Fort St. John Pilot Project

Sustainable Forest Management Plan

Submitted for approval to the
Regional Manager, Ministry of Forests
and the
Regional Director, Ministry of Water, Land and Air Protection

March 15, 2004

Part 1 of 2

Preface

The Sustainable Forest Management Plan for the Fort St. John Pilot Area was prepared according to the Fort St. John Pilot Project Regulation and the Canadian Standards Association Sustainable Forest Management Standard CAN/CSA-Z809-02.

Although this public document is intended to be useful to a wide variety of readers, emphasis is placed towards:

- Employees of the Participants who will use the plan to guide plans and activities;
- Government agency representatives involved in the approval process of this Sustainable Forest Management Plan.

Several authors and many reviewers contributed in developing key components of this plan. Preparation and submission of this plan was coordinated by:

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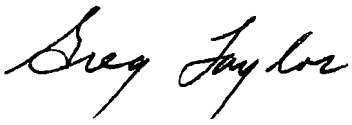

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We would like to thank the Public Advisory Group members and advisors for their continued contributions.

Special thanks to Carol Norris for her significant time and effort in assembling this plan.

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1. INTRODUCTION

1.1. PURPOSE

As society has been increasingly affirming a wider set of values that forests can provide, the forest industry has witnessed a distinct change in the philosophy of forest management. Though timber may still be the primary economic value from the forests, a wider range of economic, environmental and social values is being demanded. Forest management now involves the sustainable management of a much larger spectrum of values such that the benefits we enjoy from the forests today do not impact on the ability of subsequent generations to enjoy benefits from the forests in the future. This concept is commonly referred to as "Sustainable Forest Management" (SFM) and has gained acceptance at the international, national, and local levels. Furthermore, SFM has attracted the attention of buyers of forest products who are increasingly demanding that the industry demonstrate that products are derived from forests managed on a sustainable basis. As a result, forest certification has emerged as a dominant factor in the forest industry in order to provide assurances to buyers of wood products that the management of forests meets identified standards that are considered critical for SFM. As British Columbia forest companies have evolved and have become dependent on the global marketplace for the export of forest products, the issues of sustainable forest management and forest certification have become paramount.

Sustainable Forest Management (SFM): Management to maintain and enhance the long term health of forest ecosystems, while providing ecological, economic, social and cultural opportunities for the benefit of present and future generations. (*The State of Canada's Forests 2001/2002*).

In addition to considering public objectives and forest management issues, this plan incorporates the participants' broad business objectives. These include:

- Participants have either a significant long term capital investment in manufacturing plants, or rely on timber sales to manufacturing plants to provide important revenues. Participants therefore have a vested interest in ensuring timber supplies are sustainably managed in order to provide relatively continuous deliveries of reasonably priced, high quality timber that meets manufacturing plants requirements over the long term.
- Participants are interested in attaining certification of their forest management in order to maintain or increase access to resources and markets. This entails ensuring management strategies are implemented which provides for the sustainability of other non-timber forest resources.
- Participants must be cost competitive provincially and globally within their business sectors. This needs to be achieved by minimizing costs and maximizing value within a sustainable forest management framework.
- In mixedwood areas the participants business objectives are to optimize the net value of the mixedwood stands by coordinating activities where practical in order to minimize timber harvesting and access costs, and by working to reduce administrative barriers to economic and environmental sustainability of this component of the timber resource.

1.2. DESCRIPTION OF EXISTING STRATEGIC PLANS

1.2.1. Fort St. John Land and Resource Management Plan

Objectives for values and resources, and acceptable uses on Crown land were outlined in the LRMP, a public land use process that was completed in 1997. The Fort St. John Land and Resource Management Plan (LRMP) was approved by Cabinet in October 1997. The plan incorporates the principles of integrated resource management into a long term plan (ten years) for resource development on Crown land within the Fort St. John Timber Supply Area (TSA). The Fort St. John pilot project area falls entirely within the LRMP area.

The Fort St. John LRMP is the outcome of the deliberations of a range of local private citizens, stakeholders, including Canfor and Slocan, and government agency representatives. The Fort St. John LRMP process incorporated a form of consensus-based decision-making that enabled general agreement on all issues.

The Fort St. John LRMP adopts the following principles as stated in the approved document.

- Sustainable use of renewable natural resources, and;
- The management of any one resource shall take into consideration other resource values, rights, tenures, and development opportunities and shall recognize the biological and physical limitations of the land and resources. In addition, land and resource management objectives and strategies will incorporate the need to maintain or enhance the local quality of life, social and economic stability, and vitality of the local communities.[1]

An implementation plan for the LRMP has been developed and is reviewed periodically by a core of representatives from the original planning table. The implementation plan is under the direction of the Ministry of Sustainable Resource Management.

Forest resource planning conducted by the participants, including the Sustainable Forest Management Plan, will be consistent with the objectives of the Fort St. John LRMP. The Fort St. John LRMP also includes strategies for meeting the stated objectives. Forest management activities conducted by the participants will be consistent with the intent of the strategies of the LRMP. Insofar as several LRMP sectors and interests are similarly represented in the PAG, the participants are confident that there will be strong consistency in interpretation and application of the objectives.

1.2.2. Muskwa-Kechika Management Area

A portion of the Fort St. John pilot project area is contained within the Muskwa-Kechika Management Area (MKMA), as defined in Bill 37-1998, the *Muskwa-Kechika Management Area Act*. The Preamble to the Act describes government's intent regarding the area and states:

[1] *Fort St. John Land and Resource Management Plan*, October 1997, page 7

"Whereas the Muskwa-Kechika Management Area is an area of unique wilderness in northeastern British Columbia that is endowed with a globally significant abundance and diversity of wildlife;

And whereas the management intent for the Muskwa-Kechika Management Area is to maintain in perpetuity the wilderness quality, and the diversity and abundance of wildlife and the ecosystems on which it depends while allowing resource development and use in parts of the Muskwa-Kechika Management Area designated for those purposes including recreation, hunting, timber harvesting, mineral exploration and mining, oil and gas exploration and development;

And whereas the long-term maintenance of wilderness characteristics, wildlife and its habitat is critical to the social and cultural well-being of first nations and other people in the area;

And whereas the integration of management activities especially related to the planning, development and management of road accesses within the Muskwa-Kechika Management Area is central to achieving this intent and the long-term objective is to return lands to their natural state as development activities are completed;

Therefore her majesty, by and with the advice and consent of the Legislative Assembly of the Province of British Columbia, enacts as follows (the Act):"

Section 8(1) of the *Muskwa-Kechika Management Area Act* specifies that a prerequisite to the approval of a forest development plan in the Muskwa-Kechika Area is an approved landscape unit objective.

1.2.3. Graham River IRM Plan

Sustainable resource values, including timber, fishery, wildlife, recreation, and scenic values, were assessed in the Graham River valley, as part of an Integrated Resource Management Plan (IRM Plan) prepared by Canfor. The Graham River IRM Plan includes the Crying Girl Landscape Unit (LU) in the Boreal Foothills Natural Disturbance Units (NDU), and the portion of the Graham LU that falls within the Omineca NDU.

The plan brought together existing resource information, and collected new information through discussions with resource user groups and government agencies, and extensive photo and field assessments of various resources. The final plan document discusses the resource values and issues in the valley, and presents a general timber harvest strategy which addresses the key resource issues in the drainage. The objectives were *to "plan the use of the area without prejudice to the value, use or sustainability of any one resource at the expense of other resources within the area or dependent on it"* (Lance 1997). Following public, agency, and First Nations reviews, the plan was approved by MOF and MELP in September of 1998. The four primary management strategies to be implemented are the application of sequential clustered development, maintenance of connectivity corridors, access management, and adaptive management.

Forestry Operations within the Crying Girl LU and the portion of the Graham LU that falls within the drainage will be consistent with the intent of the Graham River IRM Plan. Strategies are designed to implement key components of the Graham River IRM Plan in these areas within these LU's.

The Ministry of Forests district manager and a designated official of the Ministry of Environment, Lands and Parks jointly approved the Graham River IRM Plan in September 1998. In his letter of September 16, 1998, the district manager stated "…the joint approval status accorded the Graham River IRM Plan represents a special situation in which special measures have been deemed appropriate so as to best achieve the spirit and intent of the Forest Practices Code of British Columbia Act, the *Fort St. John LRMP* and past commitments and expectations of stakeholders."[2]

1.3. DESCRIPTION OF THE SFM PLANNING AREA

The Fort St. John Timber Supply Area (TSA) is located in the northeastern interior of British Columbia. The TSA covers about 4.7 million hectares and is bounded by the Peace River and TFL 48 in the south, the Alberta border in the east, the Fort Nelson TSA in the north, and the Rocky Mountains in the west. The Fort St. John pilot project area (the "defined forest area", or DFA) covers approximately 4.1 million hectares (see Figure 1) within the Fort St. John TSA. Private lands and woodlots located within the TSA are excluded from the DFA. The TSA is located in the Northern Interior Forest Region and is administered by the Peace Forest District.

The eastern portion of the TSA is dominated by a plateau (primarily the Alberta Plateau ecoregion), while the western portion consists of the Rocky Mountains and foothills. Four biogeoclimatic zones occur in the TSA: the Boreal White and Black Spruce zone in the plateau and lower elevations; the Englemann Spruce-Subalpine Fir and Spruce-Willow-Birch zones at medium to high elevation in the mountains and foothills; and the Alpine Tundra zone at higher elevations. White spruce, lodgepole pine, aspen, and black spruce are the dominant tree species in the area. Minor amounts of subalpine fir, birch, balsam poplar and larch are also present in the DFA.

In 2001, the population of the Fort St. John TSA was estimated at 28,250 people. The city of Fort St. John is the largest community in the TSA, with about 60 percent of the TSA population. First Nations communities in the TSA include settlements at Halfway River, Blueberry River, Doig River and Kahntah. An additional three First Nations have declared traditional territory within the TSA: Prophet River, Assumption (from Alberta) and West Moberly. The general TSA area falls within the provisions of Treaty 8.[3]

The Fort St. John TSA is unique in several ways. Oil and gas exploration and development has occurred throughout most of the planning area over the past few decades. The southern and southeastern portion of the planning area is predominantly used for agriculture and has a high concentration of privately held lands. Forest harvesting and management,

[2] *Proposal for selection of Graham South SMZ As A Special Management Zone Pilot*, Submitted to the Prince George Inter-Agency Management Committee, November 30, 1998, Canadian Forest Products Ltd.

[3] *Fort St. John Timber Supply Area Rationale for allowable annual cut determination*, effective December 31, 1996 by BC Ministry of Forests, Chief Forester Larry Pedersen)

although a major part of the current local economy, is relatively recent with some areas yet to be developed for timber harvesting. The mineral resources of the area are relatively unexplored and significant potential exists in the western portion of the TSA near the Rocky Mountains. Energy development is the largest economic sector in the TSA, with agriculture and forestry ranking second and third respectively, in terms of local employment.
Nationally and internationally recognized wildlife resources are an important feature in the in much of the western portion of the TSA. The TSA incorporates the southern portion of the Muskwa-Kechika Management Area. The *Muskwa-Kechika Management Area Act* was passed in June 1998, and establishes management intent for a series of protected areas and special management areas in the "Northern Rockies". Management of the Muskwa-Kechika area for its high wildlife, biodiversity and wilderness values is a key goal of several resource sectors and provincial, national and international interest groups.[4]

About 48 percent of the Fort St. John TSA (about 2.243 million hectares) is considered productive forest land managed by the Crown. Currently about 47 percent of this area is considered available for timber harvesting under current forest management practices. The current timber harvesting land base is 1,058,540 hectares, consisting of 733,221 hectares dominated by coniferous species and 325,318 hectares dominated by deciduous species.

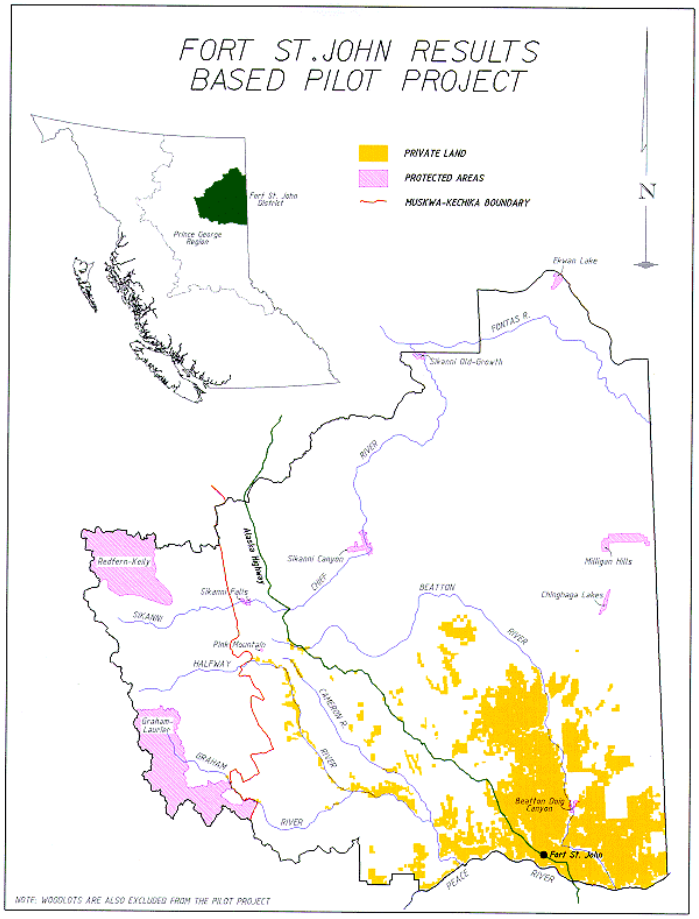


Figure 1: Project Area Map

[4] *Fort St. John Land and Resource Management Plan,* October 1997

1.3.1. Description Of The Landscape Units

Landscape Units (LU) are based on updated Biogeoclimatic Ecosystem Classification (BEC) mapping, ecosection boundaries, Natural Disturbance Units and important administrative boundaries such as the revised district boundaries and the strategic land use boundaries of the Muskwa-Kechika Management Area. In the absence of an administrative boundary, resource features such as mainstem rivers (midpoint) or height of land were used wherever possible to provide logical natural boundaries for each LU. These boundaries often encompass multiple watersheds in mountainous terrain, and reflect similar BEC units, ecosections and Natural Disturbance Units.

The current LU boundaries are consistent with strategic boundaries and their respective objectives at the LRMP Resource Management Zone (RMZ) level, and allow the administrative areas to be managed without overlapping LU boundaries and fragmenting objectives during implementation.

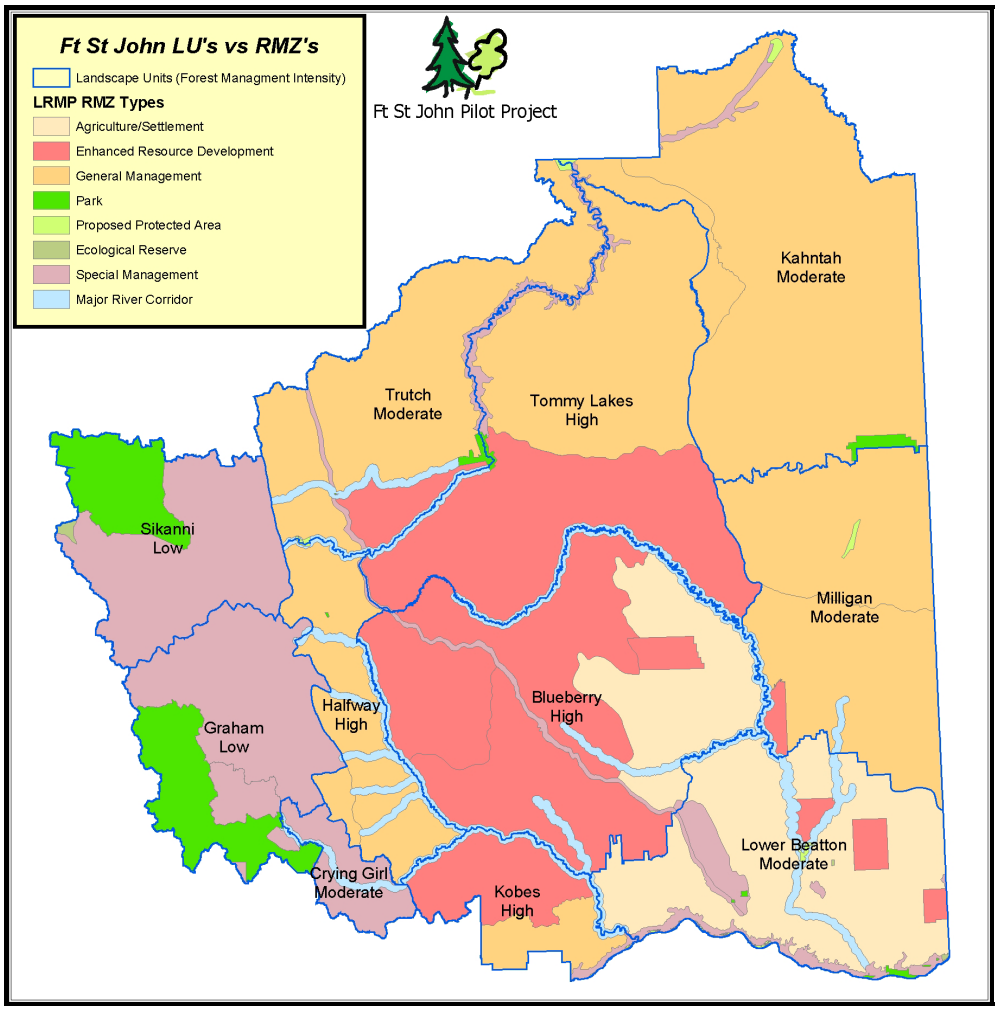


Figure 2: Fort St. LU's and RMZ's

The following Table 1 summarizes the area breakdown of each LRMP resource management zones that are contained within each Landscape Unit.

