

# Timber Growth and Value Program

## Eligible Research Topics 2008/09

August 2007

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NOTE : The 2008/09 Call for Proposals is focused on a subset of the Timber Growth and Value Program themes and topics. Please refer to Appendix 1 in this document for the complete set of themes and topics.

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## Timber Growth and Value Program— Eligible Research Topics 2008/09

### Introduction

The research topics and priorities described in this document are those eligible for funding under the Timber Growth and Value funding category of the Forest Investment Account Forest Science Program (FIA-FSP) in 2008/09. For simplicity of presentation, this document includes only the research topics and priorities eligible for funding in 2008/09<sup>1</sup>. Other information related to the Call for Proposals is available from the PricewaterhouseCoopers website ([www.bcfsp.com](http://www.bcfsp.com)).

As previously, research topics are organized by theme, and priorities within research topics are specified individually and by geographic region. The regions used are those of the Ministry of Forests and Range: Coast (C), Northern Interior (NI), and Southern Interior (SI). A map showing these regions is available at: <http://www.for.gov.bc.ca/mof/maps/regdis/>

During this year's annual review of the FIA-FSP Timber Growth and Value research program, the Timber Growth and Value Program Advisory Committee (TPAC) undertook a process to harmonize the FIA-FSP with First Nations research priorities. Other consideration was also given to the apparent significance and broad concern over climate change and the mountain pine beetle epidemic in B.C. As a result, many of the eligible topics and priorities for research in 2008/09 have been restructured and reworded to reflect the TPAC's consideration of these important issues.

The ten-year research strategy of the (TPAC), *Timber Growth and Value PAC Research Strategy 2007-2017*, contains the complete list of research topics and will provide context for understanding this year's priorities. The Strategy is currently being updated and will be available in September 2007. However, the complete list of research topics for 2008/09 is presented here in Appendix 1.

### Submitting proposals

Proposals for research must be submitted using the appropriate proposal templates and guidelines, which are available on [www.bcfsp.com](http://www.bcfsp.com).

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<sup>1</sup> Note that the numbering of research topics does not imply ranking.

## Eligible Timber Growth and Value Research Topics and Priorities for 2008/09

This list of research priorities is a compilation and synthesis of input provided by the TPAC at the request of the FIA-FSP Forest Science Board (FSB). It serves as reference material to support the FIA-FSP Call for Proposals in August 2007. The research topics and priorities eligible for funding in 2008/09 are a subset of those identified in the Timber Growth and Value Program ten-year strategy. The FSB felt it necessary to focus spending as a means of ensuring that the FIA-FSP funds are used efficiently and effectively.

### Theme 1.0 Basic research on tree growth and stand development

#### Description

Improve the understanding of basic biological processes such as competition for light, nutrients, and moisture, and the resulting allocation of carbon that regulates tree growth and stand development. This information is needed to improve operational models and decision-support tools.

#### 1.1 Complex stands (including partial cutting and variable-retention harvesting)

Complex stands include multiple species, stands with structural diversity, and mixed stands of conifers and hardwoods. Areas of research eligible for funding in 2008/09 include:

Research priorities for topic 1.1		C	NI	SI
b	Microclimate effects related to tree and stand growth in multi-storied stands.	✓	✓	✓

#### 1.3 Old trees and stands

Old stands include those being retained for non-timber purposes, or that remain in inventory for long periods due to the age structure of a management unit. Areas of research eligible for funding in 2008/09 include:

Research priorities for topic 1.3		C	NI	SI
a	Stand dynamics (e.g., volume loss, decay, succession, stand breakup, mortality). Includes, cedar, hemlock, aspen, true fir stands.	✓		

### Theme 2.0 Design and analysis of silvicultural systems

#### Description

Comparing silvicultural systems and management regimes at the stand, landscape, and forest levels to maximize timber volume and value while providing specific non-timber values of interest.

