
FIA-FSP

Forest Science Board

Sustainability Program

Eligible Research Topics 2008/09

August 2007

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

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Sustainability Program— Eligible Research Topics 2008/09

Introduction

The research topics and priorities described in this document are those eligible for funding under the Sustainability 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 2008/09¹. Other information related to the Call for Proposals is available from the PricewaterhouseCoopers website (www.bcfsp.com).

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 Sustainability research program, the Sustainability Program Advisory Committee (SPAC) 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 SPAC's consideration of these important issues.

The ten-year research strategy of the SPAC, *Sustainability 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; the complete list of research topics for 2008/09 is presented here in Appendix 1.

Submitting proposals

Proposals must be submitted using the appropriate proposal templates and guidelines, which are available on www.bcfsp.com.

¹ Note that the numbering of research topics does not imply priority ranking.

Eligible Sustainability Research Topics and Priorities for 2008/09

This list of research priorities is a compilation and synthesis of input provided by the SPAC 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 Sustainability Program ten-year strategy. The FSB felt it necessary to focus spending on the topics and priorities that have been identified as the highest priorities by the SPAC as a means of ensuring that the FIA-FSP funds are used efficiently and effectively.

Theme 1.0 Ecosystem structure, function and processes, and biodiversity related to forest management

In addition to other experimental approaches, research that utilizes variable-retention harvesting and/or alternative silvicultural systems as a treatment framework for experimental research will be considered eligible for funding in all topics in this theme, and may be considered especially appropriate in some cases.

1.4 Effectiveness of site-level structures in maintaining biodiversity and rangeland habitats typified by grass and shrub cover

Current site-level harvesting practices in both old and immature stands include the retention of old-growth attributes and wildlife habitats such as green trees, wildlife tree patches, downed wood, riparian reserves, patches of residual advanced regeneration, and high stumps (created with feller-bunchers). In addition, silvicultural treatments may be used to create old-growth attributes in immature stands; for example: simulating advanced decomposition by halving and hollowing variable diameter logs or hollowing out stumps; creating openings by felling stems; inoculating stems with decay pathogens; thinning around stems; and fertilizing residual trees to encourage accelerated growth. The intent of these practices is to provide or maintain habitat at the site level, thus enhancing site-level biodiversity and contributing to landscape biodiversity over time. Areas of research eligible for funding in 2008/09 include:

Research priorities for topic 1.4		C	NI	SI
a	Contribution of site-level attributes to wildlife habitat needs and maintenance of biodiversity. Research needs are particularly focused on identifying appropriate site-level targets and configurations of site-level structures in cutblocks including those resulting from salvage of stands killed by Mountain Pine Beetle.	✓		
b	Identification of appropriate targets and configurations of site level structures to maintain biodiversity in dry forest and open range (i.e., grassland, shrubland).			✓
c	Effectiveness of management strategies in creating site-level structures and in the maintenance of site-level biodiversity, non-timber forest products, and rangeland habitat.	✓	✓	✓
d	Effectiveness of riparian buffers and their design in maintaining site-level wildlife habitat and biodiversity. Research needs are particularly focused on upland, riparian, and aquatic habitats.	✓	✓	✓

1.9 Climate Change

Research is needed on the effects of projected changes in climate on species, biological communities and ecosystems, and on the identification and understanding of the controlling variables causing the response. Areas of research eligible for funding in 2008/09 include:

Research priorities for topic 1.9		C	NI	SI
a	Identification of the species most affected by climate change that subsequently have the greatest impact on ecosystem composition and function. Research needs are particularly focused on species response, and the controlling variables causing species response to climate change.	✓		✓
b	Understanding how biological communities and ecological processes, at both the stand and landscape levels, might respond to projected changes in climate.	✓	✓	✓
c	The influence of climate change on the interactions among wildland fire and wildland fire behaviour, the appropriate management responses, and the ultimate impacts of wildland fire on other resources.		✓	✓
d	Effects of climate change on the range, distribution, and impact of exotic and invasive species (e.g., role of insects and disease as biotic agents of change, and the controlling variables).			✓

Theme 4.0 Scientific information to inform policy, regulations, and FRPA practice requirements

4.1 Species at Risk recovery research

Species at Risk represent a significant and immediate challenge to the goal of sustainability. Their high visibility and the irreversible nature of their loss make listed species a high and urgent priority for sustainability research.

