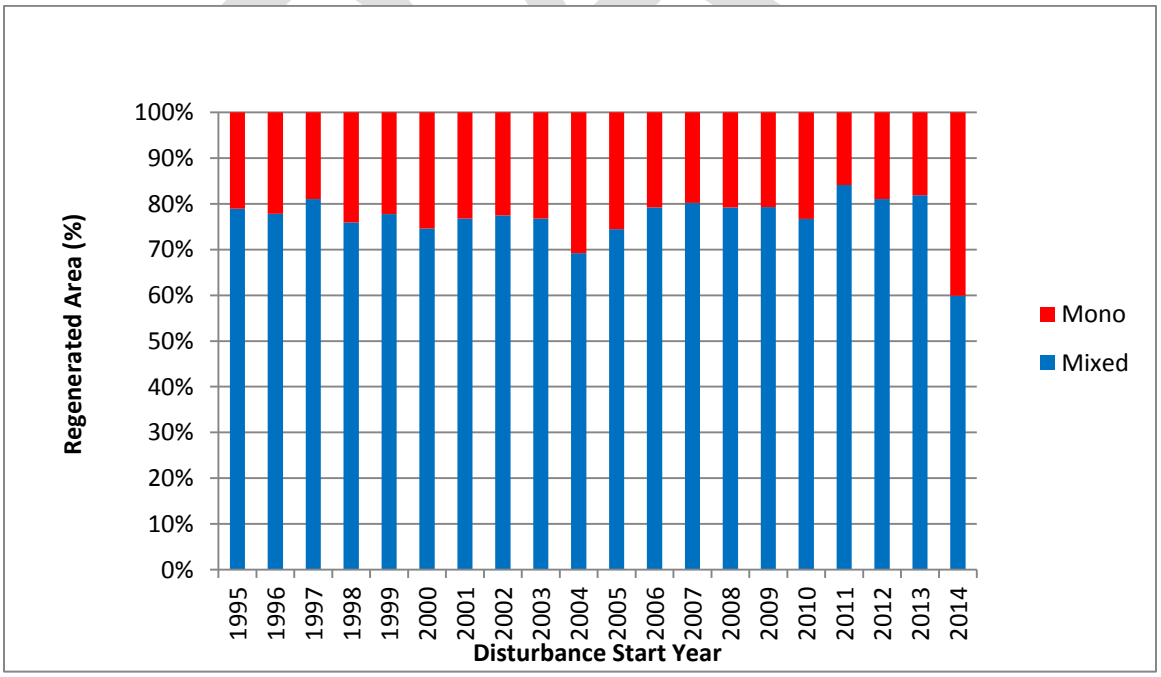
[20] Monoculture stands" means at least 80% of trees in a stand are one species

Figure 4b: Monoculture stands regenerated species composition[21]

Interior



Coast



[21] Based on the leading the percentage of leading species in the inventory label for stands with the leading species average age >7 years

Based on Figure 4a, since 2007 when ‘no data’ was not a significant factor, about 35% in the interior and about 7% on the coast of the harvested area consisted of monocultures stands. Based on Figure 4b above, since 2007, about 40% in the interior and 20% on the coast of the harvested area are regenerating to be monoculture stands. Different types of areas were harvested versus regenerated during that time period, or factors such as crop management for planting one species with anticipated natural regeneration augment species composition may explain this difference. There may be a need to revise this provincial target to examine this indicator at the landscape rather than the stand level as stand management decisions and the influence of natural regeneration can skew the analysis of the stand level indicator when rolled up to a provincial level.

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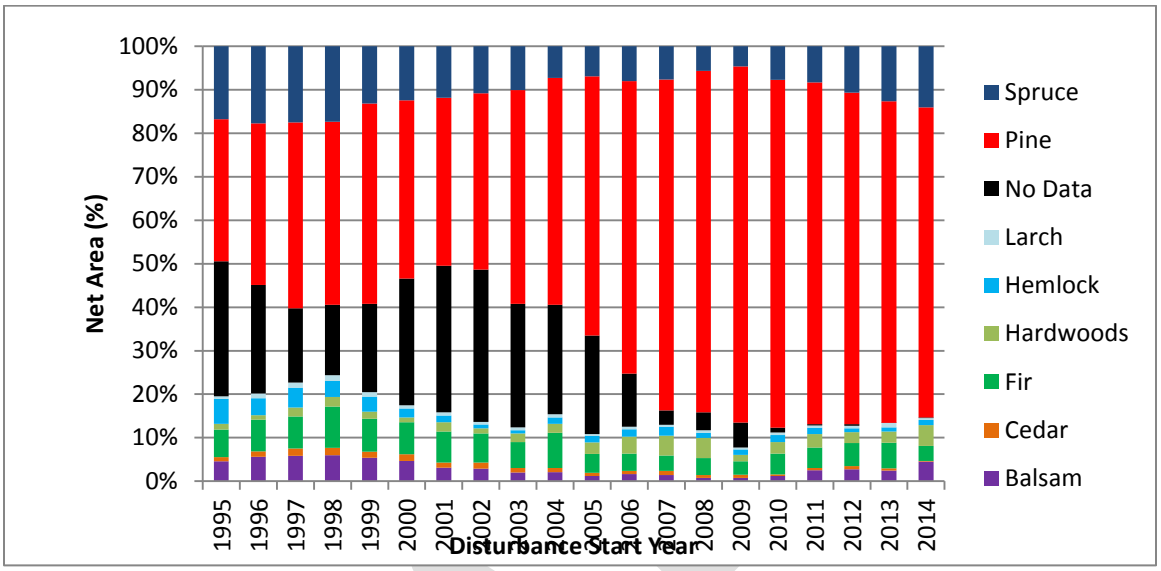
Tree Species

