

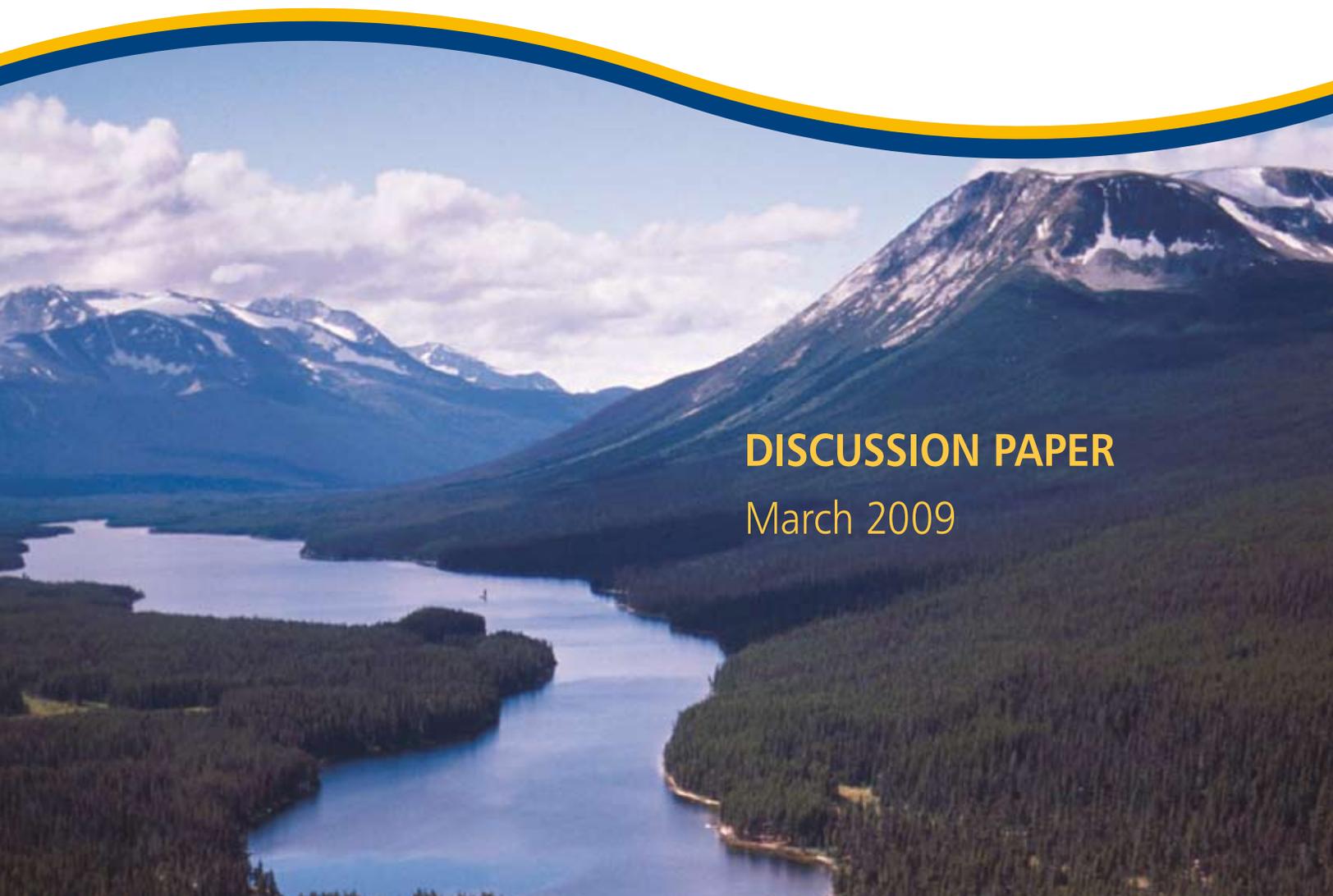


BRITISH  
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# GROWING OPPORTUNITIES