Research should address knowledge gaps for species and ecological communities named under FRPA; listed in the federal Species at Risk Act (SARA) Schedule 1; listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as endangered, threatened, or extirpated; and on the B.C. Conservation Data Centre (CDC) Red and Blue Lists.

Research should also focus on knowledge gaps related to (but not limited to) the following species of immediate concern to forest managers in B.C.: Spotted Owl, Mountain Caribou, Queen Charlotte Islands Goshawk, Marbled Murrelet, Grizzly Bear, Tailed Frog, Coho/Cutthroat Trout (small stream species), and Bull Trout.

Consideration will also be given to proposals dealing with COSEWIC-candidate species or species that are designated "Data Deficient" and that are named in the CDC Red or Blue Lists.

Areas of research eligible for funding in 2008/09 include:

Research priorities for topic 4.1		C	NI	SI
a	Determination of critical habitat requirements for species at risk, defined at the appropriate level of habitat classification.	✓	✓	✓
b	Clarification and/or assessment of threats to species or ecosystems at risk, particularly those with cumulative effects or where empirical evidence is apparently conflicting.	✓	✓	✓
c	Effects of management practices (e.g., forest road development, salvage and rehabilitation of stands killed by Mountain Pine Beetle, livestock use, exclusion/re-introduction of fire) on the ecology of species at risk.	✓	✓	✓
d	Determination of how specific threats to habitat may be mitigated or how recovery mechanisms could be developed to assist recovery of species at risk.	✓	✓	✓

4.2 Evaluation and management of impact of potential AAC changes over time on community resiliency

Research is needed to help understand the impacts of potential changes in AAC on community resiliency. Areas of research eligible for funding in 2008/09 include:

Research priorities for topic 4.2		C	NI	SI
a	Evaluation of mechanisms for enhancing community resilience.	✓	✓	✓
b	Effects of established policies and regulations on community resilience (e.g., how do communities adapt to AAC changes).	✓	✓	✓
c	Development of knowledge to improve determination of AAC in ways that minimize impacts on communities.	✓	✓	✓
d	Consequences of policies, regulations, and science on community resilience.	✓	✓	✓
e	Evaluation of effectiveness of implemented policy in achieving socio-economic objectives.	✓	✓	✓

Appendix 1 2008/09 Sustainability Program research strategy themes, topics and priorities

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

#	Theme/Topic	Priorities	FFEI	FN	MPB	Range	Score		
							Coast	N. Int.	S. Int.
1.0	Ecosystem structure and processes, and biodiversity related to forest management								
1.1	Riparian ecology and stream management	<p>a Sensitivity of small stream and wetland ecosystems to alternative riparian management strategies (e.g., livestock use). Research needs are focused particularly on water quality, channel morphology, and biological effects.</p> <p>b Riparian biodiversity of small streams and wetlands, especially in dry interior ecosystems.</p> <p>c Significance of small streams as sources of material and energy to downstream reaches.</p> <p>d Consequences of managing the Mountain Pine Beetle epidemic (e.g., salvage, mortality, rehabilitation, and other related management activities) on the riparian character and function of small streams, wetlands, and other aquatic habitats. Research needs are focused particularly on channel morphology, stream temperature, and organic matter dynamics.</p>		FN	MPB	Range	1	2	2
			FFEI	FN	MPB		6	2	2
1.2	Soil biology, ecology, and productivity	<p>a Effects of forest management (e.g., coarse woody debris retention, green tree retention, soil disturbance allowances, salvage of MPB-killed stands) on soil ecology and site productivity. Research needs are particularly focused on biological, chemical, and physical attributes and processes.</p> <p>b Relationships between soil biological, chemical, and physical attributes and processes. Research needs are particularly focused on resilience of, and critical thresholds for, site productivity.</p> <p>c Improving the scientific basis for determining the sensitivity of soil as defined in the forest planning and practices regulations.</p>	FFEI				4	4	4
				FN	MPB		3	3	2
							5	6	5