Figure 5a: Composition of tree species harvested

Interior



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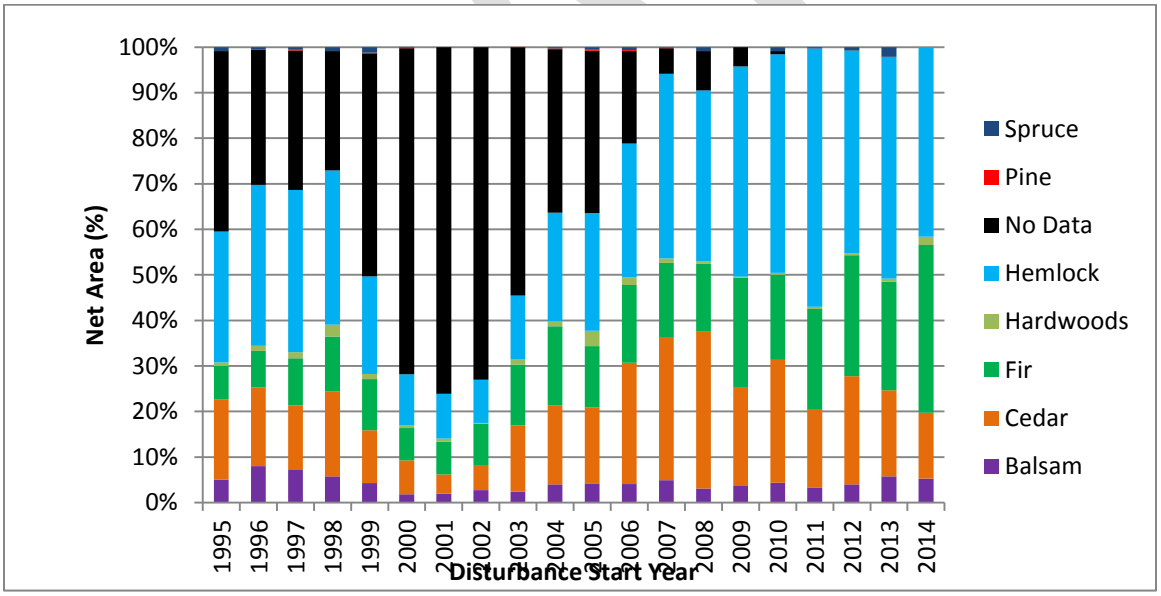
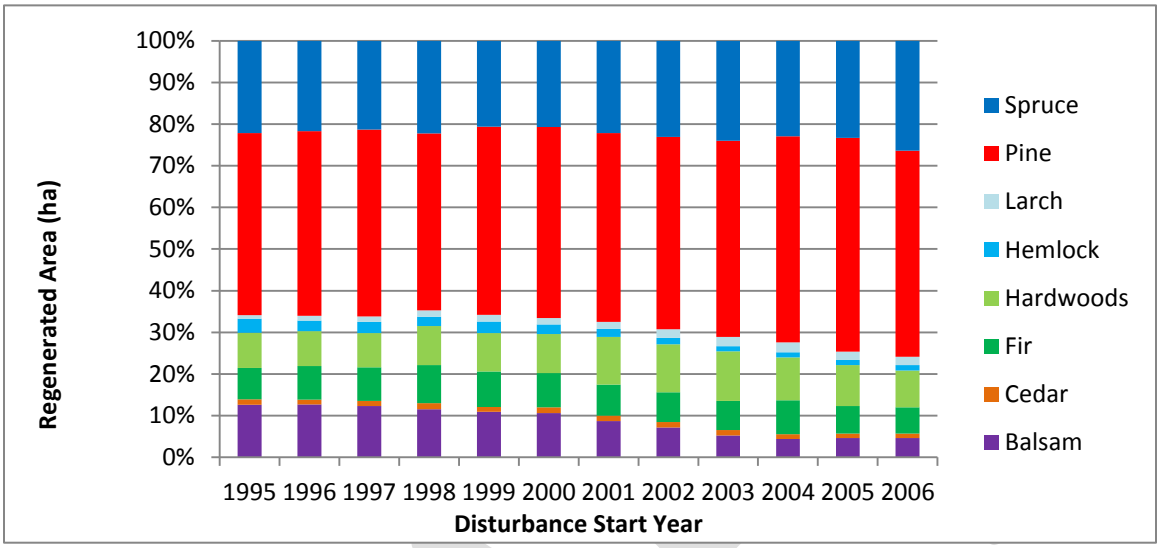
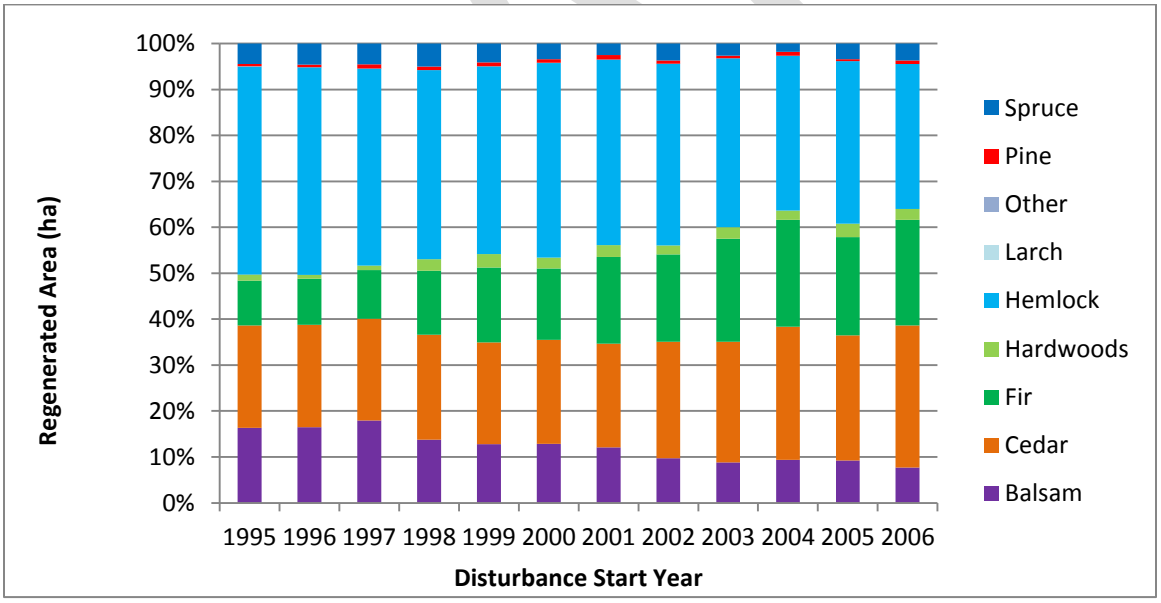