A New Vision for Silviculture in British Columbia



**DISCUSSION PAPER**

March 2009

# Contents

Introduction.....	3
Challenges & Opportunities.....	4
Current Silviculture Framework .....	6
Basic Silviculture .....	7
Rehabilitation and Incremental Silviculture .....	7
Benefits of Silviculture Activities.....	8
Tree Improvement .....	8
Reforestation Planning .....	8
Site Preparation .....	9
Planting .....	9
Vegetation Management.....	10
Spacing.....	10
Pruning .....	10
Commercial Thinning.....	10
Fertilization .....	10
Principles to Guide Development of a New Framework .....	11
Consultations .....	12

# Introduction

The intent of this discussion paper is to solicit input on a new vision to guide silviculture on public forest lands and make British Columbia a world leader in growing trees. This paper outlines challenges and opportunities, benefits, the current silviculture framework, principles to guide the development of a new framework, and some questions to stimulate discussion on the future of silviculture in British Columbia.

The Ministry of Forests and Range is responsible for managing, protecting, and conserving the province's Crown forest and range resources to provide environmental, social and economic benefits to all British Columbians. For more than a century, British Columbia's forest sector has been the cornerstone of the province's economy and manufacturing sector, sustaining rural and First Nations communities and generating revenue to finance a broad range of public services. Our forests are culturally significant to First Nations and provide important wildlife habitat, recreation opportunities, grazing opportunities, and water supply. This resource is also becoming increasingly important for its role in carbon sequestration and as a source of bio-energy.

Silviculture is one of the primary means to enhance the social and economic benefits from our forest resource. British Columbia benefits from a world-class, environmentally sustainable forest sector in part because it is a global leader in the prompt regeneration of new forests following harvest. But we know there is more to silviculture than reforestation. The goal is for British Columbia to build on its success at reforestation and broaden silviculture's focus and resulting benefits over the life cycle of our forest stands.

Silviculture investments can protect our resource by making our forest more resilient to climate change and insect infestations. They can improve the productivity of our forest lands and shorten the timeframe to harvest – helping to mitigate the impacts of natural disturbances such as the mountain pine beetle or land use decisions. Silviculture can also help maximize the value of the fibre we grow, whether for traditional commodities like dimensional lumber, or future products such as cellulose bio-chemicals or bio-energy.

Given its importance to how we manage and invest in our forests, British Columbia's silviculture framework benefits from periodic review to make certain it remains current and relevant in an ever-changing world. This will ensure British Columbia has a vibrant, sustainable, globally competitive forest industry that provides enormous benefits for current and future generations and for strong communities.

## NEW VISION

“ British Columbia's silviculture policies encourage investments that maximize productivity, value, and support forest resiliency. ”

# Challenges & Opportunities

British Columbia is a world leader in reforestation -- but there is far more to silviculture than planting trees. The British Columbia forest sector can extend its considerable talent, expertise, and effort to a much broader range of silviculture activities. With a new vision and the right framework, British Columbia can emerge as a world leader in growing trees to maximize the economic, social, and environmental benefits from our forest lands.

## OPPORTUNITY MARKET FOR CARBON CREDITS

Forest ecosystems sequester carbon and directly reduce the buildup of greenhouse gases in the atmosphere. Silviculture treatments are seen as a key component of an overall strategy to increase sequestration in the mid to long term (20-50 years).

The development of carbon-based markets and legislation like the Greenhouse Gas Reduction Targets Act (Cap and Trade Act) creates opportunities to explore alternate funding sources for silviculture and investments in B.C.'s forests.

Organizations such as the Pacific Carbon Trust and the Canada-U.S Western Climate Initiative are working to define the silviculture activities that will aid in the reduction of atmospheric greenhouse gases. It will allow B.C. to participate in a cap and trade system that will directly benefit the province's forest industry and economy.

The definition of eligible activities will open up opportunities for new funding sources for silviculture activities that grow trees faster, more efficiently, and increase carbon storage. For example, it is estimated that every \$100,000 invested in activities such as fertilization can result in the sequestration of approximately 4,500 additional tonnes of carbon dioxide.

The new vision for silviculture responds directly to a recommendation of the Working Roundtable on Forestry. Established in early 2008 to identify key issues and opportunities facing the forest sector in British Columbia, the Roundtable released its report in March 2009. The report sets 6 key priorities and 29 specific recommendations for the British Columbia forest sector. One of the priorities is "growing trees, sequestering carbon, and ensuring that land is available from which to derive a range of forest products." More specifically, recommendation #3 is:

“ We should review our forest management and silviculture practices to ensure that they encourage maximum productivity, value and support forest resilience.”