Table 1: Resource Management Zones by Landscape Units

Landscape Unit	LRMP RMZ Name	Total Area (ha)
Blueberry	Agriculture Settlement Area	183,259
	Aikman Deadhorse	166,164
	Alaska Highway Corridor	14,296
	Charlie Lake Community Watershed	596
	Grazing Reserve 1	17,210
	Jedney	183,290
	Major River Corridor	53,460
	Upper Cameron	113,159
Blueberry Total		731,433
Crying Girl	Crying Girl	27,882
	Graham-Laurier Protected Area	222
	Graham-South RMZ	30,707
	Major River Corridor	8,532
Crying Girl Total		67,343
Graham	Besa Halfway Chowade	202,824
	Graham-Laurier Protected Area	99,778
	Graham-North RMZ 1	27,041
	Graham-North RMZ 2	3,474
	Graham-South RMZ	117
	Major River Corridor	1,975
Graham Total		335,209
Halfway	Alaska Highway Corridor	1,361
	Bluegrave Horseshoe	80,258
	Crying Girl	15,298
	Grassy-Minaker	0
	Pink Mountain Protected Area A	98
	Major River Corridor	34,789
	Sikanni Falls Protected Area A	163
	Sikanni Falls Protected Area B	132
	Two-Bit	74,339
Halfway Total		206,438
Kahntah	Chinchaga	680,257
	Conroy	49,255
	Ekwan Lake Protected Area	1,741
	Milligan Hills Protected Area	7,227
	Sikanni Old-Growth Protected A	585
	Sikanni-Fontas Valley	10,181
Kahntah Total		749,247
Kobes	Farrell Creek	50,207
	Kobes	91,961
	Peace Corridor	4,670
	Peace River / Bodreau	128
	Major River Corridor	12,840
Kobes Total		159,807
Lower Beatton	Agriculture Settlement Area	374,203
	Alaska Highway Corridor	4,207
	Beatton Doig AOI	948
	Beatton Park	309
	Beatton River Site	186
	Boundary Lake Wetlands	348
	Cecil Lake ER	121
	Cecil Lake Wetlands	1,156
	Charlie Lake Park	85
	Charlie Lake Community Watershed	25,036
	Clayhurst Ecological Reserve	284

Landscape Unit	LRMP RMZ Name	Total Area (ha)
	Grazing Reserve 3	7,809
	Grazing Reserve 4	14,481
	Grazing Reserve 5	6,223
	Peace Corridor	23,414
	Peace Corridor / River Sites	1,676
	Peace River / Bodreau	716
	Major River Corridor	36,997
Lower Beatton Total		498,200
Milligan	Chinchaga	227,754
	Chinchaga Lakes Protected Area	1,475
	Grazing Reserve 2	9,180
	Osborne	225,404
	Major River Corridor	10,154
Milligan Total		473,968
Sikanni	Besa Halfway Chowade	229,431
	Redfern-Keily Protected Area	80,779
	Sikanni Chief River ER	2,075
Sikanni Total		312,285
Tommy Lakes	Alaska Highway Corridor	1,157
	Conroy	342,362
	Jedney	321,857
	Major River Corridor	21,014
	Sikanni Canyon Protected Area	1,412
	Sikanni-Fontas Valley	17,875
Tommy Lakes Total		705,677
Trutch	Alaska Highway Corridor	6,291
	Buckinghorse River Way Park	36
	Grassy-Minaker	72,846
	Jedney	37,084
	Major River Corridor	21,064
	Sikanni Canyon Protected Area	3,297
	Sikanni Falls Protected Area A	302
	Sikanni Falls Protected Area B	186
	Sikanni Old-Growth Protected A	890
	Sikanni-Fontas Valley	14,324
	Trutch	280,404
Trutch Total		436,724
Grand Total		4,676,330

Table 2 provides a general summary of the LRMP objectives as they relate to the Landscape Units. Strategies presented in this SFMP will, where applicable, reference the respective objectives noted in Table 2.

Timber harvesting strategies and general biological diversity emphasis strategies proposed by the LRMP are included in Table 3.

Based on a combination of the LRMP timber objectives and timber strategies, as well as the LRMP's proposed biodiversity emphasis strategies, relative management intensity levels have been assigned to the landscape units. Management strategies for seral stage, wildlife tree patch retention levels and salvage of damaged timber reflect the variable management intensity levels.

Table 2: LRMP Objectives by Landscape Unit

Significant Forestry Influence	Resource Objective	LRMP Objectives	LANDSCAPE UNIT APPLICABILITY										
			Blueberry	Crying Girl	Graham	Halfway	Kahntah	Kobes	Lower Beatton	Milligan	Tommy Lakes	Trutch	Sikanni
Y	Access1	Coordinate access and linear development to minimize negative effects on other resource values.	X	X	X	X	X	X	X	X	X	X	X
Y	Access2	Maintain existing access, coordinate industrial access development including linear development to minimize negative effects on other resource values.							X				
Y	Access3	Manage access to protect alpine areas(e.g. Pink Mountain).				X							
Y	Access4	Manage access to protect significant fish and wildlife habitats, alpine areas and recreation values.		X	X			X					
N	Access5	Ensure future infrastructure requirements are considered when exploring for oil and gas.(intent- for Agriculture or Settlement needs)							X				
Y	Agric1	Control the spread of noxious weeds.	X					X	X				
Y	Agric2	Maintain livestock grazing opportunities on existing tenures.	X			X			X				
Y	Agric3	Maintain or enhance opportunities for livestock grazing.	X			X		X	X	X	X	X	
N	Agric4	Maintain or increase land supply for agriculture including access to Crown land.	X			X		X	X	X			
N	Agric5	Minimize or mitigate wildlife impact on agricultural enterprises.	X			X	X	X	X	X			
N	Agric6	Provide opportunities for the growth and expansion of the agriculture and food production industries.	X			X		X	X	X	X		
N	Agric7	Recognize the high agricultural values within the Peace River corridor.						X	X				
Y	Consult	**Ensure that all land and resource management planning activities within the planning area provide for consultation with local municipal governments.**		X	X			X	X				
N	Ecology1	Maintain and enhance ecological integrity in areas subject to resource impacts from recreational use.				X						X	X
Y	Ecology2	**Maintain functioning and healthy ecosystems.**	X	X	X	X	X	X	X	X	X	X	X
Y	Ecology3	Restore and rehabilitate negatively affected ecosystems.	X	X	X	X		X					
N	Energy1	Maintain opportunities and access for oil & gas exploration, development and transportation.	X	X	X	X	X	X	X	X	X	X	X
Y	Fish1	**Maintain fish habitat and water quality for priority fish species.**	X	X	X	X	X	X	X	X	X	X	X
Y	Fish2	**Maintain high quality fisheries in natural settings.**											X
Y	Guide1	Maintain guide outfitting opportunities.		X	X	X		X				X	X
Y	Habitat1	Maintain caribou habitat.		X		X	X	X				X	X
Y	Habitat2	Maintain habitat for priority furbearing species.	X	X	X		X	X	X	X	X	X	
Y	Habitat3	Maintain high capability ungulate winter habitat.	X	X	X	X	X	X	X	X	X	X	X
Y	Habitat4	Maintain site specific habitats.	X			X			X	X		X	
Y	Habitat5	Manage critical wetland habitats for waterfowl and other wildlife species.						X	X	X			
Y	Habitat6	Minimize wildlife habitat fragmentation and maintain existing large mammalian predator/prey system.		X	X	X		X				X	X

Significant Forestry Influence	Resource Objective	LRMP Objectives	LANDSCAPE UNIT APPLICABILITY										
			Blueberry	Crying Girl	Graham	Halfway	Kahntah	Kobes	Lower Beatton	Milligan	Tommy Lakes	Trutch	Sikanni
Y	Habitat7	Protect or enhance habitats for red and blue listed species.					X		X	X	X		
N	Recreation 1	Integrate recreational activities with grazing and resource extraction.							X				
Y	Recreation 2	Manage backcountry recreation and tourism opportunities in a natural or natural appearing condition.											X
N	Recreation 3	Manage wildlife populations to provide opportunities for non-commercial hunting.											X
Y	Recreation 4	Provide a full range of recreation opportunities.				X	X	X	X	X	X	X	
Y	Recreation 5	Provide a full range of wilderness recreation opportunities identified in the ROS as primitive, semi-primitive non-motorized and semi-primitive motorized.		X	X								X
Y	Recreation 6	Provide quality public and commercial recreational opportunities and values.	X	X	X	X		X	X		X		X
N	Recreation 7	Provide tourism opportunities in Peace R corridor.						X	X				
Y	Timber1	Enhance timber harvesting and a sustainable long-term timber supply.	X	X	X	X		X		X	X		
Y	Timber2	Maintain timber harvesting and forest management opportunities.		X	X	X	X		X			X	X
Y	Timber3	**Manage for forest health.**							X				
Y	Timber4	Minimize losses to the timber harvesting land base.	X			X		X	X			X	
	Timber 5	Ensure timber harvesting in the Graham recognizes the watershed's other important resource values eg. trapping, guide outfitting, wilderness.			X								
Y	Timber 6	Forest Mgmt Intensity Levels Strategies	Intensive	Moderate	Low	Intensive	Moderate	Intensive	Moderate	Moderate	Intensive	Moderate	Low
Y	Visual1	Manage visually sensitive areas along existing access corridors/trails and adjacent to protected areas.			X								X
Y	Visual2	Manage visually sensitive areas as scenic areas.	X	X	X	X		X	X	X	X	X	X
Y	Visual3	Manage visually sensitive areas within the Peace River Valley.						X	X				
Y	Visual4	Manage visually sensitive areas within Tommy Lakes area.									X		
Y	Visual5	Manage visually sensitive areas within the Alaska Highway corridor.	X			X			X		X	X	
Y	Water1	Maintain groundwater quality and quantity.	X			X		X	X			X	X
Y	Water2	Maintain the headwaters of major rivers and streams as a source of water for current and future generations.			X								X
Y	Water3	Maintain water quality in the Peace River.											
Y	Water4	Promote water stewardship to manage for other resources.	X	X	X	X		X	X		X	X	X
Y	Water5	Protect water quality and quantity in Charlie Lake watershed.							X				
Y	Water6	Sustain natural stream flow regime.	X	X	X	X		X	X	X	X		

Table 3: LRMP Timber Strategies by Landscape Unit

	LRMP Strategy PROPOSED FOREST MANAGEMENT INTENSITY LEVEL BY LU	LANDSCAPE UNIT APPLICABILITY										
		Blueberry	Crying Girl	Graham	Halfway	Kahntah	Kobes	Lower Beatton	Milligan	Tommy Lakes	Trutch	Sikanni
		INTENSIVE		LOW	INTENSIVE		INTENSIVE			INTENSIVE		LOW
all	Quantify timber harvesting land base and develop policies to reduce permanent losses	X	X	X	X	X	X	X	X	X	X	X
1	Establish forest production target for LU's… consistent with high intensity forest mgmt regimes	X			X		X			X		
2	Establish forest production target for LU's… consistent with moderate intensity forest mgmt regimes		X	X		X		X	X		X	
3	Establish forest production target for LU's… consistent with low intensity forest mgmt regimes							X				X
4	Reforest … all PP Br, NC deciduous, and NSR.. while providing for critical wildlife habitat	X			X	X	X	X	X	X		
5	Establish and maintain a permanent road infrastructure	X	X		X	X	X		X	X		
6	Minimize losses from damaging agents through aggressive fire and pest mgmt, including salvage	X	X			X	X	X	X	X	X	X
7	Promptly and aggressively reforest and manage cutovers and burnt areas within the THLB	X	X	X	X	X	X	X	X	X	X	X
8	Encourage utilization of pulp quality stands , unless it can be shown that long term viability and sustainability of wildlife species will be negatively impacted		X	X								X
8B	Encourage utilization of pulp quality stands	X			X	X	X	X	X	X	X	
9	Vary cutblock adjacency requirements	X	X				X	X			X	
10	Encourage afforestation of reverted and low capability ag land	X					X	X		X		
11	Develop a long term plan to manage access and forest mgmt activities, incorporating sequential development		X	X								
12	No harvesting South of Graham R in the North Graham until at least 2006			X								

High Intensity Forest Management LU's
The Blueberry, Halfway, Kobes and Tommy Lakes LU's are included in this zone. The LRMP's predominant timber objective in the RMZ's that make up the majority of these landscape units is to enhance timber harvesting and a sustainable long term timber supply. The LRMP's predominant timber strategy in the RMZ's that make up the majority of these landscape units is to establish forest production targets consistent with high intensity forest management regimes. Similarly, the predominant biological diversity emphasis identified in the LRMP for these zones is low. To meet other non-timber objectives identified in the LRMP, some unique areas within these LU's will receive special management attention.

Moderate Intensity Forest Management LU's
This includes the Crying Girl, Kahntah, Lower Beatton, Milligan and Trutch LU's. The LRMP timber objectives in the RMZ's that make up the majority of these landscape units include maintaining timber harvesting and forest management opportunities, and in some cases enhancing timber harvesting for a sustainable long term timber supply. The predominant LRMP timber strategy in the RMZ's that make up the majority of these landscape units is to establish forest production targets consistent with moderate intensity forest management regimes. Similarly, the predominant biodiversity emphasis identified in the LRMP for these zones is intermediate. To meet other non-timber objectives identified in the LRMP, some unique areas within these LU's will receive special management attention.

Low Intensity Forest Management LU's
The Graham and Sikanni LU's make up this zone, which also coincides with the Muskwa-Kechika Management Area. The LRMP objective is to maintain timber harvesting and forest management opportunities, and the predominant timber strategy in the RMZ's that make up the majority of these landscape units is to establish forest production targets consistent with either low and/or moderate intensity forest management regimes. Similarly, the biodiversity emphasis identified in the LRMP for these zones is predominantly high. Timber harvesting operations will occur in these LU's, but an enhanced emphasis will be placed on ensuring other resource values are protected. Timber harvesting within these areas will be consistent with the Muskwa-Kechika Management Plan and any other approved plans which specifically apply to forestry operations.

Protected Areas
Protected Areas identified in the LRMP are imbedded within the LU areas noted above. Regardless of the assigned LU intensity classification, there will be no timber harvesting activities planned within those portions of the LU's identified by the LRMP as protected areas.

Table 4 summarizes the Landscape Unit areas by forest management intensity level.

Table 4: Landscape Unit Intensity Classes

LU by Intensity Classes	Total Hectares	% Distribution
HIGH INTENSITY		
Blueberry	**731,433**	15.6%
Halfway	**206,438**	4.4%
Kobes	**159,807**	3.4%
Tommy Lakes	**705,677**	15.1%
Total High Intensity:	**1,803,355**	**38.6%**
MODERATE INTENSITY		
Crying Girl	**67,343**	1.4%
Kahntah	**749,247**	16.0%
Lower Beatton	**498,200**	10.7%
Milligan	**473,968**	10.1%
Trutch	**436,724**	9.3%
Total Moderate Intensity:	**2,225,482**	**47.6%**
LOW INTENSITY		
Graham	**335,209**	7.2%
Sikanni	**312,285**	6.7%
Total Low Intensity:	**647,494**	**13.8%**
TOTAL AREA	**4,676,330**	**100%**
PROTECTED AREAS	**234,439**	**5.0%**

Unique Management Areas within High or Moderate Intensity LU's

In addition to protected areas, portions of some landscape units have unique values that require enhanced management consideration. While these areas are included in the larger landscape units to reflect the broad natural disturbance patterns, specific management strategies will be tailored to address the concerns in these areas.

- Major river corridors requiring some special management considerations transect portions of several LU's in the moderate and high intensity forest management regimes. These areas include the Blueberry River, downstream of approximately 56 degrees 46 minutes latitude, the Beatton River below its confluence with Julliene Creek, the Sikanni River, Halfway River, Graham River, Chowade River, Peace River, Cameron River below 56 degrees 35 minutes latitude, the lower reaches of the Osborn (downstream of 56 degrees, 36 minutes), and the Doig River (downstream of 56 degrees 49 minutes), Bluegrave Creek, Horseshoe Creek and Cypress Creek. These major river systems are very important to the sustainability of a wide variety of resource values. Wildlife, fisheries, water and timber values are all very high within these areas, and some modified management strategies are needed to minimize impacts on non-timber resources.
- The Charlie Lake water supply area was also identified as a special management area, which requires particular attention to water management concerns.
- The Alaska Highway, which winds through several landscape units, requires added management consideration for visual resources.

2. DESCRIPTION OF THE PILOT PROJECT

In June 1999 the BC government added Part 10.1 to the Forest Practices Code of BC Act to enable results-based pilot projects. The intent of the pilot projects is to test ways to improve the regulatory framework for forest practices while maintaining the same or higher levels of environmental standards.

Canadian Forest Products Ltd., Slocan Forest Products Ltd., Louisiana-Pacific Canada Ltd., and the Ministry of Forests Small Business Forest Enterprise Program prepared a detailed pilot project proposal that provided for the basis for the Fort St. John Pilot Project Regulation. Beginning in 2000, the participants established a public advisory group (PAG) comprised of local people representing a variety of interests. The public advisory group reviewed the draft detailed project proposal and draft regulation, reviewed comments from the general public and provided advice to government on the suitability of the project. Cabinet accepted the proposal and a draft regulation late in 2001.

The Fort St. John Pilot Project Regulation requires the establishment of a strategic plan for the pilot project area, to be known as a Sustainable Forest Management (SFM) Plan. The participants have and will continue to prepare the SFMP with the guidance of a local public advisory group and a scientific/technical advisory committee. The SFMP requires the joint approval of the Regional Manager, Northern Interior Forest Region, Ministry of Forests and the Regional Director, Omineca-Peace Region, Ministry of Water, Land and Air Protection. Upon approval, the SFMP will provide strategic direction to forest operations carried out in the pilot project area.