2.1 Complex stands (including partial cutting and variable-retention harvesting)

Development and monitoring of silvicultural systems for complex stands (multi-species, structurally complex) at multiple scales (stand, landscape, forest). Areas of research eligible for funding in 2008/09 include:

Research priorities for topic 2.1		C	NI	SI
a	The relationship between residual stand structure and understory recruitment and development; evaluation of the results of partial cuts and the effects on stand establishment, early growth and yield, and response to management practices.	✓	✓	✓
b	Development and monitoring of the impact of various stand treatment regimes on regeneration.	✓	✓	✓

**Theme 3.0 Growth and yield modeling/predictions**

Description

Develop and improve models and decision-support tools that predict tree and stand characteristics related to the production of timber volume and value and to non-timber values, with priority given to models that support the provincial Timber Supply Review. This research may also include estimating and evaluating the impacts of management decisions on timber at multiple scales (stand, landscape, and forest).

3.1 Complex stands (including partial cutting and variable-retention harvesting)

Models of complex stands, including those with multiple species and stands with structural diversity. Areas of research eligible for funding in 2008/09 include:

Research priorities for topic 3.1		C	NI	SI
a	Boreal mixed wood (spruce-pine-aspen)		✓	
b	Coastal BEC zones (MH, CDF, CWH)	✓		

**Theme 4.0 Timber losses to environmental and biotic factors (wind, drought, insects, disease, animals, and fire)**

Description

Find methods to predict and mitigate timber losses due to environmental factors.

4.1 Stand and forest dynamics following MPB

Research aimed at understanding and quantifying how stands will develop following MPB attack. Basic research regarding post-attack stand dynamics and succession. Research under this topic may involve the use of growth and yield models, but should not be mainly about growth and yield model development. Areas of research eligible for funding in 2008/09 include:

MPB Research priorities for topic 4.1		C	NI	SI
a	Quantification of stand and forest change and development following MPB attack and impacts on timber supply. Evaluating and estimating timber growth implications on residual trees and regenerated stands, in the understory and in clearcut openings. Includes species interactions related to the scale and pattern of harvesting.		✓	✓
b	Growth, development, and health of residual stands (overstory and understory) across a wide range of post-attack stand types and conditions (i.e., mixed species - salvaged; mixed species - unsalvaged; pine dominant - unsalvaged) in different BEC zones. Includes mitigating losses and determining the extent and intensity of MPB impacts on younger stands (e.g., 25-30-year-old plantations).		✓	✓
c	Mitigating MPB losses: silvicultural treatments and regimes, such as fertilization of non-lodgepole pine stands, treatment of repressed lodgepole pine stands, mixedwood management, broadleaf management, and under-planting, to accelerate operability, enhance mid-term timber supply, and reduce future risks.		✓	✓

#### 4.2 Estimating stand-level losses (other than MPB)

Research may involve the use of growth-and-yield models, but should not be mainly about growth-and-yield model development. Areas of research eligible for funding in 2008/09 include:

Research priorities for topic 4.2		C	NI	SI
c	Spruce bark beetle		✓	✓

#### 4.4 Site productivity impacts

Recent wildfires, the current MPB infestation, and the possibility of increasing incidence of such disturbances due to climate change are sufficiently widespread as to significantly impact hydrology and productivity at the site level. Forest policy makers and managers have little information about how major disturbances impact these site factors, and therefore, how they impact stand establishment, growth and health. Research under this topic aims to understand and assess the impacts of disturbance (especially extensive disturbance such as MPB mortality and salvage) on site hydrology and productivity. Areas of research eligible for funding in 2008/09 include:

Research priorities for topic 4.4		C	NI	SI
a	Impacts of changes to site hydrology due to major disturbance (e.g., MPB mortality/salvage, fires) on productivity and growing conditions.		✓	✓

**Theme 6.0 Marketable resources other than timber**

Description

Effects of silvicultural systems on Non-Timber Forest Product (NTFPs), and the values derived from non-timber forest products. Non-Timber Forest Products include products for cultural, subsistence, recreational, and commercial uses.