The Roundtable Report points out that investments in silviculture in British Columbia are largely driven by the least-cost options to meet reforestation regulations – reaching a “free-growing<sup>1</sup>” state. This gives rise to questions whether these investments always result in maximum potential

1 A stand of healthy trees of a commercially valuable species, the growth of which is not impeded by competition from plants, shrubs or other trees; depending on the species and other conditions, the time frame to achieve this to a maximum of 20 years.

productivity, increased value and improved forest resiliency, and whether the current allocation of basic and incremental silviculture responsibilities results in the best future forest conditions.

It also notes that British Columbia's silviculture, forest manufacturing, tenure and valuation systems evolved from the assumption that sawlogs are the primary forest product – a focus that can obscure new and emerging opportunities. Bioenergy and biofuels in particular can be manufactured from small or younger trees, and ecosystem services such as carbon sequestration, biodiversity, energy and water, as well as increased wood and wood waste utilization, are all real opportunities. In addition, as our climate changes, our silviculture and other forest management systems will need to adapt.

The Roundtable report also called for an expansion of community forest tenures and long term, area-based First Nations forest tenures. The Ministry of Forests and Range is also increasing the number of woodlot tenure opportunities. Since long term, area-based tenure holders enjoy greater certainty of direct benefits from intensive silviculture, they have a greater incentive to invest their own resources in silviculture to achieve their business or community objectives.

The challenge is to ensure that our silviculture and forest management systems are flexible enough to allow those who make silviculture investments – whether they be government, communities, industry, individuals, or First Nations – to maximize the returns from their investments. These systems must continue to deliver sustainable forest management while providing the flexibility necessary to face climate change, address the timber supply impacts of the mountain pine beetle epidemic, and produce forests that are suitable for new product and ecosystem service opportunities.

## OPPORTUNITY CLOSING THE TIMBER SUPPLY GAP

Among B.C.'s timber supply challenges is the profound impact of mountain pine beetle infestation in the Interior. Actual timber harvest for the Interior last year is estimated at about 50 million cubic metres. This harvest level could decline to 38 million cubic metres in the mid-term (about 15 years from now) due to damage caused by the beetle. This represents a 24 per cent drop from the current harvest level by the year 2024, a decline that could last until 2070.

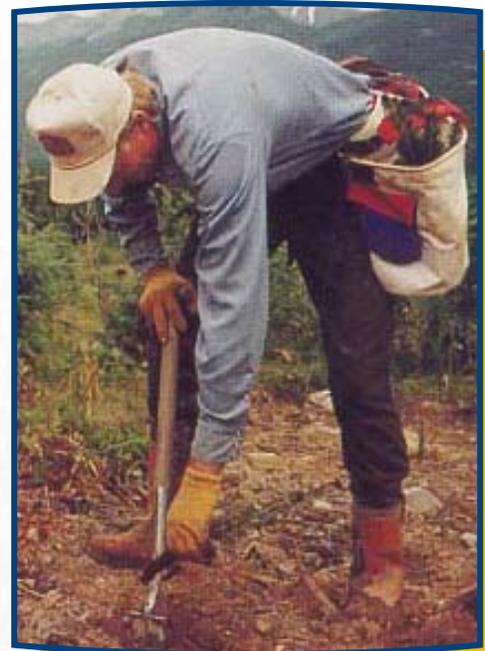
The Ministry of Forests and Range has identified three key ways to narrow this gap in mid-term timber supply. Targeting which areas are harvested first can extend the shelf-life of dead pine stands and close the gap by six per cent. Secondly, harvesting more dead pine and fewer green trees can fill the gap by a further six per cent. Finally, the gap can be reduced another five per cent with more intensive silviculture – activities such as planting improved stock, fertilization and spacing – to bring second growth into the timber harvesting rotation sooner.

By making second-growth available for harvest sooner, silviculture can play a key role in moving the mid-term timber supply gap from a 24 per cent drop to a more manageable seven per cent decline – a significant improvement for the forest-dependent communities affected by the infestation.