The participants also intend that the Sustainable Forest Management Plan (SFMP) for the pilot project area meet the requirements of the Canadian Standards Association (CSA) Sustainable Forest Management Standard CAN/CSA-Z809-02. The Public Advisory Group (PAG) has worked with the participants to identify and select values, objectives, indicators, and targets to be considered in the development of the SFMP for the pilot project area. The PAG will continue to have a role in monitoring and evaluating the results of the SFMP and in recommending improvements.

After a sustainable forest management plan has been approved the participants may prepare and submit to the district manager MoF a Forest Operations Schedule (FOS). The FOS, which replaces the Forest Development Plan (FDP), will identify the areas where timber harvesting and road construction are proposed. All forest operations carried out under a FOS must be consistent with the SFMP. The forest operations schedule is subject to the same public review and comment process as a FDP. The district manager will not formally approve the schedule but may withhold the authorization of specific operations.

2.1. DESCRIPTION OF THE PARTICIPANTS

The following companies and agencies have agreed to participate in the Fort St. John Pilot Project.

2.1.1. BC Timber Sales

The Small Business Forest Enterprise Program (SBFEP) was initially established in 1978 to help diversify and strengthen British Columbia's forest industry. In June 2001, the Ministry of Forests was directed by government to develop a plan to make the Small Business Forest Enterprise Program more effective and put it on a commercial footing. Since then, significant work has been undertaken to achieve these outcomes. A new program and organization – **BC Timber Sales** – has replaced the SBFEP. The transformation of the small business program is part of widespread policy and organizational change across the Ministry of Forests targeted at revitalizing British Columbia's forest industry. BC Timber Sales (BCTS) was fully implemented on April 1, 2003. BCTS has been set up as an independent organization within the Ministry of Forests, with financial independence from regional and district operations. The new organization will sell timber competitively through auction and has been set up to handle an increase in the volume sold.

As part of government's commitment to revitalizing the province's forest economy, a new market-based pricing system will be introduced. Under this system, the price of Crown timber harvested on all tenures will be based on the selling price of Crown timber competitively auctioned through BC Timber Sales. BC Timber Sales currently provides access to 13 per cent of the provincial allowable annual cut however to support the new system, BC Timber Sales will increase the amount of timber it auctions to 20 per cent of the provincial allowable annual cut. All cutting licences in the program will be awarded to the highest bidder, and the auction rules will be amended to provide a clear, consistent administrative framework.

Our Vision:
To be an effective timber marketer generating wealth through sustainable resource management.

Our Core Purpose:
To market Crown timber to establish market price and capture the value of the asset for the public.

Objectives:
In achieving its vision and carrying out its core purpose, BC Timber Sales has three major objectives:

1. To provide a credible reference point for costs and pricing of timber harvested from public land in B.C.
2. To generate the best possible revenue return to the province, recognizing objective # 1.
3. To provide opportunities for customers to purchase timber in an open and competitive market.

The transformation of the SBFEP into the BCTS program also amalgamated a number of forest districts into twelve larger BCTS business areas each with a main timber sales office. The Peace Liard Business Area of BC Timber Sales geographically encompasses the Fort Nelson and Peace (formerly Dawson Creek and Fort St. John) Forest Districts. The administrative, planning and management centre for the business area is the Timber Sales Office (TSO) located in Dawson Creek. In addition to the

TSO, field teams comprised of field-oriented staff reporting to the main TSO are located in Dawson Creek, Fort Nelson and Fort St. John.

Currently each field team location associated with individual timber supply areas retains its allowable annual cut apportionment. The Fort St. John location has a coniferous apportionment of 147,218 cubic meters per year and a deciduous apportionment of 180,000 cubic meters per year. However 70,000 cubic meters of the coniferous apportionment has been awarded to a Section 13.1 non-replaceable forest license (A59959) Cameron River Logging which has since also become a participant in the pilot project. The remaining 77,218 cubic meters of conifer and the 180,000 cubic meters of deciduous will be auctioned competitively with timber sales being awarded under Section 20 of the *Forest Act* subject to market demand.

Refer to Appendix 1 for BCTS's SFM policy.

2.1.2. Cameron River Logging Ltd.

Cameron River Logging Ltd. (CRL) operates as a custom manufacturer of softwood products in Taylor BC (approximately 15km south of Fort St. John) for distribution to various value-added manufacturers. The company also processes hardwood logs provided by North Peace Timber Ltd. (NPT). CRL and NPT are both highly dependent on Canadian Forest Products Ltd. (Canfor) as it is the only primary lumber manufacturer in the Fort St. John area. A trimblock recovery system has been implemented at Canfor's Fort St John mill that will provide the CRL processing facility with approximately 21 million board feet of unprocessed trim blocks per year over the term of the licence. CRL's processing facility will then sort, grade, chop, rip and manufacture the unprocessed trim blocks. CRL is also responsible for the 1" rough sort for Canfor's Fort St John mill.

CRL is the holder of Forest Licence A59959 that has an allowable annual cut (AAC) of 70,000 cubic metres of timber from coniferous leading stands located in the Fort St. John Timber Supply Area (TSA). This is a non-replaceable forest licence with a term of 15 years. The company has a full time employee base of 29 people, and has retained the services of Canfor to manage all aspects of its forest licence (i.e. planning, harvesting etc) on their behalf.

CRL became a participant in the FSJ Results Based Pilot Project on December 19th, 2002.

Refer to Appendix 1 for Canfor's SFM policy.

2.1.3. Canadian Forest Products Ltd.

Canfor Corporation is a leading Canadian integrated forest products company based in Vancouver, BC. Canfor has extensive woodlands operations and manufacturing facilities in British Columbia, Alberta and Quebec, and lumber re-manufacturing facilities in Washington State. The company is a major producer of lumber and bleached kraft pulp. It also produces semi-bleached and unbleached kraft paper and remanufactured lumber products. Canfor's products are sold in global markets by the Canfor Wood

Products Marketing and Canfor Pulp and Paper Marketing groups through offices in Canada, Europe and Japan. Canfor Corporation is listed on the Toronto stock exchange. The main operating company is Canadian Forest Products Ltd., from which the name Canfor is derived.

Canfor operates two facilities in the Fort St. John area, a random length dimension mill near Fort St. John and a planer mill at Taylor, 15 kilometres south of Fort St. John. The two facilities currently produce spruce-pine-fir lumber for the North American housing market and the British Columbia secondary manufacturing industry. Canfor has a strategic alliance with several large US owned do-it-yourself retailers and is one of the major suppliers of premium quality lumber to that market. By-product chips are sold to Fibreco Pulp for consumption in Slocan's Taylor pulp mill and to Canfor's three Prince George pulp mills. Canfor's Fort St. John/Taylor operations employ 250 persons directly and another 200 contractor employees in woodlands operations.

Canfor's Fort St. John/Taylor operations consume approximately 1.1 million cubic metres of coniferous timber annually. The primary source of this timber is Forest Licence A18154, a replaceable coniferous forest licence with an allowable annual cut of 704,793 cubic metres. Additional sources of timber currently include 70,000 cubic metres per year from FL A59959, and 83,498 cubic metres per year from FL A60972, two non-replaceable FL's held by other participants. The remainder of the required volume is purchased through the BC Timber Sales Program, or from private landowners.

In 1999, the Ministry of Forests offered Canfor and West Moberly First Nations the non-replaceable Forest Licence A56771, which will authorize an annual harvest of 150,000 cubic metres for a period of twenty years. Canfor has finalized a joint venture agreement with representatives of West Moberly as committed to in the proposal for the licence.

Canfor has obtained certification of all its woodlands operations under the ISO 14001 standard, and Canadian Standards Association (CSA) Sustainable Forest Management System for all of its area based tenures. The company recently certified its Prince George and Quesnel Timber Supply Areas to the Sustainable Forestry Initiative (SFI) Standard of sustainable forestry. Canfor made additional commitments to its Board of Directors and major customers that the company will investigate ways to enable CSA certification of its volume based tenures in BC. The Fort St. John pilot project is one such investigation.

Refer to Appendix 1 for Canfor's SFM policy.

2.1.4. Louisiana-Pacific Canada Ltd.

Founded in 1973 and headquartered in Portland, Oregon, Louisiana-Pacific Corporation (LP) is a leading manufacturer of building materials in North America, with facilities throughout the United States, Canada, and in Chile. LP has more than 40 manufacturing facilities in North America.

LP's trademark is our superior ability to provide a wide variety of cost-competitive commodity and value-added specialty building products to our retail, wholesale, homebuilding, and industrial customers.

As one of the North America's largest suppliers of building products, LP is committed to providing high-quality products and ideas, and the highest level of service for our customers.

Louisiana-Pacific Canada Ltd. is the Canadian arm of Louisiana-Pacific Corporation. Canadian facilities are located in Nova Scotia, Quebec, Ontario, Manitoba, and British Columbia.

LP holds two Forest Licences in the Fort St John TSA. The timber from these licences is expected to supply a joint venture oriented strand board (OSB) plant with Slocan Forest Products Ltd. (Slocan-LP OSB Corp.) planned for Fort St. John and a veneer plant in Dawson Creek.

The Sustainable Forestry Initiative is a strategic priority for LP. Innovation, adaptation and continual improvement of forest management practices on all forested lands are key components to sustainable forest management. The Fort St. John Results Based Pilot Project provides unique opportunities and unique challenges in leading the forest industry in BC into a new era of forest management. Data sharing, joint planning efforts, innovative silviculture activities, innovative management of mixedwood forests and a landscape level approach to forest management will help address the sustainable management of timber and other forest resources.

LP's tenures within the pilot project are managed by the Slocan-LP OSB Corp. Refer to Appendix 1 for Slocan-LP OSB Corp's SFM policy.

2.1.5. Slocan Forest Products Ltd.

Slocan Forest Products Ltd. is a British Columbia based company with all its manufacturing facilities and forest management activities located within the province. Beginning in 1978 with one sawmill in the Slocan Valley, Slocan Forest Products today employs over 4000 people in over 20 communities. The company's facilities include ten sawmills, one oriented strand board plant, one plywood/veneer mill, a pulp mill, and a secondary manufacturing plant. Products are sold throughout North America, Asia and Europe. The company has a wide and predominantly Canadian shareholder base with its shares being publicly traded on the Toronto Stock Exchange.

Although Slocan is one of the largest forest products companies in British Columbia, with operations ranging from the Slocan Division near the US border, to the Fort Nelson operations near the Yukon border, each division is managed as a virtually autonomous operating unit. Divisional efficiencies are gained through corporate purchasing and marketing activities. Divisional managers work closely with local communities to address local interests and concerns. All Slocan's activities are guided by its Management of Trust Philosophy. This philosophy states that the company will only be able to continue operating on Crown land as long as it has the trust and support of the public, who are the owners of that land.

Slocan Forest Products' presence in the Fort St. John Forest District was initiated with the purchase of a majority interest in Fibreco Pulp Joint Venture in May 1991. Slocan became sole owner of Fibreco Pulp, now Slocan Taylor Pulp Division, on December 31, 1998, and has recently completed a bleach upgrade that permits increased utilization of deciduous fibre. Under its new configuration, Slocan Taylor Pulp Division will utilize up to 120,000 Bone Dry Units (350,000 cubic metres) of softwood chips annually, all of which are purchased as residual chips from local sawmills. Slocan Taylor will also utilize up to 84,000 Bone Dry Units (240,000 cubic metres) of hardwood chips annually, a portion of which is received in chip form from local field chipping operations and from Slocan Fort Nelson Division. In November 2002, Slocan Taylor Pulp Division installed a chip plant on location at the pulp mill and currently purchases up to 200,000 cubic metres of deciduous logs annually, debarking and chipping on site, and providing the majority of the company's hardwood chip requirement. Residual sawmill chips from Slocan and Canfor are supplemented by private deciduous chip purchases. Slocan Taylor Pulp Division provides direct full time employment to 130 people.

In 1989 Slocan was offered Pulpwood Agreement (PA) 12, which provided the opportunity to harvest up to 500,000 cubic metres of deciduous volume in the Fort St. John Timber Supply Area. Under terms of the agreement, the company was to expand the annual capacity of the Taylor pulp mill by 500,000 cubic metres. Market conditions prevented the company from expanding the pulp mill, and in 1997 the company requested, and have since received approval, that the Pulpwood Agreement be amended by replacing the requirement to expand the pulp mill with a requirement to build an oriented strand board plant. The request was approved in 2000. On June 23, 2000, Slocan and Louisiana-Pacific announced the formation of a 50:50 joint venture, Slocan-LP OSB Corp., to build and operate an oriented strand board mill near Fort St. John.

Slocan Forest Products Ltd. recently successfully registered its forestry environmental management system to the standard of *ISO 14001* as of August 3, 2001. Certification by the Canadian Standards Association will be considered in addition to the ISO certification. The joint venture Slocan-LP OSB Corp. will implement ISO (planning element) in 2003, and pursue CSA certification registration of its woodlands operations in 2003.

Refer to Appendix 1 for Slocan-LP OSB Corp's SFM policy.

2.1.6. Tembec

Tembec is an integrated Canadian forest products company principally involved in the production of wood products, market pulp and papers. The Company has sales of approximately $4 billion with over 55 manufacturing sites in the Canadian provinces of New Brunswick, Quebec, Ontario, Manitoba, Alberta, and British Columbia, as well as in France, the United States and Chile. Tembec's common shares are listed on the Toronto Stock Exchange under the symbol TBC. It employs approximately 10,000 people.

Tembec operates a high yield pulp mill approximately 30 km east of Chetwynd, BC. The facility produces Bleached Chemi-Thermo Mechanical pulp from Aspen,

Cottonwood and softwood fibre (primarily residual SPF chips). The manufactured pulp products are marketed under the Temcell brand name, and are sold mainly in Canada, the United States, Europe and Asia. Tembec's Chetwynd operations employ 160 persons directly and another 90 to 100 contract employees in log yard and woodlands operations.

Tembec's Chetwynd operations consume approximately 520,000 cubic metres of hardwood timber and residual softwood chips annually. The primary source of the hardwood timber is Forest Licence A70730, a non-replaceable forest licence with an annual allowable cut of 252,000 cubic metres. The other primary source of timber is Pulpwood Agreement #13, which allows up to 200,000 additional cubic metres per year from Crown land. The remainder of the required volume is purchased from private landowners, or through the BC Timber Sales Program. Residual softwood chips are purchased from local sawmills.

As part of the purchase of the Chetwynd Pulp Mill from Louisiana-Pacific Ltd. in October 2002, Tembec acquired the rights to FL A60972, a non-replaceable forest licence in the Ft. St. John area with an annual allowable cut of 83,498 cubic metres per year. Tembec is currently in the process of entering into a Timber Tenure Management Agreement with one of the Pilot Project Partners (Canfor), which will enable them to manage the woodlands operations for this licence on Tembec's behalf. In this agreement, an equivalent quantity of softwood chips will be made available to Tembec from Canfor's Chetwynd sawmill.

Tembec has obtained certification of the majority of its woodlands operations under the ISO 14001 standard.

Refer to Appendix 1 for Canfor's SFM policy.

2.2. STRUCTURE AND RESPONSIBILITY

A Steering Committee and a Working Group govern the Fort St. John Pilot Project. The Steering Committee, comprised of senior management representing the participants, provides broad guidance to the Working Group. The managing participants with local management representation have formed a Working Group to develop and implement pilot initiatives including the SFMP. Figure 3 identifies the governance model and the continuous improvement model for the SFMP.

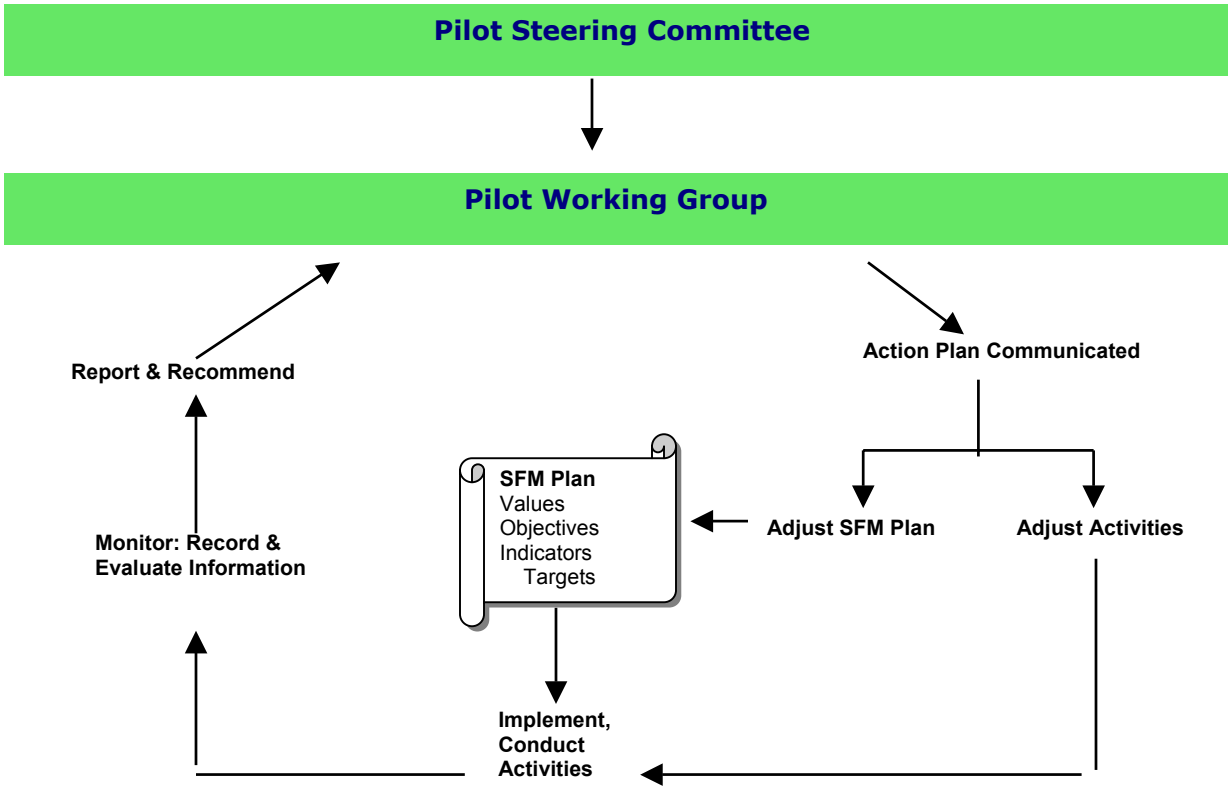


Figure 3: Pilot Governance

The pilot participants specific responsibilities related to the performance indicators and targets are summarized in a Responsibility Action Matrix (RAM). It is recognized that the pilot participants are not the only operators with management responsibilities within the DFA.