6.2 Non-timber forest products (NTFP)

Research on the interactions of both forest management and traditional First Nations (FN) management on NTFP, and techniques for enhancing NTFP and overall stand value, with the objective of developing better co-management practices by combining silviculture with botanical, experiential, and traditional-use knowledge. Researchers must provide rationale for why their selected species is a priority for research, and must demonstrate adequate community involvement and participation for species of particular significance to FN. Areas of research eligible for funding in 2008/09 include:

Research priorities for topic 6.2		C	NI	SI
a	Identifying the necessary ecological information (e.g., autecology, synecology, NTFP harvest effects) for key NTFPs or suites of NTFP species. Priority will be given to heavily utilized and impacted NTFP species.		✓	✓
b	Understand the effects of existing forest and range practices (e.g., harvesting, silviculture) on traditionally-used plant communities and other NTFPs. Priority will be given to NTFP species located in areas with accelerated timber harvesting or endangered ecosystems.	✓	✓	✓

**Theme 7.0 Climate change**

Description

Effects of climate change on tree and stand growth at multiple scales ranging from individual tree to forest and landscape scales.

7.1 Predicting effects of climate change on growth and productivity

Research on the effects of predicted changes in climate on growth and productivity of forest ecosystems. Areas of research eligible for funding in 2008/09 include:

Research priorities for topic 7.1		C	NI	SI
a	Predicting the effects of climate change on the management and growth and yield of current and future stands.	✓	✓	✓

7.2 Predicting effects of climate change on forest health and condition (e.g., insects, disease, fire)

Research will involve developing an understanding of the key controlling variables affecting how natural disturbance agents will respond to a changing climate, and the associated effects on forest

productivity, health, and condition under alternate natural disturbance regimes. Areas of research eligible for funding in 2008/09 include:

Research priorities for topic 7.2		C	NI	SI
a	Determining how insects and disease (as biotic agents of change) will respond to climate change, and the controlling variables in the response.		✓	✓
b	Methods for forecasting the effects of climate change on forest productivity, susceptibility to pests and pathogen outbreaks, and the health of plantations.		✓	✓

#### 7.4 Physiological and adaptive responses of species and seedlots

Research will involve developing an understanding physiological and adaptive responses of tree species used to produce seeds for reforestation under various climatic conditions. Areas of research eligible for funding in 2008/09 include:

Research priorities for topic 7.4		C	NI	SI
a	Quantifying plant-climate relationships and estimating the future range and deployability of B.C. tree species and genotypes, including bio-climatic modeling and opportunities for facilitated migration to match genotypes with future environments.		✓	✓
d	Understanding the physiological stress response of trees to changing environments, with linkages to species and seed zone ranges.			✓

### Theme 8.0 Forest harvesting and engineering studies

#### Description

Forest engineering research aimed at enabling cost-effective and environmentally appropriate methods of harvesting.

#### 8.1 Salvaging MPB-killed timber

This topic does not include research related to manufacturing with timber killed by MPB (i.e., utilization of the MPB-killed logs after they reach the mill). Areas of research eligible for funding in 2008/09 include:

Research priorities for topic 8.1		C	NI	SI
b	Studies to quantify the rates and amount of deterioration of MPB-killed timber for forest product use in relation to timber supply, harvest scheduling, and salvage operations.		✓	✓

## Appendix 1 2008/09 Timber Growth and Value Program research strategy themes, topics and priorities

**Table A1 2008/09 priority rank scores for Timber Growth and Value Program themes, topics, and priority restrictions.**  
Columns 5 to 7 indicate relevance to the Future Forest Ecosystem Initiative (FFEI), identified First Nations interests (FN), and Mountain Pine Beetle (MPB). Priorities are scored regionally with values ranging from 1 to 8, 1 being the highest priority.