Figure 5b: Composition of regenerated[22] tree species

Interior



Coast



[22] Data only shown to 2006 due to a large amount of regenerating areas still within the natural regeneration delay period

Table 3 below shows the approximate range in the proportion of species at harvest from Figure 5a and regenerated[23] from Figure 5b.

Table 3:. Comparison of species at time of harvest and regenerated average per cent composition from 1995 – 2006

Interior

Species	% at harvest	% regenerated
Pine	61%	46%
Spruce	17%	23%
Fir	9%	9%
Cedar	1%	1%
Balsam	5%	9%
Hemlock	3%	2%
Larch	1%	2%
Broadleaves	3%	10%

Coast

Species	% at harvest	% regenerated
Pine	0.2%	1%
Spruce	0.8%	4%
Fir	22%	17%
Cedar	25%	24%
Balsam	8%	12%
Hemlock	42%	40%
Broadleaves	2%	2%

This provincial-level establishment data suggests a shift in species composition for some species is occurring. Data indicates that on average the amount of area dominated by pine has decreased while the area dominated by spruce, balsam, and broadleaves have increased from that which existed at the time of harvest. Balsam and broadleaf species are not typically considered high value species except in some locations on the Coast.

Climate Based Seed Transfer

The provincial target is by 2020, all tree seed used to establish a free growing stand is registered and selected in accordance with new climate-based seed transfer (CBST) standards.

The CBST Project Charter is targeting completion of the project by March 2017.

[23] Based on the leading the percentage of leading species in the inventory label for stands with the leading species average age >7 years

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In BC, science-based seed transfer is the foundation for the effective reforestation and genetic adaptation of stock planted as part of BC's sustainable forest management system. Seed transfer is ideally positioned to become an adaptation management option under a changing climate. The aim of this climate change adaptation initiative and project is to transition BC seed transfer system from a geographically-based science, policy and decision support framework to one that is climate-based. In the interim, steps to support this transition over the next five to ten years are underway as part of BC's Ministry of Forests, Lands and Natural Resource Operations Forest Stewardship Action Plan for Climate Change Adaptation (2012-2017).