# Current Silviculture Framework

Over the past 80 years, British Columbia has developed an effective and well-established reforestation program, which has improved even further since 1987. Some key points include:

- Prior to 1987, just over one-half of harvested areas were planted. Average seedling survival was 54 per cent and the average period of time to plant new seedlings (regeneration delay) was about 10 years.
- Today, over 80 per cent of harvested areas are planted, while remaining areas are expected to successfully regenerate naturally. Average seedling survival is now 93 percent and regeneration delay is under two years.
- British Columbia harvests less than one per cent of its forests each year, and harvested areas must be reforested with native species suited to local ecological conditions.
- In 2007 about 185,500 hectares were planted with 235 million seedlings of 15 different tree species.
- More than six billion trees have been planted in British Columbia since operational planting began in the 1930s.
- In the 2008 Throne Speech the Province announced that all forest land currently identified as not sufficiently restocked will be replanted and no future backlogs will be allowed to develop.
- The Province has introduced a goal of zero-net deforestation to ensure our forests are protected for the future. If forest land is converted to other purposes, an equal amount of non-forest land must be transformed to forested areas.



Prior to 1987, all silviculture was funded largely by government. Starting in 1987, a mixed model emerged. Forest licensees are now responsible for funding and delivering basic silviculture, while government remains the lead funder of rehabilitation and incremental silviculture.

**BASIC SILVICULTURE** aims to accelerate the establishment of a free-growing stand of commercially valuable tree species after harvesting. To achieve free-growing status, various activities may be required such as seed collection, site preparation, artificial and natural regeneration, brushing, and density control.

## BASIC SILVICULTURE

Although government remains involved in approving basic silviculture activities, forest licensees hold the legal and financial obligation to reforest any harvested area with commercially valuable species and then ensure the reforested areas achieve a free-growing condition.

This approach has resulted in timely reforestation and world-leading advances in reforestation technologies and practices. Since January 2004, further refinements to this framework were achieved with the introduction of the Forest and Range Practices Act. This framework helped streamline basic silviculture delivery by moving from a prescriptive approach to a results-focused model. Monitoring by government and investigation by the Forest Practices Board

ensures that forest licensees continue to achieve their legal silviculture obligations. Independent third party certification also considers how well the forest licensees are meeting their reforestation obligations.

## REHABILITATION AND INCREMENTAL SILVICULTURE

Rehabilitation silviculture aims to accelerate the establishment of a free-growing stand of commercially valuable tree species on areas affected by natural disturbances, such as wildfire, disease, or insects, as well as areas harvested prior to 1987 that have not successfully reforested.

Since 2002, incremental silviculture projects are planned and carried out by forest licensees mainly under the government-funded Land Base Investment Program which is the largest of the five programs under the Forest Investment Account. In part, Land Base Investment Program investments are expected to increase timber volumes, value, and site productivity and support sustainable forest management practices.

### FOREST FOR TOMORROW

Most rehabilitation silviculture is now carried out through the Forests for Tomorrow program, which was established in 2005 to reforest areas impacted by the mountain pine beetle and the catastrophic wildfires of 2003 and 2004. The Forests for Tomorrow program also plans and manages treatments for areas harvested prior to 1987 that have not successfully reforested. This annual \$50-million program has already planted over 17 million seedlings, and will plant an additional 17 million seedlings annually by 2010.

**INCREMENTAL SILVICULTURE** treatments are carried out to maintain or increase the yield and value of regenerating forests beyond the free-growing stage. Examples are juvenile spacing, pruning, fertilization, and commercial thinning.

Forest licensees set their own priorities and government sets the standards and eligibility criteria for project funding. In 2007 this account funded 18,392 hectares of fertilization, 1,157 hectares of juvenile spacing, and 102 hectares of pruning.

# Benefits of Silviculture Activities

Today's changing markets for forest products and the projected impacts of climate change raise important questions about whether the current silviculture framework encourages the right mix of silviculture investments to maximize the productivity, value and resiliency of British Columbia's forest resource. Answering these questions starts with understanding the different benefits that can be achieved through different silviculture practices.

There is a considerable body of scientific and applied research to help us navigate the potential benefits from different silviculture investments. Forests are incredibly complex ecosystems. The specific benefits of various silviculture treatments vary widely depending on local geographic and environmental conditions.