#	Theme/Topic	Priorities		FFEI	FN	MPB	Range	Score		
								Coast	N. Int.	S. Int.
		d	Impacts of natural disturbance (e.g., Mountain Pine Beetle epidemic, fire) and/or climate change on soil organisms, nutrient cycling and availability, and other soil processes.	FFEI	FN	MPB	Range	4	3	4
1.3	Coarse filter approaches to maintaining biodiversity at the landscape scale	a	Contribution of landscape-level attributes (e.g., seral stage distribution; salvage, rehabilitation, or retention of stands killed by Mountain Pine Beetle; patch size distribution; ecosystem representation in reserves; and riparian networks) to coarse-filter biodiversity conservation objectives.	FFEI	FN	MPB		1	1	1
		b	Effects of current management (e.g., variable retention, salvage and rehabilitation of stands killed by Mountain Pine Beetle) and traditional First Nations land-management practices on the creation or maintenance of structure and ecological processes at landscape scales.	FFEI	FN	MPB		1	1	1
		c	Effects of current management (e.g., variable retention, salvage and rehabilitation of stands killed by Mountain Pine Beetle) and traditional First Nations land-management practices on individual species or groups of species at the landscape scale.	FFEI	FN	MPB		1	2	1
1.4	Effectiveness of site-level structures in maintaining biodiversity and rangeland habitats typified by grass and shrub cover	a	Contribution of site-level attributes to wildlife habitat needs and maintenance of biodiversity. Research needs are particularly focused on identifying appropriate site-level targets and configurations of site-level structures in cutblocks including those resulting from salvage of sites killed by Mountain Pine Beetle.	FFEI	FN	MPB	Range	2	3	3
		b	Identification of appropriate targets and configurations of site-level structures to maintain biodiversity in dry forest and open range (i.e., grassland, shrubland).	FFEI	FN	MPB	Range	5	4	2
		c	Effectiveness of management strategies in creating site-level structures and in the maintenance of site-level biodiversity, non-timber forest products, and rangeland habitat.	FFEI	FN	MPB	Range	1	1	1

#	Theme/Topic	Priorities	FFEI	FN	MPB	Range	Score			
							Coast	N. Int.	S. Int.	
		d		FN	MPB	Range	2	2	2	
1.5	Natural disturbance ecology	a	FFEI		MPB		3	1	1	
		b		FN	MPB		2	1	2	
		c	FFEI		MPB		1	1	1	
		d					1	2	2	
		e		FN	MPB		3	1	1	
		f					Range	6	2	2
		g	FFEI	FN	MPB		4	4	2	
		h	FFEI	FN	MPB		6	4	1	

#	Theme/Topic	Priorities	FFEI	FN	MPB	Range	Score		
							Coast	N. Int.	S. Int.
1.6	Watershed function	a			MPB		1	2	2
		b	FFEI	FN	MPB		2	3	3
		c					1	2	1
		d	FFEI				1	6	6
		e	FFEI	FN	MPB	Range	1	1	1
		f					4	3	4
		g			FN		2	4	3
1.7	Invasive species (plants, animals, pathogens)	a	FFEI			Range	4	3	2
		b			MPB	Range	2	2	2
		c					4	2	2