The Climate-Based Seed Transfer (CBST) project is comprised of the following four phases:

Phase One – Scientific Foundation: This phase will evaluate a number of scientific methodologies, statistical and theoretical approaches and options for development of a science-based framework to support seed selection, transfer and deployment decisions aimed at managing forest tree genetic adaptation across BC's managed stands and landscapes under a changing climate.

Phase Two – Policy Development: This phase will develop the regulatory and policy framework required to incorporate CBST in forest regeneration, Gene Resource Management (GRM) and seed use (transfer) decision-making and climate change adaptation strategies such as assisted migration.

Phase Three – Implementation: This phase will develop the decision support framework to guide implementation of the CBST system. A range of options to suit the needs of BC's GRM/Seed Use clients will be explored, including both incremental (e.g. species or regionally-based pilots) and transformative approaches. Transition planning will be critical, with particular attention directed to support of strategies and plans to mitigate impacts to tree improvement, orchard, seed and silviculture investments.

Phase Four – Monitoring and revision: This phase will develop indicators, measures and protocols for monitoring effectiveness, performance and outcomes to inform the development of new and/or revised actions for continuous improvement and adaptive management.

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4. Stand Productivity and Growing Stock

Management of stand productivity and growing stock focuses on trends in standing timber (all ages) over the management unit through time. This encompasses the health, genetics, density, and stocking of various stands so that they can productively utilize site resources, balanced against the various risks, which threaten that growing stock through its life span.

Provincial Goal:

Maintain or improve stand productivity.

Provincial Objectives:

1. Following significant and sudden changes to growing stock from natural disturbances and salvage harvesting, timely management unit analysis and planning are used to develop cost effective management options for the consideration by government.
2. Management will target full site occupancy of growing space, after making effective allowances for other values and risks.
3. The proportion of high-risk species[24] across a management unit will not be increased and, where future risks for such species are disproportionately high compared with other species, they will be gradually reduced.
4. Decisions at the stand level will not be made solely on the basis of return-on-investment data, but will consider stand level risks and management unit objectives and targets.
5. Use tree seed selected for improved growth or pest tolerance, where available.

Provincial Targets

- Harvested areas will be reforested with tree species and stocking levels that meet or exceed growth and yield projections assumed in timber supply review.
- By 2020, 75 % of all trees planted will be grown from select seed with an average genetic gain of 20 %.

[24] 'High-risk species' are species with a high risk of mortality during its development stages due to a range of biophysical influences including climate change (an example is lodgepole pine in some provincial ecosystems as identified through vulnerability analysis or district forest health strategy).

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Stocking levels (planting density)

Figure 6a: Planting density by year (interior)