The Ministry of Forests (MOF) has the overall authority for approvals of the pilot participants' operational plans within the DFA, and to monitor the pilot participants' compliance. They are also responsible for:

- Forest health
- Forest protection
- Forest and range resources
- Tenure administration
- Timber supply review and allowable annual cut determinations

The Ministry of Water, Land and Air Protection (MWALP) is responsible for:
- Environmental protection of air, water and land
- Environmental stewardship of biodiversity, including wildlife, fish and protected areas
- Park and wildlife recreation management, including hunting, angling, park recreation, and wildlife viewing
- Environmental monitoring and enforcement

The Regional Manager MOF and the Regional Director MWALP have the authority to approve a sustainable forest management plan under the FSJPPR.

The Ministry of Sustainable Resource Management is responsible for:
- Land use planning including the LRMP
- Muskwa-Kechika Management Area
- Landscape units and objectives
- Resource inventory
- Archaeology
- Integrated land and resource information management and analysis

MOF, MSRM and MWALP participate as advisors to the Public Advisory Group.

The Oil and Gas Commission is responsible for authorizing petroleum industry activities on the landbase, such as seismic lines, road construction, pipelines and well site locations, and ensuring these activities are referred to the pilot participants for comments where overlaps occur. An OGC representative sits on the Pilot Project steering committee.

2.3. DESCRIPTION AND ROLE OF PAG

The participants are committed to provide ongoing opportunity for the public to be involved in the Fort St. John pilot project planning and monitoring activities. A key element in the public overview component is the establishment of a public advisory group.

The PAG consists of a representative for each of the following interests:
i) Commercial recreation
ii) Environment/conservation
iii) Forest contractors/workers
iv) Labor
v) Oil & gas industry (contractors/producers)
vi) Non-commercial recreational – fishing/hunting
vii) Non-commercial recreation – non-consumptive
viii) Range/agriculture/private woodlots
ix) Rural communities
x) Trapping
xi) Urban communities

The role of the Fort St. John Pilot Project Public Advisory Group (PAG) is to provide input on the pilot project as described in the approved regulation and pilot proposal. In addition, the group will also meet the needs of the SFM Standard certification process, which includes providing input to help ensure that the participant's forest management decisions "…are made as a result of informed, inclusive, and fair consultation with local people who are directly affected by or have an interest in sustainable forest management"[5]. The PAG will represent the diverse range of interests in the Defined Forest Area (DFA) and will:

a) According to Section 47 of the Pilot Regulation, ensure that the participants' forest management decisions, as contained in the sustainable forest management plan, are made as a result of informed, inclusive and fair consultation with local people who are directly affected by or have an interest in sustainable forest management and
   - review proposed sustainable forest management plans and amendments to sustainable forest management plans (according to Section 37 with the Pilot Regulation), and
   - review audits as noted in Section 50 of the Pilot Regulation, and
   - review annual reports as noted under Section 51 of the Pilot Regulation

b) According to CAN/CSA-Z809-02, have opportunities to work with the participants to:
   - identify and select values, objectives, indicators and targets, based on the CSA SFM elements and any other elements of relevance to the DFA;
   - develop alternative strategies to be assessed;
   - assess alternative strategies and select the preferred one;
   - review the SFMP;
   - design monitoring programs, evaluate results and recommend improvements; and
   - discuss and resolve any issues relevant to SFM on the DFA.

2.4. FIRST NATIONS PARTICIPATION

The SFM planning process has the potential to provide First Nations with enhanced opportunities to participate in forestry planning through participation on the Public Advisory Group, or some parallel process as a separate group from the PAG, if First Nations so desire.

The scope of the committee would be to address timber and non-timber values identified by First Nations as being important. The planning horizon would be sufficiently long to enable forecasting of "future forest conditions" under various development scenarios thereby providing an opportunity to investigate First Nations concern about the cumulative impacts of forest development. Finally, the consolidation of planning would enable First Nations to see all proposed forestry activities in a specific area on the same map. Each of these aspects would improve the participants' and government's ability to identify and address First Nations concerns.

The participants' responsibility would be to balance the values expressed by aboriginal and non-aboriginal participants in the public involvement process while respecting the existing treaty rights of local First Nations people.

[5] Canadian Standards Association. 1996. CAN/CSA-Z808-96 A sustainable forest management system: guidance document. Canadian Standards Association, Etobicoke, ON.

Currently, most of the licencee participants have negotiated, or have attempted to negotiate agreements with individual Treaty 8 First Nations that are intended to create opportunities to improve relationships. These agreements vary in content, but are similar in that they attempt to address a number of economic issues. The participants believe it is important to separate economic issues, such as those addressed in their individual agreements, from issues related to the pilot project. Under the pilot project, the participants hope to focus attention on the environmental and cultural issues related to forestry that affect First Nations.

2.5. DESCRIPTION AND ROLE OF STAC

The Scientific Technical Advisory Committee (STAC) is a team of well-recognized and respected academics and professionals possessing a diverse set of knowledge in sustainable forest management. In addition to members of this committee, other specialists may be brought in to review the input from the public advisory group and make recommendations to the participants on possible operational methods, strategies, training and other considerations.

The overall role of the Scientific Technical Advisory Committee is to provide strategic input for consideration in the development and implementation of the Sustainable Forest Management Plan (SFMP). Additionally, the scientific and/or technical experts may assist the participants in the identification of appropriate indicators, objectives or strategies to address values and goals derived through the public advisory process. The Committee may also provide an overview and comments on the adaptive management framework that will be used by the pilot participants.

The participants are responsible for the development and implementation of the SFMP and will carefully consider recommendations of the Public Advisory Group and the Scientific Technical Advisory Committee.

3. SUSTAINABLE FOREST MANAGEMENT

Sustainable forest management is often depicted as the intersection between the sets of management options that are ecologically appropriate, socially acceptable, and economically viable.

Achievement of this best set of options is based on the application of Ecosystem Management, which is defined as a forest management system that recognizes the natural variability of an ecosystem and attempts to emulate these natural responses with man-made disturbances while managing forests for a range of environmental, social and economic values.

Designing a forest management system that recognizes the natural variability of ecosystems and attempts to emulate patterns of natural disturbance is delivered through the application of two key concepts: 1) sustaining biological richness and 2) natural disturbance unit planning. Both concepts are discussed in the sections below. To demonstrate that ecosystem management is being achieved to meet a range of environmental, social and economic values, a series of indicators (performance measures) and targets are established within the SFMP (see section 6).

3.1. SUSTAINING BIOLOGICAL RICHNESS

The concept of "sustaining biological richness" as described in this SFMP was derived from the work initially developed by Dr. Fred Bunnell and the Weyerhaeuser Adaptive Management Working Group (Bunnell et. al. 2003). This concept is further described in discussion papers completed for Canfor's TFL 48 (Bunnell 2002), and for the Prince George Timber Supply Area (Wells et. al. 2003b). The following section describes the importance of "sustaining biological richness" as it relates to "biodiversity" and three "indicators" that may be used to assess achievement. The term "indicator" used by Bunnell et. al. 2003; Bunnell 2002; and Wells et. al. 2003a,b is used in the context of providing broad qualitative tests not to be confused with the indicators in section 6 of this Plan, which are specific measures of performance.

Table 5 identifies biological richness and the indicators and sub-indicators defined by Wells et. al. 2003a,b. Performance indicators are contained in section 6 that measure and demonstrate performance with regard to the conservation of biological richness over time.

Table 5: Biological Richness and its Indicators and Sub-indicators (Wells et. al. 2003)

Biological Diversity Criterion: Biological richness and its associated values are sustained within the management unit.	
Indicator 1: Ecologically distinct ecosystem types are represented in the non-harvestable land base of the management unit to maintain lesser known species and ecological functions.	
Indicator 2: The amount, distribution and heterogeneity of habitat and landscape structure important to sustain biological richness is maintained over time.	Coarse woody debris
	Large live trees
	Cavity trees (snags)
	Shrubs
	Broad-leaved trees
	Riparian areas
	Late seral and early seral
	Adjacent or continuous canopy
Indicator 3: Productive and well-distributed populations of forest dwelling species are maintained over time.	

Table 6 identifies the critical habitat and landscape elements (sub indicators in Table 5) defined by Bunnell et. al.1999 and their importance for ecosystem management.

Table 6: Habitat and Landscape Elements Identified by Bunnell et al. (1999)

Coarse woody debris (downed wood)	• Important habitat for a wide range of invertebrates, small vertebrates and cryptogams (mosses, liverworts and lichens). • Large variations in persistence exist by size (diameter) and species.
Large live trees	• Important contributors to snags and coarse woody debris. • Important for larger sized cavities. • Abundance dramatically affected by forest management.
Cavities (snags)	• Snags form critical habitat for at least a portion of the life cycle for a significant portion of all animal species. • Tree species preferences exist. • Large variations in persistence exist by size (diameter) and species.
Shrubs	• Important as food sources for many species (leaves and berries). • Important as a habitat component for small mammals and birds, including nest sites. • Species diversity increases in early seral, riparian and open stands.
Broad-leaved trees	• Mixtures of coniferous and deciduous trees frequently increase niche diversity. • Deciduous snags are frequently preferred as habitat for cavity dwellers. • Broad-leaved trees are frequently early seral colonizers, and abundance may decline in low intensity managed an unmanaged areas protected from fire.

Riparian	• Unique assemblages of species and stand structures. • Frequently large impacts on aquatic habitat through temperature controls and biotic inputs. • Potentially large impact on water quality.
Late seral and early seral	• Very old and very young stands have the greatest niche diversity. • Many species appear dependant on either late or early seral stands. • Relative importance varies with natural disturbance type and large impact on habitat. • Influences water quality and quantity through leaf area (evapotranspiration) and runoff.
Adjacent or continuous canopy	• Important habitat attribute for some species through influences on species movements. • When coupled with spatial considerations, has a large impact on habitat connectivity. • Closely associated with patch size and seral stage distributions. • Relative frequency of forest opening of different sizes. • Major influence on decisions related to scale. • Large impact on interior forest and thus habitat.

The term "**biodiversity**" is complex and difficult to demonstrate the conservation of the value over time. Biological richness is a much more concise term and is a credible surrogate for biological diversity (Bunnell 1998; Wells et. al. 2003). The intent of sustaining biological richness is to maintain productive, well-distributed populations of species in a defined management area over time, and can be assessed through the use of the three (3) indicators identified in Table 5:

1. Ecosystem representation
2. Habitat and landscape elements
3. Species productivity and distribution

Biodiversity: The variability among living organisms from all sources including terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species, and of ecosystems. (Canadian Biodiversity Strategy 1995)

Ecosystem representation is a coarse filter approach intended to ensure a proportion of ecologically distinct ecosystem types are maintained within the non-harvestable land base (NHLB). Maintaining representative ecosystems in an unmanaged state (i.e. NHLB) is important for three (3) reasons (Wells et. al. 2003): 1) They sustain poorly understood ecological functions and species habitat requirements; 2) They act as a precautionary buffer against errors in efforts intended to sustain species in the managed forest, and; 3) They provide an ecological baseline against which the effects of human activities can be compared.

Habitat and landscape elements are structural attributes that occur at a variety of temporal and spatial scales. Maintaining these elements is a medium filter approach and is important for two (2) reasons (Bunnell and Kremsater 1990; Lindenmayer and Franklin 2002; Wells et. al. 2003): 1) Studies have shown that most forest dwelling species require these elements as a habitat requirement, and; 2) Forest management activities have a strong influence over the abundance, distribution and functionality of these elements.

Species productivity and distribution is a fine filter approach intended to monitor the presence and trends of species in response to changes in habitat structure and pattern.

This indicator is a long-term adaptive approach, which tests the "effectiveness" of the provisions designed to manage indicators 1 and 2 (above). This approach is often referred to as "effectiveness monitoring" and relies on the results of long-term forest monitoring and research programs such as, forest inventory monitoring plots, and wildlife research that supports species accounts (distribution and abundance). As stated above, effectiveness monitoring can be used to support adaptive management or continuous improvement of forest practices related to indicators 1 and 2 over time. Continuous improvement of the SFMP is further discussed in section 3.4.

3.2. NATURAL DISTURBANCE UNIT PLANNING

Natural disturbance unit planning refers to the work completed by Craig DeLong, Regional Ecologist, Prince George Forest Region, in a document entitled "Natural Disturbance Units of the Prince George Forest Region: Guidance for Sustainable Forest Management, 2002". DeLong, 2002, provides a summary of research findings to illustrate the range of natural variability for some of elements described in Table 6 across a set of Natural Disturbance Units (NDU). The Ministry of Sustainable Resource Management and the Ministry of Forests have indicated (MSRM and MOF 2002) that the guidance provided in DeLong, 2002, is a synthesis of the most current scientific information on the natural range of variability for habitat management in the Prince George Forest Region. The indicators and targets identified in section 6 therefore rely on DeLong 2002 for local-level baseline information.

The underlying assumption of NDU's is that the biota of a forest is adapted to the conditions created by natural disturbances and thus should cope more easily with the ecological changes associated with forest management activities if the pattern and structure created resemble those of natural disturbance (Hunter 1993, Swanson et al. 1993, Bunnell 1995, DeLong and Tanner 1996, Bergeron and Harvey 1997, Angelstam 1998, DeLong and Kessler 2000). Adopting forest management practices that approximate the natural range of variability is being widely accepted as an appropriate way to manage for the needs of many organisms. The Biodiversity Guidebook (1995) was the first attempt in British Columbia to present guidance for forest management based on the natural disturbance template. Since the completion of the Biodiversity Guidebook, more information on natural disturbance dynamics has become available. Within the Prince George Forest Region a number of studies have investigated particular aspects of natural disturbance (DeLong 1998, DeLong and Kessler 2000, Lewis and Lindgren 2000, Rogeau 2001).

The underlying assumption of NDU's is that the biota of a forest is adapted to the conditions created by natural disturbances and thus should cope more easily with the ecological changes associated with forest management activities if the pattern and structure created resemble those of natural disturbance.

Instead of adopting the Natural Disturbance Types (NDT's) presented in the Biodiversity Guidebook (1995) DeLong 2002 presents information for 9 Natural Disturbance Units. These units better separate areas based on differences in disturbance processes, stand development, and temporal and spatial landscape pattern. DeLong 2002 contains guidance on management of old forest, young natural forest, patch size distribution, and stand species composition and structure. Most of the guidance relates to approximating wildfire as it was the key stand replacement disturbance agent in most landscapes and it is the one

that we have exhibited the most control over. In other words it is the disturbance process we are attempting to replace with harvesting.

Examples of how this Plan has adopted the principles identified in DeLong 2002 include:

1. Large forested areas identified as temporary or semi permanent reserves.
2. Maintenance of some naturally disturbed areas over time, which is not salvaged.
3. Openings, which represent a more natural patch, size distribution.
4. Providing for stand-level characteristics (e.g. species composition, stand structure) that emulate natural baseline information as much as possible.

To move towards a more natural range of variation and emulate patterns of natural disturbance many of the indicators and targets identified in section 6 are established at a landscape or DFA level, as opposed to management strategies directed at individual stands or cutblocks.

3.3. MANAGED STAND MONITORING

Under the principles of SFM, monitoring is defined as the periodic measurement and assessment of change of an indicator, where an indicator is a variable used to report progress towards achieving an objective. Objectives are broad, general statements that describe a desired state or condition related to one or more forest values (CAN/CSA-Z809-02). In this context, two broad categories of monitoring can be recognized. The first, which may be referred to as "administrative monitoring", checks that planned SFM activities are carried out (i.e., did we do what we said we were going to do?). An example is monitoring to ensure conformance with late seral targets.

The second category of monitoring may be referred to as monitoring the state of the forest, which includes activities that measure timber and non-timber variables over time. Growth and Yield (GY) monitoring, which is the process of checking GY estimates for a defined population, is in this broad category. Monitoring the state of the forest requires a long-term commitment to establishing and re-measuring plots over time.

Monitoring is a key process in adaptive management. It is a feedback loop that provides information for continuous improvement. The level of success in achieving objectives can be evaluated, and planning and management activities can be improved accordingly.

The participants have implemented a GY monitoring program for managed stands within the DFA. This program is based upon a 3-km grid covering the whole DFA. When any one of the points is harvested a GY monitoring plot will be established 15 years post-harvest and periodically re-measured over time. The GY monitoring objectives for the Ft St John DFA are as follows:

1) Monitor the change in volume, species composition, top height, and site index in managed stands from 15 years post-harvest onwards.

   The intent is that this data will be compared with predicted values of the same attributes used in timber supply analysis. This is to develop a level-of-confidence in the accuracy and precision of projections used in timber supply analysis. This data can also be used to address several SFM indicators pertaining to maintaining or improving the harvest level over time.

2) Provide data on snags, coarse woody debris, and shrubs to address SFM objectives

3) Provide data on stand growth and development that can be used as a subset of the data required for developing new GY models.

4) Use a sample design that can be modified in the future to incorporate establishment of plots in mature stands and linkages with other inventory sampling.

See Appendix 3 for a detailed description of the sample design and objectives developed for the DFA.

3.4. CONTINUOUS IMPROVEMENT

In keeping with the principles of SFM, opportunities to continuously improve the SFMP are built into the SFM process. Continuous improvement relies on the ability to recognize, plan for, and adapt to change as it occurs. As time goes by, changes will occur to both the practice of forest management and the process in which it is delivered. Ensuring that a process is in place to accept and adapt to change is a necessary part of SFM. To ensure continuous improvement occurs means that the sources of "change" are recognized and strategies developed to accept and adapt to these changes. Table 7 identifies the sources of change with regard to forest management and the strategies that are in place to adapt.