#	Theme/Topic	Priorities		FFEI	FN	MPB	Range	Score		
								Coast	N. Int.	S. Int.
		d	Characterizing the mechanism of interaction (e.g., predation and competition) between invasive species and species at risk.					2	4	2
1.8	Ecological restoration	a	Evaluating the effectiveness of restoration techniques on mitigating forest encroachment and in-growth in NDT4 ecosystems.		FN		Range	7	4	2
		b	Evaluating the effectiveness of diversity enhancing techniques, such as introducing snags and gaps, as a means of restoring biodiversity in stands or landscapes dominated by homogeneous second growth forests.		FN			2	4	2
		c	Evaluating the effectiveness of methods for controlling the populations or impacts of invasive species.		FN		Range	4	4	2
		d	Evaluating the effectiveness of in-stream aquatic habitat restoration techniques.		FN			4	4	4
		e	Evaluating the effectiveness of soil rehabilitation techniques in re-establishing soil productivity.		FN			6	5	5
		f	Evaluating the effectiveness of riparian habitat restoration techniques.		FN	MPB	Range	2	2	2
		g	Utilizing traditional knowledge to understand the pre-harvest values of the land to define rehabilitation practices that result in desired future landscapes and promote important species associations at different stages of regeneration.		FN	MPB		2	2	2
1.9	Climate Change	a	Identification of the species most affected by climate change that subsequently have the greatest impact on ecosystem composition and function. Research needs are particularly focused on species response, and the controlling variables causing species response to climate change.	FFEI				2	3	1
		b	Understanding how biological communities and ecological processes, at both the stand and landscape levels, might respond to projected changes in climate.	FFEI				2	2	1

#	Theme/Topic	Priorities		FFEI	FN	MPB	Range	Score		
								Coast	N. Int.	S. Int.
		c	The influence of climate change on the interactions among wildland fire and wildland fire behaviour, the appropriate management responses, and the ultimate impacts of wildland fire on other resources.	FFEI	FN			6	2	1
		d	Effects of climate change on the range, distribution, and impact of exotic and invasive species (e.g., role of insects and disease as biotic agents of change, and the controlling variables).	FFEI	FN	MPB		3	4	1
2.0	Decision support Tools for sustainable forest management									
2.1	Habitat supply modeling	a	Developing, calibrating, and validating habitat models related to priorities identified in theme 1.0 (Ecosystem structure, function, and processes...), topic 3.2 (Indicator thresholds of ecological sustainability), and for decision support related to priorities in topic 4.1 (Species-at-risk recovery research) and 4.4 (Management of Non-timber Forest Products).		FN	MPB		1	1	1
		b	Evaluate the effectiveness of fish habitat capability models in identifying high value fish habitat.					1	1	1
		c	Development of tools to explore the spatial and temporal dynamics of habitat values in both natural and managed forest stands at both stand and landscape levels. Tools focused within stands may include multi-species irregular stand structures and/or patterns resulting from variable-retention harvesting. Needs are particularly focused on the development of new, or the adaptation of existing, tools that use or improve the utility of existing inventory and other readily available data and that are responsive to external variables (e.g., stands killed by Mountain Pine Beetle, projections of climate change).	FFEI				1	1	1
2.2	Population viability and spatially explicit population models	a	Developing spatially explicit habitat supply models for population viability analysis (PVA) applied to species at risk as outlined in topic 4.1 (Species-at-risk recovery)					3	3	3