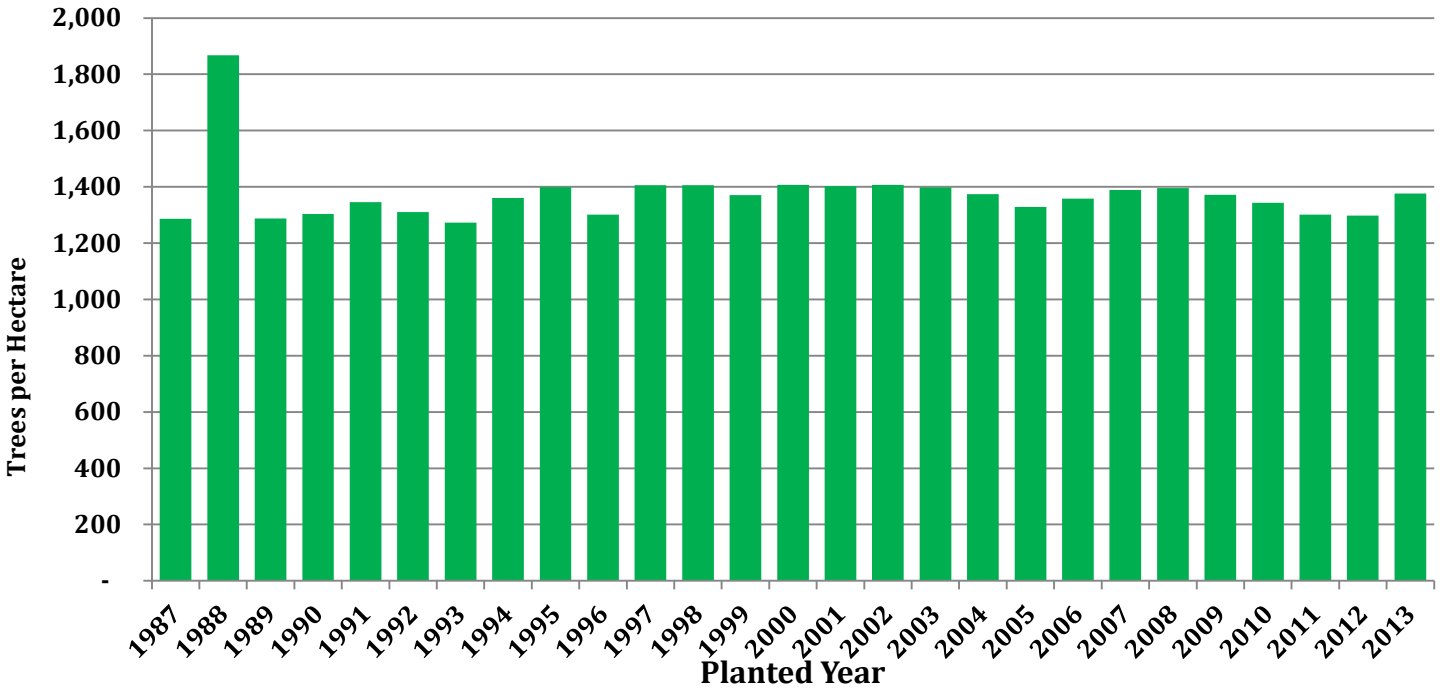
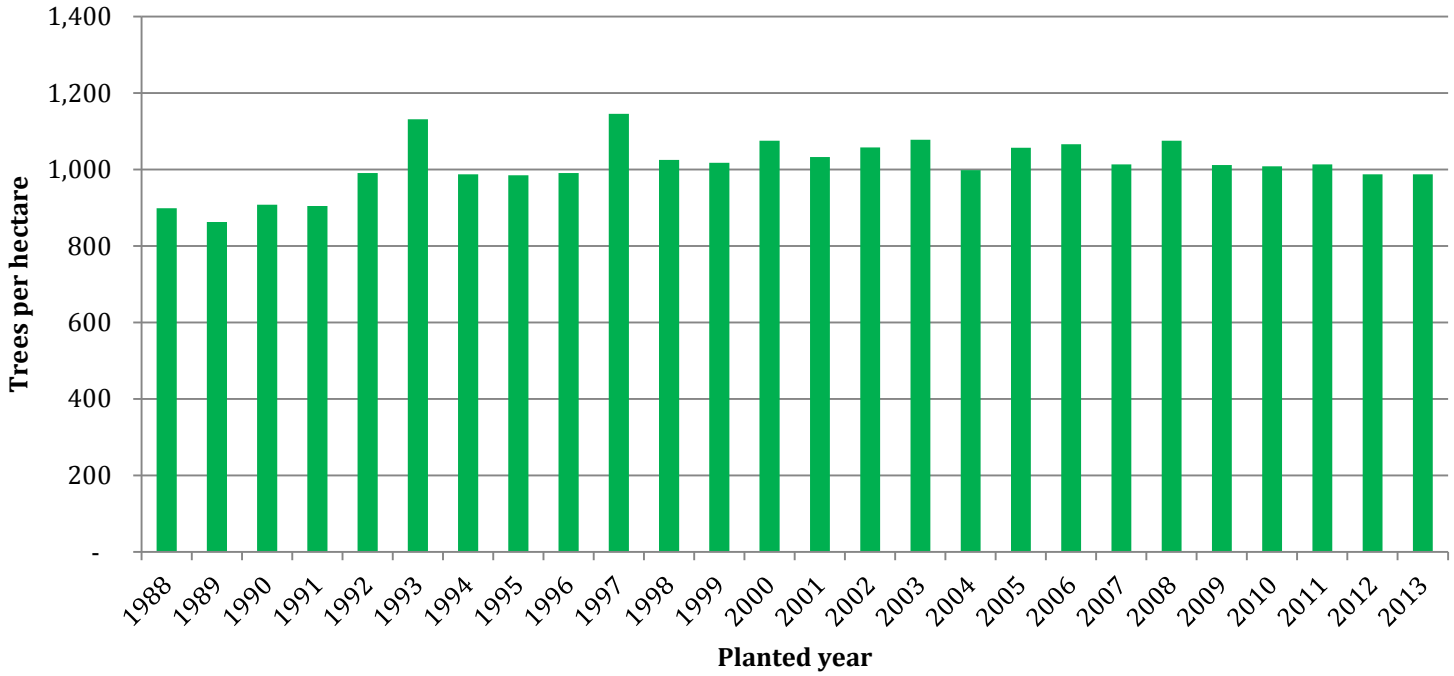


Figure 6b Planting density by year (Coast)



Suggested stocking standards vary by ecosystem but typical targets are 900 and 1200 trees per hectare (Coast and interior respectively). Planting density since 1987 indicate those targets have generally been met or exceeded.

The average provincial planting density over the period 1987-2013 is over 1300 trees per hectare (1373 sph) in the Interior and slightly over 1000 trees per hectare (1011 sph) on the Coast .