Table 7: Continuous Improvement Process for the SFMP

Source of Change	Adaptation Strategy
Change in environmental circumstance i.e. natural events such as large fires.	• Performance monitoring as outlined in section 6 will occur on an annual basis. • Conduct an annual *performance management evaluation and review* of monitoring results and compare to original targets. • Adjustments to practices and/or targets are made.
New information that can reveal assumptions, targets or measures are incorrect or could be improved.	• Annually, an SFM Investment Plan is developed that demonstrates how resources are allocated and prioritized with regard to research, effectiveness monitoring, and adaptation of measures and targets in the SFMP. • The SFM Investment Plan will seek to collaborate wherever possible with other associations having mutual interests SFM. Examples include, The McGregor Model Forest Association, other industry partners, the Forest Investment Account, and Government Agencies. • The results of the SFM Investment Plan will be reviewed on an annual basis. • Adjustments to practices and/or targets are made as a result of the new information.
Changing social values or SFM criteria/standards .	• Periodic meetings are held with the Public Advisory Group annually to gather local changes in public values over time. • The annual performance management evaluation and review will take into account government policy and land base planning and zonation changes. • Annual audits will be completed to verify compliance to the existing SFM Criteria/Standards. • Adjustments to practices and/or targets are made if necessary.

Continual improvement includes the incorporation of new information and knowledge, the identification of other information gaps, and undertaking research to address such gaps. The incorporation of new knowledge and understanding allows for better management approaches to evolve. Continual improvement activities also include modifications to the adaptive management system as a result of what is learned from indicator monitoring. Indicator results provide a means to evaluate the achievement of objectives and to determine whether values are being maintained. This process may also reveal issues with the SFM system that requires adjustment to the SFM system in part, or as a whole.

Following the performance management evaluation and review, non-conformance issues related to organizational management and/ or practices will be addressed within a "Management Adjustment Action Plan" which will be implemented by the applicable organization(s). If it is determined that non-conformances are related to issues regarding the SFM system a "SFM System Adjustment Action Plan" will be produced and implemented by the participants.

The SFMP is intended to be delivered and implemented through each of the managing participant's existing EMS organizational structure. Since the EMS is designed as a performance management loop, the SFMP will continuously improve, adjust and adapt to changing circumstances.

4. LANDSCAPE LEVEL STRATEGIES

The landscape level strategies (LLS) provide the strategic direction to the participants' plans and operations.

The Fort St. John Pilot Project Regulation (FSJPPR) specifies the regulatory content of the SFMP. A sustainable forest management plan at a minimum must include landscape level strategies for all of the following:

- timber harvesting,
- road access management,
- patch size, seral stage distribution and adjacency,
- riparian management,
- visual quality management,
- forest health management, and
- range and forage management.

This SFMP also includes a Landscape Level Reforestation Strategy.

The FSJPPR also requires the participants to ensure that each strategy contained in the plan specifies the performance indicators for evaluating whether or not the strategy has been successfully implemented. The participants will regularly review each of these indicators for appropriateness and evaluate performance and progress towards the associated targets. A summary of these reviews and any proposals for change will be reported in the SFMP annual reports. The targets will be managed within the continuous improvement process as described in section 3.4.

A summary of the landscape level strategies and related performance indicators being submitted to the regional manager (MOF) and regional director (MWALP) for approval are:

Table 8: Landscape Level Strategies and Related Performance Indicators Submitted for Approval

Landscape Level Strategy	Performance Indicators			
	Affecting Part 3 Division 5 of the FSJPPR (Sec 35(5))	Applicable Performance Standards used for Part 3 Division 5 of FSJPPR (Sec 35(6))	For Evaluation of LLS (Sec 42 of FSJPPR)	Additional (not for regulatory approval)
4.1 Timber Harvesting	N/A		6.18, 6.19, 6.20, 6.21, 6.52	6.27, 6.48, 6.49, 6.50, 6.51, 6.53
4.2 Road Access Management	6.24		6.24, 6.45	6.40
4.3 Patch Size, Seral Stage Distribution and Adjacency		6.6, 6.9	6.2, 6.3, 6.4	
4.4 Riparian Management	N/A		6.7, 6.22, 6.34, 6.36	6.23
4.5 Visual Quality Management	N/A		6.44	
4.6 Forest Health Management	N/A		6.1, 6.2, 6.3, 6.25	6.26
4.7 Range and Forage Management	N/A		6.10, 6.42	6.41
4.8 Reforestation	6.29		6.28, 6.29, 6.30	

The SFMP must specify the provisions, if any, of Part 3 Division 5 of the FSJPPR and the schedules that are to be affected through the application of the proposed landscape level strategy, and include rationales on how these will provide at least equivalent protection for forest resources, be consistent with the preamble to the Act, and provide for adequate management and conservation of forest resources. The SFMP must also include any applicable performance standards that are to be used for the purposes of Part 3 Division 5, and the associated schedules, of the FSJPPR. These can be found in section 8 "Changes to Requirements".

4.1. TIMBER HARVESTING

The participants' timber harvesting activities supply the majority of the raw material necessary to operate the forest industries local processing facilities. The timber harvesting costs largely determines the economic viability of these processing facilities. Harvesting activities must, however, balance economic considerations with ecological and social values in a sustainable forest management framework. The strategies included in this section are intended to address key issues within the DFA that relate to forest harvesting activities.

The timber harvesting strategies will provide strategic direction for the participants at the DFA, landscape unit level, and site level for forest harvesting activities, with respect to the following:

- Timber harvesting objectives, indicators and targets that have been identified by the Public Advisory Group and incorporated into the CSA SFM matrix, including those related to maintaining viable processing facilities, and silviculture systems.
- Timber harvesting objectives identified in the Fort St. John Land and Resource Management Plan, including those related to forest management intensity levels, and areas of special concern such as the MKMA (which includes the Sikanni and Graham LU's), the Graham River IRM Plan area, and the major river corridors.
- Objectives related to consistency with assumptions within the Timber Supply Review that support the maintenance of sustainable timber production levels, including allowable annual cuts, utilization and timber harvesting profile.
- Business objectives relating to timber harvesting, including optimizing fibre flow and value, harvesting systems, and coordination of operations.

Fibre Flow to Processing Facilities

Maintaining viable timber processing facilities is a major objective of the participants. The viability of local timber processing facilities is dependent on the timely delivery of sufficient volumes of high quality fibre to manufacture products at desired production levels. The primary constraint to fibre flows in the DFA is that a significant portion of annual deliveries is required during the summer and fall. This is a major challenge in the DFA, due to the scattered distribution of suitable ground, and the shortage of acceptable surfacing material in many of these locations. To support cost competitiveness and community stability, it is highly desirable for participants to focus efforts on identifying and developing suitable areas for summer development, while recognizing and managing the environmental factors impacted by summer harvesting.

Harvesting Strategy #1: Identify suitable areas for summer and fall harvesting, and maintain deliveries during this time period sufficient to meet processing plant fibre requirements, while meeting environmental objectives.

Refer to section 6.48 Summer and Fall Volumes for details on the indicator, the target and strategy implementation. This performance indicator does not affect Part 3 Division 5 of the FSJPPR and is not intended for the evaluation of the LLS as per section 42 of the FSJPPR. This performance indicator is intended to address other objectives of the Participants.

Utilization Standards and Waste and Residue Assessments

Efficiently utilizing timber resources to meet business needs, and support timber resource sustainability is an objective of the pilot participants. Strategies are required to ensure excessive waste of merchantable material is avoided, while still allowing for some flexibility to respond to changing market conditions, and accommodating other values which may benefit from retaining woody material.

Harvesting Strategy #2: Manage the utilization of the timber resource so that waste and residue of merchantable timber occurs within an acceptable range.

Refer to section 6.51 Utilization for details on the indicator, the target and the strategy implementation. This performance indicator does not affect Part 3 Division 5 of the FSJPPR and is not intended for the evaluation of the LLS as per section 42 of the FSJPPR. This performance indicator is intended to address other objectives of the Participants.

Allowable Annual Cut Levels

Effective March 1, 2003, the Chief Forester determined that the allowable annual cut (AAC) for the Fort St. John TSA will be 2,115,000 m^3 per year. This harvest level is below the estimated Long Term Harvest Level (LTHL) of the base case scenario in the Timber Supply Analysis. The cut is partitioned, with 1,200,000 m^3/year from coniferous leading stands, and 915,000 m^3/year from deciduous leading stands. The Chief Forester also noted in his determination that his expectation is that approximately 8.3% (100,000 m^3) of the coniferous AAC would be harvested from small pine stands.

To support sustainable timber supplies, it is desirable to manage periodic cut levels so they do not significantly exceed the AAC.

Harvesting Strategy #3: Manage harvesting operations to meet periodic cut control levels on all forest tenures managed by participants, including the B.C. Timber Sale Program.

Refer to section 6.53 Cut Control for details on the indicator, the target and the strategy implementation. This performance indicator does not affect Part 3 Division 5 of the FSJPPR and is not intended for the evaluation of the LLS as per section 42 of the FSJPPR. This performance indicator is intended to address other objectives of the Participants.

Timber Profile

Harvesting a timber profile consistent with assumptions included in the TSR supports the rationale provided for setting AAC levels. The participants will operate in stands consistent with merchantability criteria outlined in the Fort St. John Timber Supply Analysis Report June 2002 (Tables A-10 and A-11). Harvest priorities will be significantly influenced by seral stage and patch size strategies, as well as the salvage strategies outlined in section 6.26. The clearest direction provided in the AAC determination concerning timber profile issues was regarding height class two pine stands. Strategies to proactively address these inventory types support one of the major assumptions incorporated into the AAC rationale.

Harvesting Strategy #4: On coniferous tenures, the participants will actively plan for and conduct harvesting operations in some merchantable height class two pine types, to support timber profile assumptions used in the AAC determination.

Refer to section 6.52 Timber Profile for details on the indicator, the target and the strategy implementation. This performance indicator does not affect Part 3 Division 5 of the FSJPPR. For the purposes of Section 42 of the FSJPPR the indicator statement, target statement and acceptable variance will be used to determine if forest practices are consistent with the landscape level strategies.

Silviculture Systems

In forested landscapes it is desirable to produce new forests with similar structural characteristics that naturally occurs on the landscape. Due to the predominance of fire disturbances in the DFA, the most prevalent forests are even aged stands of one or, less frequently, two layers. Silviculture systems should be implemented that primarily result in similar stand structures in new forests following harvesting disturbances.

Harvesting Strategy #5: Even aged silviculture systems such as clearcuts, or clearcuts with reserves, will be the predominant silviculture systems employed, as these systems most closely parallel the even aged forests that result from natural disturbance events in the TSA. Where other resource values are particularly high, small patch or strip cuts may be proposed to maintain non-timber resource values, while allowing for some timber utilization. Modified shelterwoods will be employed in deciduous logging to protect coniferous understorey on an operational trial basis, consistent with the reforestation strategy.

Refer to section 6.27 Silviculture Systems for details on the indicator, the target and the strategy implementation. This performance indicator does not affect Part 3 Division 5 of the FSJPPR and is not intended for the evaluation of the LLS as per section 42 of the FSJPPR. This performance indicator is intended to address other objectives of the Participants.

Harvesting Systems

Harvesting system selection has a major impact on total harvesting costs, and the subsequent viability of the timber processing plants in the DFA. The harvesting configuration selected is based on the silviculture system requirements, equipment limitations, economic constraints and environmental protection requirements. To minimize cost fluctuations and contractor disruptions, while still harvesting the timber profiles that support AAC determinations, the percentage of area harvested using the most efficient

harvest systems should remain relatively consistent. Conventional ground based systems are the most cost effective harvest system.

Harvesting Strategy #6: Harvest plans will be designed to maintain conventional ground based harvesting systems as a consistently high proportion of total harvesting systems, in order to minimize cost fluctuations, and support contractor stability.

Refer to section 6.49 Harvest Systems for details on the indicator, the target and the strategy implementation. This performance indicator does not affect Part 3 Division 5 of the FSJPPR and is not intended for the evaluation of the LLS as per section 42 of the FSJPPR. This performance indicator is intended to address other objectives of the Participants.

Coordination of Operational Activities between Participants

Significant utilization of deciduous resources on Crown land is a recent development in the Fort St. John TSA. Coniferous and deciduous licencees will be operating on the same landbase, and occasionally immediately adjacent to each other. There are potential environmental and economic benefits to coordinating the planning and development of timber resources.

Harvesting Strategy #7: Participants will coordinate the planning of forestry operations to achieve efficiencies in planning and operational phases of the business, to facilitate analysis of cumulative impacts in relation to SFMP strategies, and to provide consolidated consultation products to interested parties.

Refer to section 6.50 Coordination for details on the indicator, the target and the strategy implementation. This performance indicator does not affect Part 3 Division 5 of the FSJPPR and is not intended for the evaluation of the LLS as per section 42 of the FSJPPR. This performance indicator is intended to address other objectives of the Participants.

The Graham River Integrated Resource Management Plan

Forestry Operations within the Crying Girl LU and the portion of the Graham LU that falls within the Graham River drainage will be consistent with the intent of the Graham River IRM Plan. The following strategies are designed to implement key components of the Graham River IRM Plan that relate to timber harvesting.

Harvesting Strategy #8: Timber harvesting within the Crying Girl LU and the portion of the Graham LU that falls within the Graham River valley will be based on sequential clustered development, and will be consistent with the intent of the harvest schedule outlined in the Graham River IRM Plan.

Sequential clustered development refers to the scheduling of operable timber into groups of neighboring blocks with a single access, developed in sequence over the full harvest cycle. The advantages of this strategy are as follows:

- Disturbance- the strategy confines activity and impact to as small an area as practical at any one time.
- Natural Disturbance Mimicry – spaces and times the harvest openings to simulate the fire history to the extent practical.

- Access and Access Management – reduces the amount of active infrastructure at any one time, and simplifies access control.
- Economics – reduces operational costs per period of time.
- Strategic – provides maximum scope for the implementation of adaptive management.

Refer to section 6.18 Graham Harvest Timing, and section 6.19 Graham Merch Area for details on the indicators, the targets and the implementation for this strategy. These performance indicators do not affect Part 3 Division 5 of the FSJPPR. For the purposes of Section 42 of the FSJPPR these indicator statements, target statements and acceptable variances will be used to determine if forest practices are consistent with the landscape level strategies.

Harvesting Strategy #9: Forest Connectivity Corridors in the Graham River IRM Plan area were identified which provide substantial connectivity throughout the plan area. Operational plans will respect the long term primary components of these connectivity corridors. If harvesting activities are proposed in any portion of the permanent corridors , to ensure consistency with the original objectives, government agencies will be consulted, and their agreement attained prior to proceeding.

Refer to section 6.20 Graham Connectivity for details on the indicators, the targets and the implementation for this strategy. This performance indicator does not affect Part 3 Division 5 of the FSJPPR. For the purposes of Section 42 of the FSJPPR the indicator statement, target statement and acceptable variance will be used to determine if forest practices are consistent with the landscape level strategies.

Muskwa-Kechika Management Area

As a consequence of the Fort St. John and Fort Nelson LRMP's, the Muskwa-Kechika Management Area (MKMA) was established. The MKMA was established by OIC in 1997 (order #1367/97) and subsequently the MKMA Act passed in 1998. The MKMA includes Special Management Zones (SMZ's) and Protected Areas (PA's). The Order in Council for the MKMA establishes that: *"The management intent for the Muskwa-Kechika Management Area is to ensure that wilderness characteristics, wildlife, and its habitat are maintained over time while allowing resource development and use, including recreation, hunting, timber harvesting, mineral exploration and mining, oil and gas exploration and development."*

The Muskwa-Kechika Management Area Plan Regulation most notably establishes the requirement for one or more landscape level objectives to be established prior to the approval of timber harvesting, other than grandparented blocks. Blocks and roads included in approved FDP's that existed prior to the regulation were grandparented, and may be harvested prior to landscape level objectives being established.

Harvesting Strategy #10: Grandparented blocks (20015, 20016, 20007, 20008, and 20007 under FL A18154, and 20060 in FL A59959) and related roads within the Cypress Creek drainage will be harvested prior to any other harvesting occurring in the MKMA. Harvesting in the Graham LU will be consistent with the clustered harvesting sequence prepared in the Graham River IRM Plan. A clustered harvesting plan will be prepared for other drainages in the MKMA, similar to the Graham North clustered harvesting plan, and submitted to government prior to being included in future FOS's or FDP's as needed.

For information on the indicators, the targets and the implementation of this strategy in the Omineca portion of the Graham LU (i.e. the Graham River IRM Plan area within this LU) refer to Sections 6.18 Graham Harvest Timing, and 6.19 Graham Merch Area, and to section 6.21 MKMA Harvest for the remainder of the MKMA. These performance indicators do not affect Part 3 Division 5 of the FSJPPR. For the purposes of Section 42 of the FSJPPR these indicator statements, target statements and acceptable variances will be used to determine if forest practices are consistent with the landscape level strategies.

4.2. ROAD ACCESS MANAGEMENT

There are a large number of industrial roads being constructed within the Fort St. John TSA on an annual basis by both the forest industry and the oil and gas industry in order to provide access to the resources they require. The Fort St. John LRMP had identified that road access for industrial activity is an acceptable use of the land but subject to other regulations and objectives. One major objective of the LRMP that was pertinent to all RMZ's was the necessity to coordinate access and linear development to minimize the negative effects on other resource values. The LRMP also directed that new access routes be appropriately managed so that unnecessary routes are permanently deactivated. The participants are very cognizant of the extent of road development that is occurring on the DFA as a result of the combined activities of both industries although they have little control on the road construction program of the oil and gas industry. However the participants are attempting to engage the oil and gas industry into adopting a more coordinated approach although progress into defining a mutually agreeable process is proceeding slowly. Since most forestry activities are planned and referred to other parties and the public well in advance of actual construction or deactivation there exists an opportunity to improve the coordination of access management activities between these two industries. We will continue to be proactive in our dealings with the oil and gas sector and we do have several examples of documented successes in road access coordination in the Tommy Lakes LU and the Graham LU.