#	Theme/Topic	Priorities		FFEI	FN	MPB	Range	Score		
								Coast	N. Int.	S. Int.
2.3	Watershed response	b	Developing, refining and validating spatially explicit watershed models. Research needs are particularly focused on: the effects of forest disturbances including mortality and salvage of stands killed by Mountain Pine Beetle, on peak flow, timing of flow, volume of flow, effect on critical aquatic habitat, and effect on ground water, and water quality.		FN	MPB		3	1	2
2.4	Refine ecological classification system	a	Updating, reconciling, and refining BEC or its components.	FFEI	FN			1	2	4
		b	Developing methods for identifying rare ecosystems.					2	2	2
		c	Developing, refining and validating classification systems for aquatic ecosystems.					2	2	2
		d	Define seral stages in all ecological sites grazed by cattle and wild ungulates.					Range	5	3
2.5	Watershed stewardship tools	a	Predicting stream temperature regimes to support designation of temperature sensitive streams.					3	4	3
2.6	Ecological Risk Assessment Frameworks	a	Developing frameworks and/or models for evaluating the resilience and sensitivity of ecosystems to change and disturbances. Research needs are particularly focused on the hydrological, geophysical, and aquatic resources at the watershed and landscape levels.	FFEI	FN	MPB		3	1	1
2.7	Cumulative impacts	a	What are the implications for ecosystem function of multiple resource uses (e.g., forest management, oil and gas exploration and development, access, and recreation).	FFEI	FN			2	2	1
		b	What are the implications for social-cultural values of multiple resource uses (e.g., forest management, oil and gas exploration and development, access, and recreation).	FFEI	FN			3	2	2
		c	Tools for strategic planning that integrate time/space/scales for assessing cumulative effects of multiple resource uses.	FFEI	FN			3	3	3

3.0 Indicators, thresholds, and monitoring systems										
3.1	Development of indicators and monitoring systems	a	How useful are the indicators and monitoring systems being developed for each of the 11 FRPA values as part of the Forest Resource Evaluation Program (FREPE)?	FFEI			Range	3	3	4
		b	What aquatic species (benthic invertebrates, algae, fish, etc.) can be used as indicators of watershed health?				4	5	4	
		c	Developing and evaluating uses of remote sensing, information systems, and innovative technology to assess landscape- and stand-level characteristics.		MPB		2	1	1	
		d	What are useful indicators and monitoring systems to detect impacts on species most affected by climate change that subsequently have the greatest impact on ecosystem composition and function?	FFEI			4	3	3	
		e	Are there species or groups of species that can be used to infer habitat condition for a variety of other species – if so, which ones?		FN		3	3	4	
3.2	Indicator thresholds of ecological sustainability	a	Defining the response curves for biodiversity indicators to assist in identifying thresholds for maintaining ecological resilience.	FFEI	FN			1	1	1
		b	Determining the likely range of natural variability (biological and biophysical) of coarse- through fine-filter indicators to aid in the determination of management thresholds.	FFEI				1	1	1
		c	Defining biophysical or indigenous knowledge-based criteria suitable for assessing the ecological representation, landscape, and site attributes needed to maintain wildlife and biodiversity, and how best to allocate them across the landscape?		FN			1	1	1
		d	Assessing potential indicator targets and management thresholds for sensitive species and ecological communities, especially those species and communities designated under the Forest and Range Practices Act and regulations as: “at risk”, “regionally significant”, or “specified ungulates”. (Also see 2.2 - Population viability and spatially explicit population models, and 4.1 – Species-at-risk recovery research.)					2	2	2

		e	Clarifying and (or) refining thresholds for indicators of change in watershed functioning (e.g., road density, equivalent clear-cut area).					4	4	4	
3.3	Indicators for socio-economic sustainability	a	Development of methods allowing for appropriate and effective participation of stakeholders, First Nations, and public in the valuation of non-timber resource uses (i.e., both consumptive and non-consumptive) and the process for their effective inclusion in forest and land management plans.		FN			1	2	1	
		b	Effect of social grouping (e.g., stakeholder, First Nation, and public) on the relative importance (i.e., values and perceptions) of social, economic, and ecological factors.		FN			2	2	2	
		c	Development of methods to aggregate social and economic data for inclusion in land-use planning processes.		FN				1	1	1
		d	Quantification of impacts on, and acceptable compensation for, parties affected by reallocated resources imposed through land use plans.		FN				2	2	2
		e	Development of methods allowing for appropriate and effective participation of stakeholders, First Nations, and public in the valuation of non-timber resource uses (i.e., both consumptive and non-consumptive) and the process for their effective inclusion in forest and land management plans.		FN				1	2	1
3.4	Indicators for socio-cultural sustainability	a	Development of indicators for assessing the well-being and resilience of communities affected by forest management and the respective forestry agreements in place.		FN			1	1	1	
		b	Development of methods to use traditional and/or local knowledge, and to engage rural communities and First Nations, in the development of indicators.		FN			1	1	1	
		c	Assessment of the use of social and cultural indicators in operations, planning and policy for sustainable forestry.		FN				1	1	1