Figure 7a: Net area planted by year(interior)

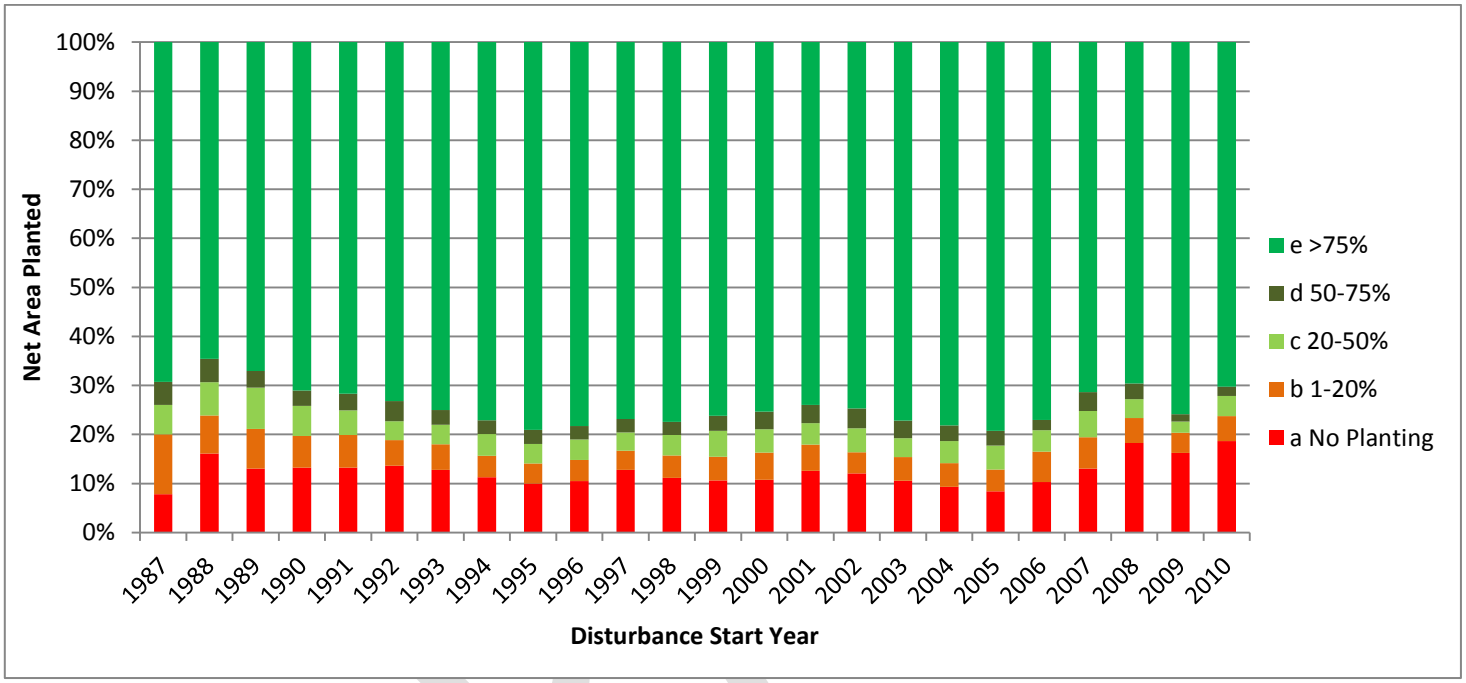
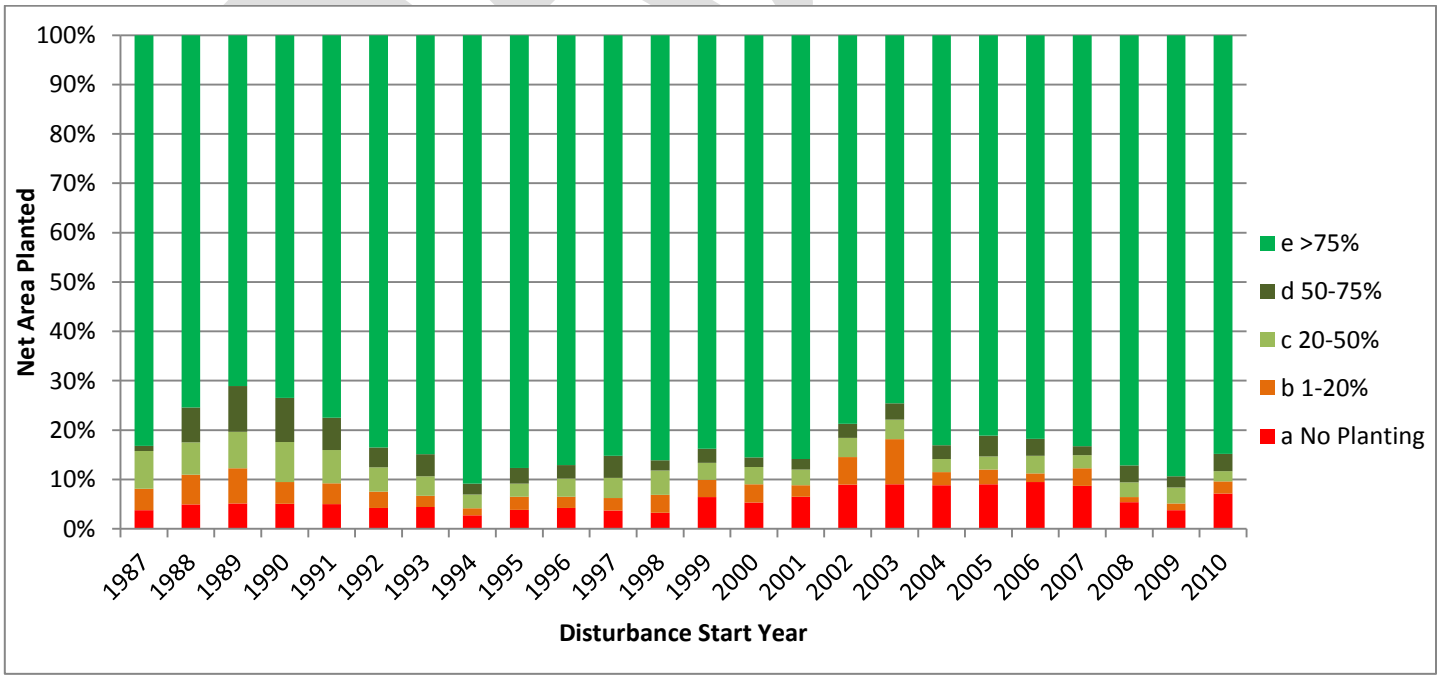