#	Theme/Topic	Priorities		FFEI	FN	MPB	Score		
							Coast	N. Int.	S. Int.
<b>1.0</b>	<b>Basic research on tree growth and stand development</b>								
1.1	Complex stands including partial cutting, variable retention	a	Species interactions				5	4	4
		b	Microclimate effects related to tree and stand growth in multi-storied stands.				2	2	2
		c	Natural regeneration		FN	MPB	3	3	3
		d	Mortality in seedling, sapling and pole stages.				4	3	3
1.2	Early stand growth	a	Subalpine fir ( <i>Abies lasiocarpa</i> )			MPB	8	4	4
		b	Western redcedar ( <i>Thuja plicata</i> )		FN		4	5	5
		c	Yellow-cedar ( <i>Chamaecyparis nootkatensis</i> )		FN		4	8	8
1.3	Old trees and stands	a	Stand dynamics (e.g., volume loss, decay, succession, stand breakup, mortality). Includes, cedar, hemlock, aspen, true fir stands.		FN		2	5	4
		b	Mortality				4	5	5
		c	Succession and stand dynamics				5	4	4
<b>2.0</b>	<b>Design and analysis of silvicultural systems</b>								
2.1	Complex stands including partial cutting, variable retention	a	The relationship between residual stand structure and understory recruitment and development; evaluation of the results of partial cuts and the effects on stand establishment, early growth and yield, and response to management practices.		FN		2	2	2
		b	Development and monitoring of the impact of various stand treatment regimes on regeneration.				2	2	2
		c	Genetics issues with complex stands, including impacts on stand genetic worth and timber supply estimates, impacts on stand genetic diversity, and edge-shading effects.				5	5	5

#	Theme/Topic	Priorities	FFEI	FN	MPB	Score			
						Coast	N. Int.	S. Int.	
		d	FFEI	FN		7	5	4	
		e		FN		5	5	5	
2.2	Even-aged stands	a				4	4	4	
		b				8	7	6	
		c				5	5	5	
		d				8	7	8	
		e				6	6	6	
<b>3.0</b>	<b>Growth and yield modeling/predictions</b>								
3.1	Complex stands including partial cutting, variable retention	a		FN		8	2	8	
		b				2	8	8	
		c			FN		8	3	8
		d			FN		8	8	3
		e					5	5	5
3.2	Wood quality	a				4	4	4	
<b>4.0</b>	<b>Timber losses to environmental and biotic factors (wind, drought, insects &lt;incl. MPB&gt;, disease, animal damage, fire)</b>								
4.1	Stand and forest dynamics following MPB	a		FN	MPB	8	2	2	

#	Theme/Topic	Priorities	FFEI	FN	MPB	Score		
						Coast	N. Int.	S. Int.
		b Growth, development, and health of residual stands (overstory and understory) across a wide range of post-attack stand types and conditions (i.e., mixed species - salvaged; mixed species - unsalvaged; pine dominant - unsalvaged) in different BEC zones. Includes mitigating losses and determining the extent and intensity of MPB impacts on younger stands (e.g., 25-30-year-old plantations). c Mitigating MPB losses: silvicultural treatments and regimes, such as fertilization of non-lodgepole pine stands, treatment of repressed lodgepole pine stands, mixedwood management, broadleaf management, and underplanting, to accelerate operability, enhance mid-term timber supply, and reduce future risks.			MPB	8	2	2
					MPB	8	2	2
4.2	Estimating and/or mitigating stand-level losses	a Windthrow b Ips beetles c Spruce bark beetle d Root disease (Armillaria, Phellinus) e Spruce leader weevil f Rusts: Dothistroma, Commandra, Western gall g Spruce budworm h Dwarf mistletoe i Wildlife and grazing impacts j Growth and yield implications of stand management at the urban interface for fire hazard protection. k Root collar weevil				4	6	7
						8	3	3
						8	2	2
						4	4	4
						6	4	6
						8	3	5
						8	7	3
						5	6	6
						7	6	6
						7	6	6
						8	4	4
4.3	This topic has been retired							
4.4	Site productivity impacts	a Impacts of changes to site hydrology due to major disturbance (e.g., MPB mortality/salvage, fires) on productivity and growing conditions.				8	1	1