## TREE IMPROVEMENT

Over the past 50 years, British Columbia has developed a globally recognized tree improvement program that is part of a broader strategy to conserve, manage, and improve the resilience of tree genetic resources. The practice of tree improvement is a continuous cycle of selecting, testing, and growing trees (seed orchards, seed centres, seedling nurseries) for faster growth, greater value, improved pest resistance, and adaptability to climate change.

Superior seed can increase volume production (and carbon sequestration) and, in some cases, provide better pest and disease resistance. Depending on superior seed source, volume gains, can range between 6 per cent and 32 per cent above that of natural stand collected seed.

Seed orchards produce about 50 per cent of the superior seed used for reforestation in the province. This amount is projected to increase to 75 per cent by 2020.

However, currently superior seed is not available for all areas or species in the province. In such cases, wild seed and natural regeneration is used.



## REFORESTATION PLANNING

For over 30 years, British Columbia's world-recognized biogeoclimatic classification system has been used to provide an ecological basis for forest management decisions, including reforestation. Ecological classification is a critical factor in determining tree species and tree densities. The Future Forest Ecosystems Program will supplement this information to help adapt to climate change.

Prior to harvest or rehabilitation of natural disturbances, work plans are developed to outline the various silviculture treatments needed to achieve free-growing, which focus on site preparation, natural regeneration or planting, and any potential treatment of non-crop vegetation. Reforestation planning helps improve reforestation success and ensure other values such as biodiversity are protected.



## SITE PREPARATION

Sometimes treatments such as trenching, mounding, or burning are required to prepare suitable sites for seedling establishment. Site preparation techniques such as burning, can also mimic natural disturbance processes and help establish the naturally occurring plant communities, which also provide valuable biodiversity and wildlife habitat. Without site preparation, reforesting some sites such as waterlogged or cooler soils would be largely unsuccessful. While the actual benefits will vary considerably by ecosystem, in northeast British Columbia, site preparation for spruce planting reduced the projected rotation age by 12 to 16 years or, in other terms, resulted in a 30 per cent volume increase.



## PLANTING

Planting after harvesting or natural disturbances establishes a new forest sooner than relying on natural regeneration, allows for more even distribution of seedlings, and often results in shorter rotations. Planting also facilitate the use of superior seed and a broader mix of species.

Planting is also used for stream bank and slope stabilization, and for other types of site restoration. In British Columbia, the average time to reforest after harvest is now less than two years by planting compared to about 6 to 7 years through natural regeneration. In some cases, establishing seedlings before competing vegetation has advanced can reduce the future need for more costly vegetation management. Faster establishment time and reduced losses from vegetation competition can reduce the rotation age by up to 10 years.

# SUCCESS STORY

## COMMERCIAL THINNING IN THE NORTHWEST

Around Terrace, from 1980 to 2000, over 27,000 hectares of forest was spaced. Most of the spaced stands were on good growing sites with reasonable road access. These trees achieved a merchantable size 30 years sooner than unspaced stands, and enabled some of these stands to be commercially thinned allowing for some wood to be used prior to the next harvest.

The removal of the trees during the commercial thinning covered the costs of the thinning project, made timber available sooner, and provided local jobs.

If spacing and thinning occurs early enough, the accelerated growth of the remaining stems in these managed stands means they may be available for harvest sooner. Individual trees remaining in these managed stands end up being larger in diameter resulting in higher quality logs and less waste.



## VEGETATION MANAGEMENT

Vegetation management includes brushing treatments to remove competing vegetation around the immediate vicinity of young trees, freeing up nutrients, water, and sunlight to increase survival and accelerate tree growth.

In part due to advancements in prompt planting and improved methods such as taller seedlings with healthier root systems, the level of vegetation management has decreased over the last 10 years. As noted in the example on site preparation, vegetation control can increase volume production at rotation by up to 30 per cent.



## SPACING

Spacing to thin the density of overcrowded young stands reduces competition for light, water, and nutrients. It promotes faster growth, larger trees, and uniform sizes and shapes that can reduce harvesting and milling costs. Spacing can also help produce healthier stands by removing diseased and damaged trees.



## PRUNING

Pruning involves the removal of lower live and dead branches from tree stems. It promotes the production of high-quality, clear (knot-free) wood. The production of clear wood may increase the value of a log at harvest by 4 to 10 times the value of an unpruned log.