Figure 7b: Net area planted by year(Coast)

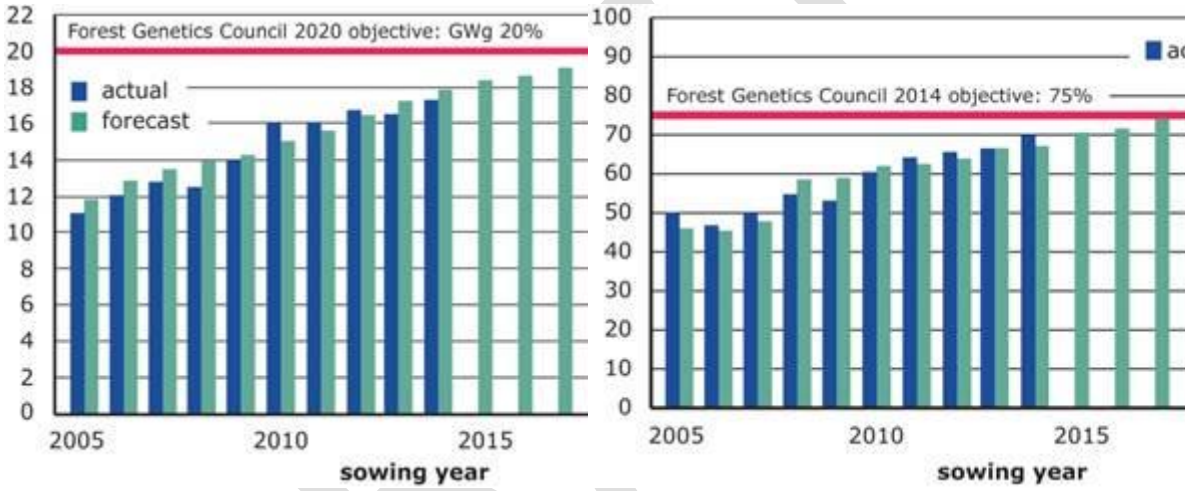


From Figure 7 above, over the period 1987 to 2010, the net area planted in the province has remained relatively constant across the province at a level of about 80%[25] (Coast 86% and interior 77%). The remaining 20% provincially (Coast 14% and interior 23%) is regenerating through the establishment of natural seedlings.

Genetic worth

Areas planted must use seedlings sown from Class A seed with genetic worth (GW) – aka genetic gain - when available. The Forest Genetics Council of BC projects that the provincial target of 75 % of all trees planted will be grown from select seed with an average genetic gain of 20 % will be achieved by 2020. As of 2014, 70% of the area planted utilized select seed with an average genetic worth of about 17%..

Figure 8: Actual and projected genetic worth (genetic gain) by year



Actual and forecast annual average genetic worth for stem-volume growth (GWg) of select seed sown in BC.

Actual and species-plan forecasts of select-seed use as a percentage of total provincial seed use, by year

[25] Planting of at least 50% of the net area to reforest (NAR) is considered to be strategy focused on planting instead of natural regeneration.

5. Inherent Site Capacity

From a timber perspective, inherent site capacity is about the biophysical attributes of the land as they relate to timber productivity. While the focus for this goal is timber, site capacity is important for all values. Site capacity is mostly influenced by soil attributes, hydrological flows and balances, and associated processes such as decomposition and nutrient cycling.

Provincial Goals

To maintain the inherent site capacity of BC's forested ecosystems.