#	Theme/Topic	Priorities		FFEI	FN	MPB	Score		
							Coast	N. Int.	S. Int.
4.5	Understanding the basis of genotypic preference, and the basis for genetic resistance to insect and disease attacks	a	Mountain pine beetle (Lodgepole pine)			MPB	8	4	4
		b	Leader weevils (spruces)				6	5	6
		c	Rusts (lodgepole pine)				8	3	3
<b>5.0</b>	<b>Analytical techniques and models for strategic analysis</b>								
5.1	Development of novel methods to integrate data and models across scales	a	Techniques for integrating various data sources for strategic analyses (e.g., forest inventory, remote sensing, GY, and non-conventional data layers such as NTFP and tourism).		FN		3	3	3
5.2	Development of novel methods to link GY models to process, climate, hydrology, wildlife and other models	a	Hybrid modeling (e.g., connecting SORTIE functionality with PROGNOSIS or TASS).	FFEI			4	4	4
		b	Linking GY models with other resource models (e.g., climate, hydrology, wildlife habitat supply, and other models).				3	3	3
<b>6.0</b>	<b>Marketable resources other than timber</b>								
6.1	This topic has been retired								
6.2	Non-timber forest products (NTFP)	a	Identifying the necessary ecological information (e.g., autecology, synecology, NTFP harvest effects) for key NTFPs or suites of NTFP species. Priority will be given to heavily utilized and impacted NTFP species.				4	3	3
		b	Understanding the effects of existing forest and range practices (e.g., harvesting, silviculture) on traditionally-used plant communities and other NTFPs. Priority will be given to NTFP species located in areas with accelerated timber harvesting or endangered ecosystems.		FN		2	1	1
		c	Initiate new trials to assess impacts of integrated forest management on NTFPs.				5	4	5
		d	Explore the potential of species not currently used as NTFPs.				6	6	6
6.3	This topic has been retired								

#	Theme/Topic	Priorities		FFEI	FN	MPB	Score		
							Coast	N. Int.	S. Int.
<b>7.0</b>	<b>Climate change</b>								
7.1	Predicting effects of climate change on growth and productivity	a	Predicting the effects of climate change on the management and growth and yield of current and future stands.	FFEI			3	3	3
		b	Predicting effects of climate-change on key NTFP species.	FFEI			5	5	5
7.2	Predicting effects of climate change on forest health and condition (e.g., insects, disease, fire)	a	Determining how insects and disease (as biotic agents of change) will respond to climate change, and the controlling variables in the response.	FFEI			4	3	1
		b	Methods for forecasting the effects of climate change on forest productivity, susceptibility to pests and pathogen outbreaks, and plantation health.	FFEI			5	3	1
		c	Effects of climate change on fire risk and behaviour.	FFEI			5	4	5
		d	Methods for assessing and managing the risk and uncertainty associated with climate change.	FFEI			4	4	4
7.3	Responding to ecosystem shifts including	a	Determine how the management of timber species can incorporate effective responses to changing climate and associated ecological changes.	FFEI			4	4	4
		b	Mitigating timber supply losses due to climate-change effects.	FFEI			4	4	5
		c	Timber supply and environmental implications of introducing exotic tree species.	FFEI			5	5	6
7.4	Physiological and adaptive responses of species and seedlots	a	Quantifying plant-climate relationships and estimating the future range and deployability of B.C. tree species and genotypes, including bio-climatic modeling and opportunities for facilitated migration to match genotypes with future environments.				4	3	3
		b	Quantifying the adaptation and productivity of select seed from B.C. and neighbouring jurisdictions when grown in current and forecast future B.C. climates.				5	4	4
		c	Tracking vegetation changes due to climate change through the evaluation of older vegetation survey plots.				5	5	5
		d	Understanding the physiological stress response of trees to changing environments, with linkages to species and seed zone ranges.				5	4	3

#	Theme/Topic	Priorities	FFEI	FN	MPB	Score		
						Coast	N. Int.	S. Int.
8.0	<b>Forest harvesting and engineering studies</b>							
8.1	Salvaging MPB-killed timber	a			MPB	7	3	3
		b			FN MPB	7	2	2
8.2	Harvesting systems for biomass (co)production	c				6	5	5