## COMMERCIAL THINNING

Commercial thinning is similar to spacing except it is carried out in older regenerating stands where some of the trees have reached merchantable size. It provides a source of wood supply prior to the final harvest of the site. Commercial thinning promotes growth of the remaining well-spaced trees resulting in larger average diameters, in some cases up to 14 per cent. Like spacing, it also encourages biodiversity and wildlife habitat, and promotes forest health.



## FERTILIZATION

Fertilizer is applied to promote tree growth, particularly on sites deficient in one or more nutrients. Fertilization can help increase annual growth rates and generate higher volumes. Trees can reach an earlier merchantable size in excess of 10 years sooner and sequester carbon at a faster rate.

In 2008, \$12 million was invested to fertilize approximately 25,000 hectares. This is projected to support 1,300 direct and indirect future jobs, produce an additional 575,000 cubic metres of wood, and sequester one million tonnes of carbon dioxide. It is estimated that every \$100,000 invested in fertilization results in the sequestration of approximately 4,500 additional tonnes of carbon dioxide.

# Principles to Guide Development of a New Framework

As we explore the opportunities for improvement, we need to identify and challenge any barriers, be innovative in our solutions, and remain mindful of the importance of maintaining sound forest stewardship.

To generate the greatest possible benefits and best future forest conditions, British Columbia's silviculture framework needs to support the development of forest stands through their lifecycles. It needs to promote forest resiliency in the face of a changing climate, maintain ecological diversity, and facilitate new, incremental investments that promote maximum growth on high production sites with species and rotation lengths that support existing forest products and new opportunities such as bio-energy or carbon sequestration.

Development of a new silviculture framework in British Columbia can be aided by a broad discussion on the importance, relevance, and validity of the following principles:

- 1 Silviculture activities align with site productivity.
- 2 All harvested areas not part of access roads are reforested.
- 3 Reforestation activities aim for optimal site occupancy through target stocking of a desirable mix of species ecologically suitable for a changing climate.
- 4 Reforestation activities include species of high productivity and value using seed with the highest genetic gain, while maintaining or enhancing genetic diversity.
- 5 Silviculture plans aim to grow trees more quickly and affordably, and consider a diversity of end-products derived from British Columbia's forests.
- 6 Silviculture activities mitigate risks from forest health factors, and include sufficient flexibility to respond quickly to climate change challenges.
- 7 Silviculture activities offset impacts on the mid-term timber supply caused by the mountain pine beetle epidemic and other catastrophic events.
- 8 Investments in incremental silviculture are maximized where those who make the investment have the assurance that they will benefit from the increase in productivity and value of the forest resource.

# Consultations

If British Columbia wants to be recognized as a world leader in growing trees, we need to rethink how silviculture is delivered. We need to maximize the returns from our silviculture investments. We need to ask ourselves if the current allocation of basic and incremental silviculture responsibilities results in the best future forest conditions.

By consulting broadly with forest sector stakeholders, we are confident that we can develop a framework that will help us achieve our new vision for silviculture.

## Question 1

How should a new silviculture framework encourage investments that maximize productivity, value, and support forest resiliency?

## Question 2

Are there ways for government to refocus its silviculture expertise, programs, and investments to maximize productivity, value, and support forest resiliency?

## Question 3

Are there barriers that prevent or discourage silviculture investments that would maximize productivity, value, and forest resiliency?

## Question 4

Are there specific information gaps about the landbase or silviculture activities that currently discourage investments or create uncertainty on whether we are achieving maximum benefits from existing investments?

## Question 5

Are there ways to streamline the planning and approvals required for silviculture activities?

## Your Input is Needed

A new silviculture framework for British Columbia requires well-informed and thoughtful input. Your feedback is welcome on any aspect of this discussion paper. All information gathered during the public review period will be considered to prepare recommendations for a new silviculture framework, which will be developed in Fall 2009.

We encourage you to visit [www.survey.gov.bc.ca/feedback.pl?TOPIC=silviculture](http://www.survey.gov.bc.ca/feedback.pl?TOPIC=silviculture) for an easy-to-complete web-based response form.

Written responses will also be accepted.

Please mail written comments to the following address:

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Comments on this discussion paper will be accepted until September 30, 2009.



Ministry of  
Forests and Range