Provincial Objectives

1. The permanent footprint of roads, trails, and landings will not exceed what is necessary for logical and efficient natural resource management.
2. Access construction and maintenance will maintain natural drainage patterns and flows, and will not contribute to slope failures or chronic erosion over the long term.
3. Harvesting, silviculture and other management activities will not result in significant soil compaction and/or erosion on growing sites, temporary trails and work areas that will be reforested.
4. Harvesting, silviculture and other management activities will be conducted to provide for maintenance or recovery of proper nutrient cycling and soil nutrition.

Provincial Targets

- Currently the province restricts soil disturbance to a maximum percentage of site disturbance within the net area to be reforested (Forest Planning and Practices Regulation, s. 35).
- Currently the province has incorporated explicit maximum percentage limits for site disturbance and construction of permanent access structures into the Forest Planning and Practices Regulation, s. 36. The ministry's target is to have the average site disturbance for the province at less than 5 %[26].
- Currently the province directs the maintenance of natural drainage patterns for road construction and maintenance (Forest Planning and Practices Regulation, s. 37-39).

[26] Adapted from Ministry of Forests' Service Plan 2005/06-2007/08 Performance Measure where the outcome indicator '% of annual harvest area with soil loss due to establishment of permanent access roads' should be less than 5% based on a 5-year rolling average. The 5-year average for 2008/09 to 2012/13 soil loss is 3.6%.

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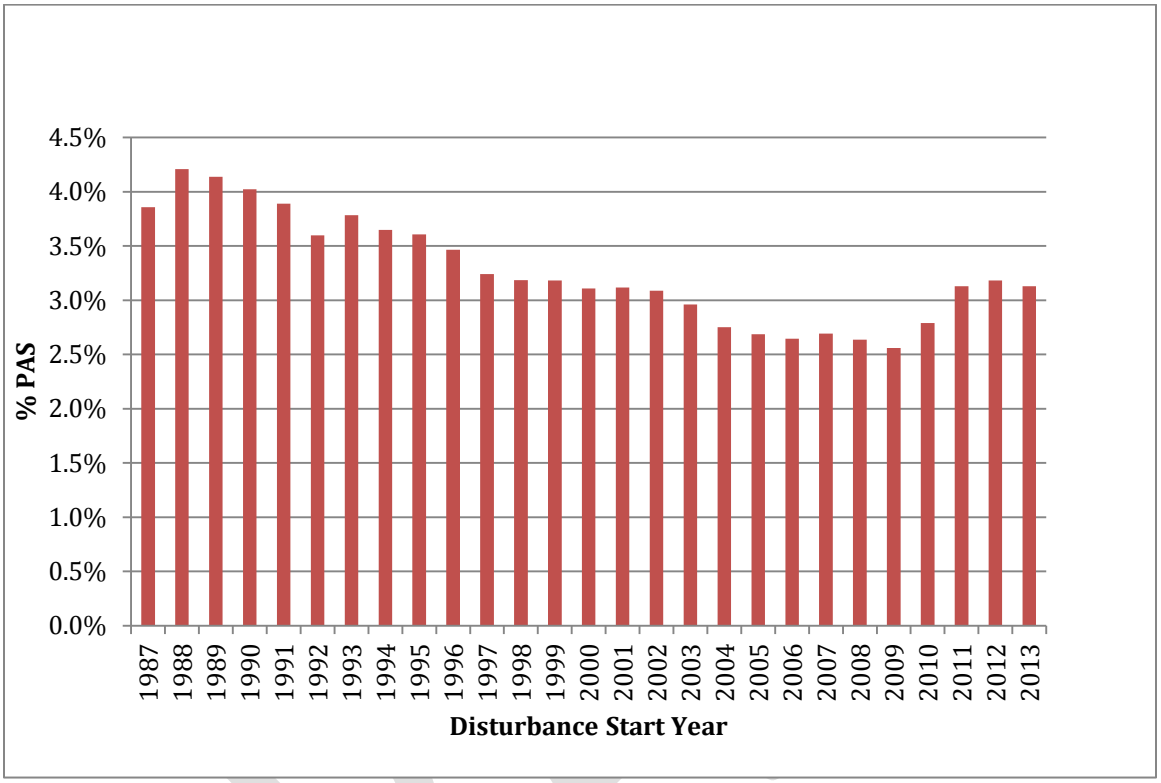
Permanent access structures

Figure 9: Percent of cutblock area with permanent access structures (PAS)



Section 36 of the *Forest Planning and Practices Regulation* states that an agreement holder must ensure that the area in a cutblock that is occupied by permanent access structures built by the holder or used by the holder does not exceed 7% of the cutblock; some exemptions are provided.

The provincial target is to have the average site disturbance for the province at less than 5%. Figure 9 above indicates that actual site disturbance reported in RESULTS from 1987 to 2013 has ranged from 4.2 to 2.6% indicating that the provincial target is being achieved (average 3.8% on Coast and 3.0% in the Interior over this period). However, issues related to inconsistent reporting of this factor means some caution should be used when evaluating this accomplishment.