Coordinated access also means that an effort should be made to identify minimum road construction standards that are critical to both industries to ensure that the resultant constructed road infrastructure meets the physical requirements of each industry where possible. With the amount of road being constructed annually by each industry it is becoming more paramount that consistent road construction practices be adopted, particularly where there is a significant likelihood that both industries will be operating in a the same area within the foreseeable future. Critical components of a road construction standard may initially focus on maximum road grade, minimum load rating for bridges, and standard road width for mainlines.

The following road access management strategies for the Fort St. John Timber Supply Area (TSA) are intended to provide strategic direction to the pilot participants at the TSA and landscape unit level with respect to the following directives:

- Road access management objectives, indicators and targets that have been identified by the Public Advisory Group and incorporated into the CSA SFM matrix, including permanent losses and coordinated developments,

- Road access management objectives as identified in the Fort St. John Land and Resource Management Plan (LRMP), including co-ordination of access and linear development to minimize negative affects on other resource values,
- To better meet the business objectives of the participants, including cost saving measures and better integration of operations.

High and Moderate Intensity Forest Management Landscape Units:

The Blueberry, Kobes, Halfway and Tommy Lakes LU's collectively have been identified as high intensity forest management zones. The Crying Girl, Kahntah, Lower Beatton, Milligan and Trutch LU's collectively have been identified as moderate intensity forest management zones. Strategies #1 and #2 will provide acceptable levels of access management for these LU's for the term of this SFMP.

Objective: Sustain those forest lands within our control within the defined forest area by limiting the amount of losses within the THLB from permanent access structures within blocks.

Road Access Management Strategy #1: Replace the current field performance requirement for the allowable percentage of permanent access structures that can be constructed within a cut block as stated in the current regulation. To propose a new field performance requirement that will not be explicitly linked to each individual cutblock but rather would be an average of the total area occupied by permanent access structures in relation to the total aggregate area harvested of all cutblocks in which harvesting was completed during that annual reporting period. This average would be less than the current allowable level under the current field performance requirement.

Refer to section 6.24 Permanent Access Structures for details on the indicator, the target and strategy implementation. For the purposes of Section 35(5) of the FSJPPR, the indicator statement, target statement and acceptable variance will replace section 30(1) of the FSJPPR. For the purposes of Section 42 of the FSJPPR the indicator statement, target statement and acceptable variance will be used to determine if forest practices are consistent with the landscape level strategies. Also refer to section 8 of this SFMP.

Objective: Foster inter-industry co-operation in minimizing the conversion of forested lands to non-forest conditions and to coordinate access to minimize negative effects on other resources.

Road Access Management Strategy #2: Communicate and provide the opportunity for forest industry access management plans to be shared with the oil and gas sector through the Oil and Gas Commission. This would include providing critical forest industry road construction standards so that the forest industry road specifications can be linked with those of the oil and gas sector. Forest industry access plans encompassing all of the participants activities will be clearly identified within the forest operations schedule (FOS) that will have been prepared for the defined forest area following the approval of this SFMP. By making this information well known and easily available to the oil and gas sector, coordinated infrastructure developments within common operating areas can be implemented , thus eliminating duplicate

entries and thereby reducing the amount of forest land converted to non-forest conditions and minimizing the negative effect on other resources.

Refer to section 6.40 Coordinated Developments for details on the indicator, the target, and strategy implementation. This performance indicator does not affect Part 3 Division 5 of the FSJPPR and is not intended for the evaluation of the LLS as per section 42 of the FSJPPR. This performance indicator is intended to address other objectives of the Participants.

Low Intensity Forest Management Landscape Units:

The Graham and Sikanni LU's collectively have been identified as low intensity forest management zones. The Muskwa-Kechika Management Area (MKMA) encompasses most if not all of these two LU's and as such specific access requirements have been identified within the Muskwa-Kechika Management Plan. The Order in Council for the MKMA establishes that: *"The management intent for the Muskwa-Kechika Management Area is to ensure that wilderness characteristics, wildlife, and its habitat are maintained over time while allowing resource development and use, including recreation, hunting, timber harvesting, mineral exploration and mining, oil and gas exploration and development. The integration of management activities especially related to the planning, development and management of road accesses within the MKMA is central to achieving this status. The long-term objective is to return lands to their natural state, as much as possible, as development activities are completed."*

Objective: Maintain a component of the remoteness and motorized and non-motorized use factors of the Recreational Opportunity Spectrum (ROS) in the following Resource Management Zones: Besa-Halfway-Chowade, Graham North, Graham South and Crying Girl.

Road Access Management Strategy #3: Road access in the Resource Management Zones Besa-Halfway-Chowade, Graham North, Graham South and Crying Girl (Graham, Sikanni and Crying Girl LU's) will be planned to maintain over time the primitive ROS class at 1996 levels, and maintain a component of semi-primitive motorized and non motorized ROS classes. Following the development of a Forest Operations Schedule which will identify all proposed forest operations for the next several years a sensitivity analysis will be completed which will quantify the impact of any proposed development on the updated ROS factors. Short term fluctuations to the ROS factors are expected due to forestry activities, however mitigating access deactivation measures will be implemented that will minimize the impacts on the current ROS factors and ensure that a minimum component of each factor is retained in each RMZ.

Refer to section 6.45 Recreation Opportunity Spectrum for details on the indicator, the target and strategy implementation. This performance indicator does not affect Part 3 Division 5 of the FSJPPR. For the purposes of Section 42 of the FSJPPR the indicator statement, target statement and acceptable variance will be used to determine if forest practices are consistent with the landscape level strategies.

4.3. PATCH SIZE, SERAL STAGE DISTRIBUTION AND ADJACENCY

The underlying assumption of NDU's is that the biota of a forest is adapted to the conditions created by natural disturbances and thus should cope more easily with the ecological changes associated with forest management activities if the pattern and structure created resemble those of natural disturbance (Hunter 1993, Swanson et al. 1993, Bunnell 1995, DeLong and Tanner 1996, Bergeron and Harvey 1997, Angelstam 1998, DeLong and Kessler 2000). Adopting forest management practices that approximate the natural range of variability is being widely accepted as an appropriate way to manage for the needs of many organisms. The Biodiversity Guidebook (1995) was the first attempt in British Columbia to present guidance for forest management based on the natural disturbance template. Since the completion of the Biodiversity Guidebook, more information on natural disturbance dynamics has become available. Within the Prince George Forest Region a number of studies have investigated particular aspects of natural disturbance (DeLong 1998, DeLong and Kessler 2000, Lewis and Lindgren 2000, Rogeau 2001).

Instead of adopting the Natural Disturbance Types (NDT's) presented in the Biodiversity Guidebook (1995) DeLong 2002 presents information for 9 Natural Disturbance Units. These units better separate areas based on differences in disturbance processes, stand development, and temporal and spatial landscape pattern. DeLong 2002 contains guidance on management of old forest, young natural forest, patch size distribution, and stand species composition and structure. Most of the guidance relates to approximating wildfire as it was the key stand replacement disturbance agent in most landscapes and it is the one that we have exhibited the most control over. In other words it is the disturbance process we are attempting to replace with harvesting.

This strategy deals with the pattern and relative distribution of disturbance across the landscape.

Seral Stage Distribution

Forests occurring in different seral and structural stages over space and time are recognized as an important part of the landscape and provide different habitat elements for a variety of species. Natural Disturbance Units of the Prince George Forest Region: Guidance for Sustainable Forest Management (DeLong 2002) has estimated the natural range of variation for different Natural Disturbance Units within the DFA.

A detailed description of the seral stage strategy can be found in section 6.2. Described is an overview of the indicator, a description and rationale for the targets, current status, forecasting and analytical methods, strategies and implementation schedule for achieving the targets, monitoring procedures and linkages to operational plans.

Patch Size

A patch is defined as a stand of similar-aged forest resulting from either a natural disturbance or created by timber harvesting. A patch may be composed of either a single disturbance event or an aggregate of events (natural, timber harvesting, or a combination of both). In forested landscapes patches represent a legacy or history of disturbances and as such may have a variety of species, stocking and ages contained within one patch. Forest patches are created naturally by disturbances such as fire, wind or pest outbreaks. In the absence of these natural disturbances forest management, through harvesting, affects the

distribution and size ranges of forest patches. Over a rotation or more of the forest, harvesting can then lead to either inflating or fragmenting the landscape beyond the limits of the natural variability of the landscape, which has developed over centuries from natural disturbances. It is therefore important to establish target ranges for the size of patches that are consistent with the natural pattern of forested landscapes.

A detailed description of the patch size strategy can be found in section 6.3. Described is an overview of the indicator, a description and rationale for the targets, current status, forecasting and analytical methods, strategies and implementation schedule for achieving the targets, monitoring procedures and linkages to operational plans.

Adjacency

The previous two strategies and indicators described in sections 6.2, 6.3, 6.4, 6.6 and 6.9 deal with patch size, patch shape and seral stage distribution and control both the amount and spatial distribution of the forested land base affected by forest management. The combined functions of managing for both early and mature patch sizes controls where harvesting can occur as well as what is left as intact mature forest over time. The seral stage indicator controls the amounts of the various age groups. The patch size indicators address both the size and shape of patches at the landscape level and over time. The CWD and Wild Life Tree Patch indicators provide structure within or adjacent to harvested areas. These processes manage the structural characteristics and the temporal and spatial distribution of forest patches such that a separate adjacency indicator strategy is not necessary.

This strategy addresses the requirements of the FSJPPR Section 97(e) to allow harvesting adjacent to areas that are not greened-up.

Linkages to the SFMP

The following table (Table 9) demonstrates the linkages for this strategy to the SFMP objectives and indicators and the applicable sections of the document where the full detail can be found.

Table 9: Patch Size, Seral Stage and Adjacency Strategy Linkages to the SFMP

SFM Objective	*Section	Indicator
The diversity and pattern of communities and ecosystems within a natural range. A natural range of variability in ecosystem function, composition and structure which allows ecosystems to recover from disturbance and stress. Ecosystem functions capable of supporting naturally occurring species that exist within the range of natural variability.	6.2	The minimum proportion (%) of late seral forest by NDU by LU
	6.3	Percent area by Patch Size Class (0-50, 51-100, and > 100 ha) by Landscape Unit
	6.4	Average shape index of young patches in a landscape unit.
	6.6	Average Coarse Woody Debris volume/ha on blocks logged in the DFA
	6.9	Aggregate Wildlife Tree Patch percentage in blocks harvested under the FSJPPR in each Landscape Unit

**The baseline targets and a detailed rationale for each indicator are located in section 6.0*

These performance indicators do not affect Part 3 Division 5 of the FSJPPR. For the purposes of Section 42 of the FSJPPR, the indicator statements, target statements and acceptable variances for 6.2, 6.3, and 6.4 of this SFMP will be used to determine if forest practices are consistent with the landscape level strategies. For the purposes of 29(2) of the FSJPPR the applicable performance standard is specified by the indicator statement, target statement and acceptable variance in section 6.6 of this SFMP. For the purposes of 29(1) of the FSJPPR the applicable performance standard is specified by the indicator statement, target statement and acceptable variance in section 6.9 of this SFMP.

Linkages to the LRMP

As this strategy and associated indicators address landscape levels of seral stages, patch size and shape distribution over space and time they help to support the following LRMP objectives:

- Maintain habitat for red and blue listed species
- Maintain habitat for priority fur bearing species
- Maintain timber harvesting and forest management opportunities
- Maintain functioning and healthy ecosystems
- Minimize wildlife habitat fragmentation

4.4. RIPARIAN MANAGEMENT

Riparian areas often support high timber and non-timber values concurrently. Some of the most productive timber sites in the DFA are located in riparian areas, which also are some of the most biologically diverse habitats. These areas provide important wildlife habitat, act as natural connectivity corridors, protect adjacent aquatic ecosystems and help maintain stream bank stability and water quality.

Management issues revolve around maintaining non-timber resource values inherent in these areas while still capturing some of the high timber values. Current practices around streams include adherence to Schedule D of the FSJ Pilot Project Regulation. This regulatory requirement requires maintenance of minimum reserve zones on certain streams and waterbodies, and the designation of riparian management zones in which constraints to forest practices may apply for the purpose of maintaining the integrity of the stream, wetland or lake, and associated habitats. Strategies also need to address the protection of streambanks and stream channel stability.

The following riparian management strategies will provide strategic direction to the participants at the landscape, watershed, and site levels, with respect to the following:

- Riparian and related objectives identified in the Fort St. John LRMP, including major river corridor considerations
- Relevant indicators and targets identified by the PAG and incorporated into the CSA SFM matrix

Riparian Management Strategy #1: Forestry operations adjacent to fish bearing S1, S2 and S3 streams will minimize negative effects on water quality by maintaining regulatory riparian reserve zones which meet or exceed the minimum widths included in Schedule D of the FSJPPR.

Refer to section 6.7 Riparian Reserves for details on the indicator, target and implementation strategy. This performance indicator does not affect Part 3 Division 5 of the FSJPPR. For the purposes of Section 42 of the FSJPPR the indicator statement, target statement and acceptable variance will be used to determine if forest practices are consistent with the landscape level strategies.

Riparian Management Strategy #2: Assessments of streams which do not have mandatory reserve zones will be conducted by qualified personnel, and site specific management practices will be incorporated into SLP's to protect streambanks, stream channel stability, and riparian vegetation to protect water quality and other riparian values. Excessive runoff at the watershed level, which can disturb stream channel integrity and adjacent habitats, will be managed by limiting the extent of harvesting within watersheds, as determined through peak flow index analyses.

Refer to section 6.36 Protection of Streambanks and Riparian Values on Small Streams and section 6.34 Peak Flow Index for details on the indicator, target, and implementation strategy. These performance indicators do not affect Part 3 Division 5 of the FSJPPR. For the purposes of Section 42 of the FSJPPR these indicator statements, target statements and acceptable variances will be used to determine if forest practices are consistent with the landscape level strategies.

Riparian values and fish habitat on small streams will also be protected by adherence to stream crossing procedures developed in conjunction with WLAP, which are included in Appendix 12. Appendix 12 does not affect Part 3 Division 5 of the FSJPPR and will not be used for the evaluation of the LLS as per Section 42 of the FSJPPR.

Major River Corridors

Major river corridors requiring some special management considerations transect portions of several LU's, as noted previously in section 1.3.1. Strategies noted below apply only to those Major River corridors noted in section 1.3.1.

Riparian Management Strategy #3: Plans developed for harvesting within the riparian corridors of these major rivers will provide for a high level of forest retention, with new patch openings normally being 1 hectare or less in size within 100 metres of the rivers' RRZ. A variety of silviculture systems can potentially be used to achieve this, including clearcut with reserves and partial cutting systems, employing methods such as strip cuts or patch cuts.

Refer to section 6.22 River Corridors for details on the indicator, target and implementation strategy. This performance indicator does not affect Part 3 Division 5 of the FSJPPR. For the purposes of Section 42 of the FSJPPR the indicator statement, target statement and acceptable variance will be used to determine if forest practices are consistent with the landscape level strategies.

Riparian Management Strategy #4: Road access will be limited to winter access where ever practical within the river corridor areas, to minimize long term disruption to wildlife. Where summer access is created for roads within 100 metres of riparian reserves, visual screening techniques will be used where topography and windfirmness permit, to minimize disturbance to wildlife.

Refer to section 6.23 Visual Screening on Roads for details on the indicator, target and implementation strategy. This performance indicator does not affect Part 3 Division 5 of the FSJPPR and is not intended for the evaluation of the LLS as per section 42 of the FSJPPR. This performance indicator is intended to address other objectives of the Participants.

4.5. VISUAL QUALITY MANAGEMENT

Visual Quality Strategy #1: All forest operations carried out in scenic areas covered by an established visual quality objective (VQO) will be consistent with the objective, and in scenic areas without established VQO's all forest operations will be designed using appropriate visual design techniques to minimize visual impacts.

See section 6.44 Visual Quality Objectives for details on the indicator, target and implementation strategy. This performance indicator does not affect Part 3 Division 5 of the FSJPPR. For the purposes of Section 42 of the FSJPPR the indicator statement, target statement and acceptable variance will be used to determine if forest practices are consistent with the landscape level strategies.

4.6. FOREST HEALTH MANAGEMENT

Forest health is defined as an ecological condition of the forest ecosystem, such that its productivity and resilience are retained in the face of natural and managed disturbances. Maintaining or enhancing forest ecosystem diversity, condition and productivity at the landscape level and to a lesser extent at the stand level, is generally the best strategy to achieve forest health. Management on this basis is thought to reduce the risk of catastrophic damage to forest productivity and maintain ecosystem resiliency.

The principles of Integrated Forest Health Management (a variant of Integrated Pest Management[6]) are:

- know the landbase and resource management objectives
- manage from an ecological perspective
- do not make the situation worse, and
- practice adaptive management

The participants' objectives of forest health management are to:

- maintain or increase the success of regeneration practices
- maintain or increase the productivity of immature stands
- reduce losses of mature timber
- reduce risk to silviculture investment
- create a more stable cost-efficient planning environment

[6] The definition of Integrated Pest Management (IPM) is posted on the Ministry of Water, Land and Air Protection (MWLAP) web site at http://wlapwww.gov.bc.ca/epd/epdpa/ipmp/IPMdefn.htm

The forest health strategy will provide strategic direction to the participants at the DFA, landscape unit and site level with respect to the following:

- Forest health objectives, indicators and targets identified by the Public Advisory Group and incorporated into the SFM matrix, including those related to maintaining the diversity and pattern of ecosystems within a natural range, and maintaining a natural range of variability in ecosystem function, composition and structure to allow ecosystems to recover from disturbance and stress.
- Forest health objectives in the Fort St. John Land and Resource Management Plan.