3.5	Methods for balancing social, economic, cultural and environmental indicators of sustainability	a	Process and criteria for setting thresholds, establishing targets, and balancing ecological, economic, and social indicators.		FN			1	2	1
		b	Implications and management of changing access patterns on non-timber resource use (e.g. fish, wildlife, recreation).		FN	MPB		1	1	1
		c	Development and assessment of methods for assessing public attitudes, values and preference related to resource management policy, actions and outcomes.					3	4	3
		d	Developing methods for the inclusion of First Nations-specific values into planning processes.		FN			1	1	1
4.0	Scientific information to inform policy, regulations, standards development, and (or) refinement									
4.1	Species-at-risk recovery research	a	Determination of critical habitat requirements for species at risk, defined at the appropriate level of habitat classification.			MPB		2	2	2
		b	Clarification and/or assessment of threats to species or ecosystems at risk, particularly those with cumulative effects or where empirical evidence is apparently conflicting.		FN	MPB	Range	2	2	2
		c	Effects of management practices (e.g., forest road development, salvage and rehabilitation of stands killed by Mountain Pine Beetle, livestock use, exclusion/re-introduction of fire) on the ecology of species at risk.	FFEI		MPB	Range	2	2	2
		d	Determination of how specific threats to habitat may be mitigated or how recovery mechanisms could be developed to assist recovery of species at risk.			MPB	Range	1	1	1
4.2	Evaluation and management of impact of potential AAC changes over time on community resiliency	a	Evaluation of mechanisms for enhancing community resilience.		FN	MPB		2	2	2
		b	Effects of established policies and regulations on community resilience (e.g., how do communities adapt to AAC changes).		FN	MPB		1	2	1
		c	Development of knowledge to improve determination of AAC in ways that minimize impacts on communities.		FN	MPB		1	2	1
		d	Consequences of policies, regulations, and science on community resilience.		FN	MPB		1	1	1

		e	Evaluation of effectiveness of implemented policy in achieving socio-economic objectives.		FN	MPB		1	1	1
4.3	Ecosystem-based management	a	Comparing the effectiveness of EBM with current planning and management approaches.		FN			1	3	2
		b	Effectiveness of protected areas and inoperable areas for meeting ecosystem objectives					1	2	2
		c	Ability for second growth (including second growth following variable retention harvesting) to meet ecosystem objectives.		FN			1	2	2
4.4	Management of non-timber forest products	a	Assessment of different policies to support the management of non-timber forest products coexistent with timber management.		FN			1	2	2
		b	Determination of habitat requirements for non-timber forest products defined at the appropriate scale.		FN			2	2	2
		c	Effects of forest management (e.g., forest road development, salvage and rehabilitation of stands killed by Mountain Pine Beetle, livestock use, exclusion/re-introduction of fire) on the ecology of non-timber forest products.		FN	MPB		2	2	2
4.5	Biomass for bio-energy	a	Environmental consequences of utilization of harvesting debris and/or increased removals of biomass (normally left on-site) from harvesting or silviculture sites for the purposes of bio-energy.		FN			3	1	2
4.6	Wildlife habitat management in response to intensive forest management and changing climate	a	Development of knowledge to support policy that maintains access to wildlife for subsistence purposes under different forest management regimes (e.g., salvage and rehabilitation of stands killed by Mountain Pine Beetle).		FN	MPB		2	2	2