Forest Health Strategy # 1: To minimize the potential of catastrophic forest health events, the participants will apply the principles of Integrated Forest Health Management in the planning and implementation of forestry activities.

Indicators, strategies and implementation details for maintaining ecological processes are included in section 6 of the SFMP.

See section 6.1 Forest Types for a detailed description of indicators, targets and strategy implementation designed to maintain the relative distribution of pure and mixedwood types across the landscape.

See section 6.2 Seral Stages for a detailed description of indicators, targets and strategy implementation designed to retain seral stage distributions within acceptable ranges.

See section 6.3 Patch Size for a detailed description of indicators, targets and strategy implementation designed to make harvest patch size more reflective of natural disturbance patterns.

The three performance indicators above do not affect Part 3 Division 5 of the FSJPPR. For the purposes of Section 42 of the FSJPPR these indicator statements, target statements and acceptable variances will be used to determine if forest practices are consistent with the landscape level strategies.

See section 6.26 Salvage for a detailed description of indicators, targets and strategy implementation designed to provide variable levels of salvage to support ecological processes. This performance indicator does not affect Part 3 Division 5 of the FSJPPR and is not intended for the evaluation of the LLS as per section 42 of the FSJPPR. This performance indicator is intended to address other objectives of the Participants.

Forest Health Strategy # 2: The participants will identify potential forest health issues, and prioritize those which may have a significant impact on forest resources. The participants will detect and monitor significant forest health agents in a timely manner, and, where potential impacts are significant, implement cost effective treatment controls where practical.

See section 6.25 Forest Health for indicators, strategies and implementation details for the identification, detection and treatment controls for specific forest management issues. This performance indicator does not affect Part 3 Division 5 of the FSJPPR. For the purposes of Section 42 of the FSJPPR the indicator statement, target statement and acceptable variance will be used to determine if forest practices are consistent with the landscape level strategies.

4.7. RANGE AND FORAGE MANAGEMENT

Access management, harvesting and reforestation activities will affect Crown range use. Effects will increase as deciduous forest operations expand following the completion of the planned OSB (oriented strand board) mill. From 2010 onward the overlap of domestic grazing and timber management activities is anticipated to be much more frequent. Subsequent SFMP strategies will reflect that change.

The focus of this range and forage management strategy is the development and refinement of a working relationship with the Crown range community within the pilot project area. Features of this strategy emphasize the development of joint management practices that will enable the integration of forest harvesting with range use as operational overlap increases.

Domestic Crown Range Use

Tenured Crown range use in the DFA is primarily associated with the beef-cattle industry. There are also tenures issued to Guide/Outfitters who graze their saddle and packhorses on Crown range as part of their activities.

Domestic livestock are authorized to graze on Crown range under the Range Act or Land Act tenure. Livestock may be grazed in community pastures, in which several ranchers' livestock are grazed in common under a tenure issued to an association, or more commonly, across the DFA area under a tenure issued directly to the rancher.

There are approximately 140 Crown range tenure holders in the TSA, operating under 127 tenures of which 110 of the tenures are under the Range Act and 17 under the Land Act. There are also five grazing reserves totaling 61, 399 hectares within the DFA. All Grazing Reserves fall in the southeast quadrant of the DFA.

- Cecil Lake Grazing Reserve
- Milligan Grazing Reserve
- Beatton-Doig Community Pasture
- Boundary Grazing Reserve
- Umbach Community Pasture

The majority of grazing use occurs in deciduous leading or pure aspen forest types, generally in the southern portion of the TSA and near the agricultural settlement areas. The FSJ LRMP recommends that the grazing reserves are managed using moderately intensive forest management. Timber harvesting is permitted in these areas.

Forage and Range Management Issues

Forest operations may affect grazing operations in guide outfitter areas.

Harvesting and reforestation of any stands generally impact grazing in domestic livestock areas through:

- the removal of natural range barriers (heavy timber)
- the temporary damage or removal of range improvement structures
- the overlapping use of roads during summer harvesting operations creating road dust issues for cattle
- increased opportunity for invasive noxious weeds in forest management areas

Harvesting and reforestation of deciduous timber in domestic livestock areas results in an impact on grazing through part of the early seral stage. This is caused primarily by the following two factors:

- the reluctance of unmanaged cattle herds to graze in dense regenerating aspen stands, resulting in disruption of livestock grazing patterns, and
- a temporary reduction in forage volume and a temporary shift in forage species both of which are attributable to the removal of the timber overstorey and the density of regenerating aspen.

Fewer coniferous dominated range areas will be affected by harvesting than those in deciduous areas, due to the distribution of timber types and range areas over the DFA.

Harvesting and reforestation of coniferous stands may result in a positive impact on grazing operations through livestock enabled brushing and weeding activity. The effects of harvesting coniferous leading stands on range areas include the following:

- an increase in forage availability in regenerating coniferous stands compared to that available under a mature coniferous canopy. Herbicides, generally employed to ensure initial survival of coniferous plantations through reduction of vegetative competition, will limit short-term forage availability in reforested stands, but may also increase forage in the mid-term.
- reduction of long-term forage volume and availability due to silviculture treatments that result in conversion of mixedwood forests to coniferous forests.

Over the period of one crop rotation most mature deciduous and coniferous timber in the DFA may be affected by harvesting and reforestation operations. Given the anticipated harvest rate, the majority of grazing areas will be affected to varying degrees.

Range grazing and management affect reforestation quantity and quality through the following means:

- cost and management complexity is higher for areas where grazing and timber operations overlap, particularly for deciduous stand management
- access management (road construction, modification and deactivation) will generally create new forage opportunities, but access controls such as deactivation may create issues for grazing tenure holder access
- escaped range burns can cause serious damage to reforested areas as well as mature timber
- survival success of regenerating deciduous and coniferous stands in heavily grazed areas is uncertain
- deciduous fibre quality is reduced in grazed areas through introduction of pathogens via scarred and damaged stems caused by cattle
- timber harvesting opportunities may be reduced as a result of range requirements, negatively affecting both timber supply and delivered wood costs, and
- increased soil disturbance and compaction created by range use in deciduous areas may lead to reduced deciduous regeneration

The Range and Forage Management Strategy will provide strategic direction for participants at the landscape unit and site level with respect to the following:

- Range and Forage objectives, indicators and targets identified by the Public Advisory Group and incorporated into the CSA SFM matrix, including those related to providing opportunities for a mix of timber and non timber commercial activities, and maintaining suitable habitat elements
- Range and Forage objectives in the Fort St. John Land and Resource Management Plan including those related to controlling the spread of noxious weeds. and restoring functioning and healthy ecosystems

Range and Forage Management Strategy # 1: The participants and range interests will define and prioritize forage and timber harvesting overlap management issues in order to develop and implement effective mutually agreed action plans to address key areas of concern. This will be accomplished by developing productive on going communication between the participants and range tenure holders, and range related associations.

See section 6.41 Range Action Plans for a detailed description of the indicator, target and strategy implementation. This performance indicator does not affect Part 3 Division 5 of the FSJPPR and is not intended for the evaluation of the LLS as per section 42 of the FSJPPR. This performance indicator is intended to address other objectives of the Participants.

Range and Forage Management Strategy #2: The participants will ensure damage to range improvements as a result of participants activities are repaired to the satisfaction of the range tenure holder in a timely manner.

See section 6.42 Damage to Range Improvements for a detailed description of the indicator, target and strategy implementation. This performance indicator does not affect Part 3 Division 5 of the FSJPPR. For the purposes of Section 42 of the FSJPPR the indicator statement, target statement and acceptable variance will be used to determine if forest practices are consistent with the landscape level strategies.

Range and Forage Management Strategy #3: The participants will implement measures during grass seeding activities that minimize the risk of inadvertently introducing noxious weeds which would be counterproductive to range interests.

See section 6.10 Noxious Weed Content for a detailed description of the indicator, target and strategy implementation. This performance indicator does not affect Part 3 Division 5 of the FSJPPR. For the purposes of Section 42 of the FSJPPR the indicator statement, target statement and acceptable variance will be used to determine if forest practices are consistent with the landscape level strategies.

4.8. REFORESTATION

The Fort St. John Pilot Project Regulation (FSJPPR) allows the SFMP to contain a landscape level strategy for reforestation.

This strategy has the following key features to:

- Set standards for reforestation to provide restocking of harvested areas.
- Provide a landscape level assessment of reforestation success based on a comparative measure of future volume.
- Ensure that Professional Foresters will have professional accountability at the cut block level to vary regimes and provide for other values as they progress to a landscape level target for volume.
- Allow continuous improvement by providing feedback on landscape level reforestation success. Silviculture regimes and/or corrective action can be considered across the landscape and implemented in a cost effective manner that considers all values being managed.

Traditionally, reforestation success has not been measured at a landscape level. This strategy extends beyond previous practices and provides an additional measure to assure adequate management and conservation.

This strategy applies to areas harvested after November 15, 2001 under the FSJPPR. Participants may elect to include areas harvested under prescription between 1987 and November 15, 2001. A statement of election to include areas must be made in writing to the District Manager.

Participants in the Pilot Project will be responsible for implementing the strategy and applying corrective actions within their harvest area. Corrective actions to meet targets can be applied to another participant's area only by mutual agreement.

RESTOCKING OF HARVESTED AREAS

The participant must declare to reforest the cutblock as a coniferous area, a deciduous area or a mixedwood area in the FDP or FOS and initial Site Level plan (SLP). The declaration may be revised prior to the end of the reforestation period subject to a compensating revision elsewhere on the landscape.

The prescribing and implementing foresters for the SLP are responsible to ensure stocking on the site is managed to provide forest establishment sufficient to meet the landscape level targets.

Coniferous Areas

The stocking standards in Appendix 6: Silvicultural Requirements for Crop Trees provide guidance to foresters preparing Site Level Plans.

The landscape level assessment of stocking will be measured using a Mean Stocked Quadrant method. At the time of assessment individual crop trees at a minimum must meet requirements to be considered able survive and contribute to the harvestable volume at rotation. These requirements are set out in Appendix 6.

Deciduous Areas

Minimum well spaced stocking densities are described in Appendix 6 and are used to determine Establishment Delay.

Well growing requirements are set out in Appendix 6.

Mixedwood Areas

In the short term mixedwood management will be achieved primarily through reforestation strategies that maintain separate deciduous and coniferous strata. The reforestation strategies will involve approaches that stratify the area to be reforested into discrete deciduous and coniferous strata (i.e. splitting cutblocks or reforesting conifers in clusters or strips). This approach enables the application of the deciduous or coniferous standards to the separate strata as applicable.

For the term of this SFMP mixedwood regimes for intimate mixtures of conifer and deciduous will be established on 10% of the harvested mixedwood landbase as operational trials. Over the longer-term a strategic approach will be developed to guide the deployment of reforestation strategies that will establish an appropriate desired future forest condition. Mixedwood forests will be sustained by managing forest type distribution (see section 6.1).

For discrete strata of deciduous or conifer within mixedwood area the respective well growing standards will apply. Well growing standards for intimate mixtures of conifer and deciduous will need to be developed.

For discrete strata of deciduous or conifer the respective stocking standards will apply. Stocking standards for intimate mixtures of conifer and deciduous will require further development. The interim requirements will be based on the FSJPPR and the "Updated Prince George Forest region Mixedwood Standard Operating Procedures" Sec 4.3 dated Mar 9 2001. Documented variations from these procedures can be made to establish operational trials.

LANDSCAPE LEVEL ASSESSMENT OF REFORESTATION SUCCESS

The landscape level reforestation assessment system measures reforestation performance and determines if reforestation obligations are complete. Block level reforestation requirements are replaced with landscape level reforestation requirements.

Description of the Assessment System

The key components of the assessment system are:

- The assessment will measure success with a comparative estimate of predicted yield (volume) to actual yield (volume). See Text Box 1.
- The system will be based on data from individual cutblocks but the data will be assessed over many blocks across the landscape.
- Areas are evaluated at a predetermined age following harvest
- The results are tracked at landscape and cutblock levels.
- Foresters will have flexibility at the cutblock level to vary regimes and provide for other values as they progress to a landscape level target for yield.
- The system will provide data to improve silviculture regimes and targets over time.

Text Box 1

PMV = function (*Species*, *Site Index*, *Effective Age*$_p$, *Harvest Rotation Age*, *MSQ*$_p$)

TV = *a* * PMV

MV = function (*Species*, *Site Index*, *Effective Age*$_m$, *Harvest Rotation Age*, *MSQ*$_m$)

Reforestation obligations will be met when MV meets or exceeds TV.

Where:

PMV	=	Predicted Maximum Volume
TV	=	Target Volume
MV	=	Merchantable Volume
Species	=	Species group (measured)
Site Index	=	Site Index (measured)
Effective Age$_p$	=	Effective Age (Prescribed). Set at 14 years.
Effective Age$_m$	=	Effective Age (measured).
Harvest Rotation Age	=	Estimated Harvest Rotation Age. (100 years)
MSQ$_p$	=	stocking (prescribed)
MSQ$_m$	=	stocking (measured)
a	=	coefficient to estimate the effects of damaging agents, operational constraints and other values

Future volume is predicted using methods developed by J.S. Thrower & Associates, Riverside Forest Products and the Ministry of Forests. The modeling system has been adapted for the Fort St. John Code Pilot. A full report can be found in Appendix 7. The modeling system is designed to predict future stand merchantable volumes at 80, 90 and 100 years after harvest using only key inputs. The following inputs are used in the model:

Site Index:
A site index of 20 was used in the TASS simulations. Adjustment factors were developed for other site index values and are applied when estimating both the target and predicted maximum volumes. Adjustment factors are found in Appendix 6. Site index will be calculated using the growth intercept method if possible, otherwise the site index may be obtained from SIBEC or pre-harvest cruise data. Field site index data is used in the PMV and MV calculation.

Effective Age:

The impacts of variables, such as brush, delayed silviculture treatments, disease, etc. are accounted for by assigning an effective age to the plantation. An effective age is calculated by comparing the actual site tree height to a height-age curve for the appropriate site index. For trees that have diminished height growth the effective age is less than the actual age while those with better than average height growth have effective ages greater than their actual age. The effective age is used for the calculation of MV. In the calculation of PMV the effective age is assumed to be fourteen years based on a two year establishment delay and planting with a one year old tree. Blocks logged over more than one year will be entered into the appropriate assessment year based on the harvest year with the most volume removed from the block. Effective age will be adjusted for area with volume removed from earlier or later years.

Species Group:
The model was developed for pure Pl (>80%), Pl/Sx (21-79%) and pure Sx (>80%) based on stand density at the time of survey. Survey data provides the basis for PMV and MV calculations.

Stocking:
The model assesses stocking based on a Mean Stocked Quadrant (MSQ). PMV is calculated based on the target stocking initially prescribed in the SLP. The target well spaced stocking standards (TSS) for each stratum set the MSQ value to be used. The MV is calculated using field MSQ data.

The above inputs are used to calculate the following predicted and actual yields:

Predicted Maximum Volume (PMV)
The collected survey data is summarized by stratum. Predicted volume (PMV) is calculated based on actual data for site index and species composition and theoretical data for stocking and effective age.

Merchantable volume (MV)
Merchantable volume is calculated using actual field data for site index, species composition, effective age and stocking.

Target Volume

The Predicted Maximum Volume (PMV) is calculated for all blocks 15 years post harvest (15 complete growing seasons following log start date) based on target stocking and an aggressive and timely implementation of current silviculture regimes. This volume is equivalent to PMV in the JS Thrower Report in Appendix 7.

The Target Volume (TV) is set at 95% of the PMV to account for the effects of damaging agents, operational constraints and consideration of other values are not considered. At the time of assessment the calculated volume based on actual field data or the Merchantable Volume (MV) is compared to the TV and a plan for corrective action will be required if results fall below the TV.

The Forest Practices Code Preamble and Section 221.1(3)(b) make requirements to provide “equivalent protection for forest resources”, provide for “adequate management and conservation”, balance various values and conserve diversity. Reliable information on the success of current silviculture practice is not available because landscape level summaries are not in place. This strategy relies primarily on ensuring that current silviculture regimes are employed aggressively over the entire Net area to be Reforested (NAR) during the initial establishment phase to ensure the requirements of Sec. 221.1(1)(3)(6) for “equivalent protection” are met. The strategy then fills an existing information gap by providing a landscape level measure of success. Measurement over the landscape allows flexibility at the block level to address biodiversity requirements and other values as set out in the preamble. Until we begin to fully appreciate the landscape level success of silviculture regimes and the impact of other values the target volume at 95% of PMV remains an estimate.

A number of important differences exist between this strategy and the TSR. The LLRS provides a relative measure of success, however, as the system is employed and data

collected it will provide feedback to the silviculture regimes and guidelines and may eventually be able to provide feedback to the TSR to improve assumptions and yield calculations. The merchantable volume under this system is not to be used for analysis under the Timber Supply Review.

Assessment Survey

The assessment survey has the following objectives:

- Identify areas not meeting well growing requirements.
- Provide basic data required to predict future volume.
- Provide inventory labels.

Defining the Target Population

The target population to sample is the total NAR based on all blocks with log start dates fifteen growing seasons in the past. Fifteen years or growing seasons has been selected, based on current field experience in the Peace, to provide sufficient time for the silviculture regimes to be implemented and for the plantations to reach a stable well growing state. The target population requires further stratification to define sample populations. Stratification occurs both pre- and post-survey. Pre-survey stratification is based on the initial stocking requirements, inventory polygons (species composition, site productivity, stand density) and actual stocking levels. Stocking levels below minimum stocking are stratified separately. Post-survey grouping is done based on inventory labels and initial stocking requirements to group strata across the landscape for future yield calculation. Field stratification procedures can be found in Appendix 5: Survey Design and Field Procedures.

Sample Design and Data Collection

The sample method follows a systematic sampling design. Plot centers are established on a one hundred metre grid based on UTM coordinates. Two types of plots are established. Full Measure Plots at every fourth plot to record site quality measurements and Count Plots at every plot to record stocking. Details can be found in Appendix 5.

The above method follows current accepted survey procedures under MoF guidelines except for the assessment of stocking using quadrants. The method is referred to as Mean Stocked Quadrant (MSQ). The method is simple and cost effective to implement. MSQ compares favourably with other methods in estimating stocking and predicting future volume and a detailed comparative review of stocking estimators can be found in Appendix 4: Stocking Estimators and Future Volume.

Failure to Meet Target

When the population fails to meet the TV corrective action will be as follows:

- Survey data is required to be maintained at the cutblock level and include areas of low stocking or requiring treatment. The data will be reviewed to locate the best candidates for further treatment.
- A report will be prepared detailing the areas selected for treatment, treatment types, expected results relative to the target and timelines for completion. Areas selected for treatment will be considered in view of the expected success and the diligence of the licensee in implementing the original plan (see below).

- For areas requiring brushing treatment a mandatory period of three years for manual methods and two years for chemical treatments will be required before areas can be reassessed.
- Only those areas selected for treatment will remain under Licensee obligation with the remaining areas released from further obligation.
- Once the timelines for the treatments have been met MSQ data will be collected from the treated areas, combined with the original survey data and merged with the original population data to demonstrate achievement of the target. A report will be prepared to document completion.
- Situations may arise in which despite due diligence in prescribing and carrying out the silviculture regimes the licensee has not met the target. Where further treatment options are limited the Regional Manager may waive a requirement for further treatment. When damage to the plantation (fire, disease, frost, etc.) requires replanting the reduction in effective age will lower the future yield. Timely and aggressive silviculture regimes can help to moderate this effect but it is largely out of the control of the licensee. The licensee is not required to direct extraordinary effort into area under management to try to correct this problem.
- The Minister must grant relief from obligation or provide funding if an event causing damage to a plantation or site occurs that will result in significant extra expense to the Licensee in meeting the obligation to establish a free growing stand. The Licensee must not have caused or contributed to the damage unless by officially induced error and must have exercised due diligence in relation to the cause of the damage.

ADAPTIVE MANAGEMENT

This strategy is intended to provide flexibility at the cutblock level to allow the forester to address other values and provide the most cost effective reforestation regimes. Initial establishment activity will target the entire NAR for site preparation and planting activity. In some areas site preparation may be limited by terrain, riparian values and/or impacts to the soil. Following the initial establishment and subsequent surveys the forester can identify areas for brushing and in some blocks further effort to establish crop trees. At this time the forester may make decisions on further reforestation effort and identify areas that may vary from stocking and well growing requirements. These areas must be small enough to avoid impacting the progress to the landscape level target. Further treatment on these areas should be limited for the following reasons. Cost effective treatment options are not available. The areas are important for other values and further treatment would impact those values. The areas support established commercial species not included in the initial SLP. Where flexibility is exercised on the cutblock it will be identified and reviewed at a progress review and finally at the well growing assessment. The feedback from the reviews and the assessment will help to guide further adaptive management to ensure the most effective reforestation regimes, that address sustainability of all resources, are implemented.

PERFORMANCE INDICATORS

Establishment Delay Indicator

See 6.30 for a detailed description of the Establishment Delay Indicator. For the purposes of Section 42 of the FSJPPR this indicator statement, target statement and acceptable variance will be used to determine if forest practices are consistent with the landscape level strategies for coniferous and deciduous areas logged after November 15, 2001.

For Mixedwood areas managed as discrete strata of conifer or deciduous the respective establishment delay indicators will apply. Mixedwood areas managed as intimate mixtures of conifer and deciduous will require the further development of survey and stocking standards to finalize the details of this indicator.

Species Composition Indicator – conifer only

See 6.28 for a detailed description of the Species Composition indicator. This performance indicator does not affect Part 3 Division 5 of the FSJPPR. For the purposes of Section 42 of the FSJPPR this indicator statement, target statement and acceptable variance will be used to determine if forest practices are consistent with the landscape level strategies.

Landscape Level Reforestation Performance Indicator

See 6.29 for a description of the Reforestation Assessment indicator. For the purposes of Section 35(5) of the FSJPPR this indicator statement, target statement and acceptable variance will be used in replacement of the portions of affected Section 32 of the FSJPPR through the application of the landscape level strategy for coniferous areas logged after November 15, 2001. This will also apply to coniferous area in cutblocks with commencement dates before November 15, 2001 if the participant currently carries reforestation liability and has submitted a statement to the district manager that the cutblock(s) will be subject to the SFMP under Section 42 of the FSJPPR.

For the purposes of Section 42 of the FSJPPR this indicator statement, target statement and acceptable variance will be used to determine if forest practices are consistent with the landscape level strategies for coniferous areas.

Further Development

Coniferous

Further development will be necessary to improve the LLRS. A number of areas were identified in the report from JS Thrower contained in Appendix 7. Some of these are included in brief form below:

- Plot intensity is currently set on a 100m grid. Following the first year of sampling the sampling intensity should be reviewed and reductions in sample intensity considered.
- Site index will be collected using the growth intercept method where possible; otherwise it will be related to ecotype. An approach should be developed to improve the estimation of site index from ecotype. The growth intercept method for site index estimation should be examined to determine its applicability to the Peace and reliability over the entire rotation.
- The model only applies to Pl and Sw and uses substitutions for Lt and Bl. The model could be expanded to specifically include Bl and Lt.
- The assessment at age of fifteen years should be reviewed as data is collected to determine its suitability. It may be possible to lower the assessment age or vary the assessment age in different ecosystems.
- A system to assess the survey data and summarize by strata will be required before the final round of sampling can be analyzed.
- As actual data is acquired for this system targets may be set for particular landscape units to recognize specific landscape unit objectives.

Deciduous and Mixedwood

Significant further work will be required to develop landscape level yield assessments in this area. Completion of landscape level yield models is expected to require five to ten years for completion. Interim survey and stocking standards can be adapted from existing information but will require further work.

Stocking Standards

Current stocking standards have not been finalized to the satisfaction of the participants and standards for intimate mixtures of deciduous and conifer are incomplete. In order to begin establishment surveys, the stocking standards will be reviewed and updated by December 2004. Stocking standards may continue to be revised as development of growth and yield models are developed further.

Growth & Yield Models

A landscape level assessment is required to extend the strategy fully into deciduous and mixedwood management. Currently further work is required to determine appropriate growth and yield models. An evaluation of the applicability of Sortie, MGM, and TASS as well as recommended applications of these models will be completed this year. This will likely need to be followed up with further development of one or more models to ensure they can support a landscape level assessment system for deciduous and mixedwood.

Survey Methods

The deciduous and mixedwood plantations have features and demands that vary significantly from conifer stands. The current survey procedures are based on survey methods designed for pure conifer plantations. Further work is needed to test different plot and sample size combinations across a range of stand ages.

Spruce Understorey Retention

Currently the participants do not expect a significant area of spruce understorey to manage. Further work will be required, however, to establish procedures for operating in and managing spruce understorey. Procedures have been established for operations in Fort Nelson and these could act as interim procedures.

Landscape Level Assessment

Once the growth and yield models have been evaluated and improved further work is required to develop a comparative yield assessment system for the deciduous and mixedwood management.

Landscape Level Ledger System

The management of both natural deciduous regeneration and artificial conifer regeneration will present opportunities to exchange areas. A system will be required to track those exchanges to ensure the distribution of forest type groups are maintained. Ideally a volume ledger system based on the landscape level yield assessments would be developed. In the short term an area based system would suffice. The need for this system should be reviewed annually based on schedules for further harvest and current management of reforestable area.

5. SFM PERFORMANCE REQUIREMENTS

The participants used the 6 Canadian Council of Forest Ministers SFM Criteria and 17 CSA SFM Elements from the Canadian Standards Association Sustainable Forest Management Standard CAN/CSA-Z809-02 and input from a Public Advisory Group to set values, objectives, indicators, and targets in the development of the SFMP.

The criteria and elements are:

Criteria	**Critical Element**
Conservation of biological diversity	• Ecosystem diversity • Species diversity • Genetic diversity • Protected areas and sites of special biological significance
Maintenance and enhancement of forest ecosystem condition and productivity	• Ecosystem resilience • Ecosystem productivity
Conservation of soil and water resources	• Soil quality and quantity • Water quality and quantity
Forest ecosystem contributions to global ecological cycles	• Carbon uptake and storage • Forest land conversion
Multiple benefits to society	• Timber and Non-Timber Benefits • Communities and Sustainability • Fair Distribution of Benefits and Costs
Accepting society's responsibility for sustainable development	• Aboriginal and Treaty Rights • Respect for Aboriginal Forest Values, Knowledge, and Uses • Public Participation • Information for Decision-Making

These criteria, their SFM elements and the values, objectives, indicators, and targets developed by the Public Advisory Group form the basis of the following sections, and are summarized in the Sustainable Forest Management Matrix (Appendix 2).

Part of the CSA SFM Standard is to produce an annual report, which reports on progress, performance and appropriateness of each of the indicators and objectives developed for the DFA.

6. VALUES, OBJECTIVES, INDICATORS AND TARGETS

Values & Objectives - What is locally important and what is desirable?

The first step in developing the SFMP is to identify what is locally important and describe what is desirable. This involves reviewing SFM standards and comparing them to the local area so that *values* that are considered locally important are identified. Once values are identified, one or more *objectives* are then developed to describe the future state or condition of each of the values. Objectives are usually broad, general statements that are qualitative as opposed to quantitative. To develop this SFMP, local values and objectives were derived from reviewing SFM Standards, LRMP's and input from the PAG and STAC.

Objective: a broad statement describing a desired future state or condition for a value.

Indicators & Targets - How do we know we have been successful?

A method of knowing when we are successful has often been a missing link within past and contemporary forest management plans. Strategic objectives are well defined throughout BC, but forest managers are often challenged with implementing on-the-ground practices and knowing whether or not the overall strategic objectives have been met. To overcome this uncertainty, SFMP's establish one or more performance measures *(indicators)* for each objective. One or more *targets* are then identified for each indicator. This is a fundamental difference between SFMP's and other strategic plans that exist throughout the Province. Indicators and targets are also a core part of the Performance Management system as a whole. A detailed description of each indicator and target are provided as demonstrated in the example below.

Indicator: a variable that measures the state or condition of an objective for which one or more targets is set.

Target: a specific statement describing a desired future state or condition of an indicator. Targets are succinct, measurable, achievable, realistic, and time bound.

X INDICATOR

Indicator Statement	Target Statement
A reiteration of the indicator as identified in the landscape level strategy or the SFM matrix .	A specific statement describing a desired future state or condition of an indicator. Targets are succinct, measurable, achievable, realistic, and time bound.
SFM Objective: A description the SFM objectives that this indicator and target relate to.	
Linkage to FSJPPR: If applicable, a brief statement regarding whether this indicator affects performance requirements of the FSJPPR, or if it will be used to evaluate success of the implementation of the landscape level strategy.	

Acceptable Variance:

This provides the acceptable variance from the desired level of the Indicator.

What is this indicator and why is it important?

A description of the indicator.

Current Status:

The information provided under this heading summarizes the current state (if known) and objective levels of the quantifiable indicator. This information will usually be summarized in table format by Landscape Unit and BEC variant, or whatever scale at which the objective is to be met. Where current and quantitative information is available for the indicator, that information will be presented here.

Forecasting Assumptions and Analytical Methods:

CSA specifies that: a) quantitative and long-term projections of expected future indicator levels have been prepared; b) that the assumptions and analytic methods used in forecasting have been specified; and c) the public participation process was used to select the preferred forecast.

Where possible and when they exist, this section provides a summary of the forecasting assumptions and analytical methods used to project a variety of possible future forest conditions that could result from present forest management activities.

Strategy and Implementation Schedule:

A description of the chosen strategy, including all significant actions to be undertaken and their associated implementation schedule.

Monitoring Procedure:

The information provided under this heading summarizes the sources of monitoring information, timing and frequency of monitoring to ensure that the Participants meet the targets.

Linkages to Operational Plans:

A demonstration of the links between short-term operational plans and the SFMP.

Linkages to LRMP:

A description the LRMP objectives that relate to this indicator and target.

Classifying indicators is important because it helps us understand the variable we are attempting to measure and the data that is produced. Indicators can be divided into three groups: *context, process,* and *response indicators* (Duinker 2000):

1. **Context Indicators** – These indicators measure the output of a system where the outcome cannot be controlled at the local level. An example is measuring climate variables such as temperature or precipitation. These indicators provide useful data to help us understand the context in which we operate, but provide little value within our SFMP because the outcome is not directly linked to our actions.
2. **Process Indicators** – These indicators measure the output of an agreed upon practice or process. An example is measuring the number of seedlings planted in a given year or season. These indicators are usually very effective because it is relatively easy to establish targets and measure and record data. However, they are based on an assumption that the practice or process is correct in the first place. Further investigation and validation of the assumptions used can help mitigate these uncertainties and facilitate continuous improvement.
3. **Response Indicators** – These indicators measure the output of a system as a direct response to actions applied. An example is the change in site index of a managed stand as various silviculture or harvesting practices are applied. These indicators are very useful but are often difficult to measure, or the results are difficult to interpret. The lack of knowledge

of biological systems and / or the expense of providing meaningful results can be preventative in the short term. Gathering more knowledge about biological systems, coupled with technological improvements will aid in the development of these types of indicators.

4. To be effective, an SFMP should contain both process and response indicators. Once all SFM objectives are covered by one or more of these types of indicators, the addition of context indicators will provide enhanced value.

All indicators do not "weigh-in" equally. Some will be stronger in some areas while others are weaker. Therefore, any one indicator by itself is "weak", however, it is the package, or suite of indicators that provides the strength to measure performance towards sustainable forest management.

6.1. FOREST TYPES

Indicator Statement	Target Statement
Percent distribution of forest type (deciduous, deciduous mixedwood, conifer mixedwood, conifer) >20 years old by landscape unit	100% of forest type groups by landscape unit will be within the target range
SFM Objective: The diversity and pattern of communities and ecosystems within a natural range Ecosystem functions capable of supporting naturally occurring species exist within the range of natural variability	
Linkage to FSJPPR: For the purposes of Section 42 of the FSJPPR this indictor statement, target statement and acceptable variance will be used to determine if forest practices are consistent with the landscape level strategies.	

Acceptable Variance:

There is no acceptable variance for this indicator.

Targets may need to be reviewed following large natural catastrophic events.

What is this indicator and why is it important?

Forest type groups are the designation of stand types into one of 4 ecologically significant groups – pure deciduous, deciduous leading mixedwood, conifer leading mixedwood, and pure conifer. The classification is based on the British Columbia Land Classification System (BCLCS). For the purposes of this indicator the BCLCS code treed broadleaf (TB) is deciduous, treed mixed (TM) is mixedwood and treed conifer (TC) is conifer. Treed mixed is further delineated into either deciduous mixedwood or conifer mixedwood based on the leading species.

This indicator monitors the change in the proportion of forest type groups (> 20 years old) within each variant over time. Stands less than 20 years of age are not included because it is expected that 0 - 20 year-old stands will show significant fluctuations in tree species composition each year due to silviculture practices and rapid natural ingress of species in regenerating stands.

This indicator is important because forest operations, through harvesting and reforestation, have a dramatic influence over the composition of forest types across forested landscapes. This influence increases with the duration and intensity of management of regenerating

stands. Since forest operations have a significant influence over the distribution of stand composition groups, it is important to monitor changes over time as harvest and reforestation activities are applied.

Leading black spruce (Picea mariana) and larch (Larix spp.) stands are not included in the conifer forest type class. Black spruce and larch stands are not targeted for timber harvesting. There are over 1,145,000 ha of these type of stands within the DFA. To include them in the conifer forest type would overly weight the conifer forest type away from the other species such as white spruce (Picea glauca) and pine (Pinus contorta) which are targeted by the forest industry and make this indicator less sensitive to our actions.

Current Status:

The following table (Table 10) indicates the current status, FDP status and baseline targets for each forest type by landscape unit. Targets are established initially at plus or minus 20% of the current status and then adjusted to provide a range for groups that have either very low occurrences or where plus 20% would exceed 100%.

Table 10: Current, FDP Status and Baseline Target for Forest Types

Landscape Unit	Forest Type	Current Status		FDP Status		Baseline Target Range	
		ha	%	ha	%	Min	Max
Blueberry	Deciduous	140,289	37.1%	127,642	36.1%	30%	45%
	Deciduous Mixedwood	32,500	8.6%	30,582	8.6%	7%	10%
	Conifer Mixedwood	50,669	13.4%	48,969	13.8%	11%	16%
	Conifer	154,320	40.8%	146,757	41.5%	33%	49%
Blueberry Total		377,778	100.0%	353,951	100.0%		
Crying Girl	Deciduous	646	1.1%	646	1.1%	0.5%	2%
	Deciduous Mixedwood	706	1.2%	706	1.2%	0.5%	2%
	Conifer Mixedwood	1,205	2.0%	1,205	2.1%	1%	3%
	Conifer	58,390	95.8%	54,544	95.5%	93%	98%
Crying Girl Total		60,947	100.0%	57,101	100.0%		
Graham	Deciduous	3,061	1.4%	3,061	1.4%	0.5%	2%
	Deciduous Mixedwood	1,724	0.8%	1,721	0.8%	0.5%	2%
	Conifer Mixedwood	3,866	1.8%	3,854	1.8%	1%	3%
	Conifer	205,996	96.0%	205,410	96.0%	93%	98%
Graham Total		214,647	100.0%	214,046	100.0%		
Halfway	Deciduous	14,845	11.5%	14,523	11.5%	9%	14%
	Deciduous Mixedwood	5,399	4.2%	5,333	4.2%	3%	5%
	Conifer Mixedwood	8,936	6.9%	8,801	7.0%	6%	8%
	Conifer	100,239	77.5%	97,391	77.3%	73%	82%
Halfway Total		129,419	100.0%	126,048	100.0%		
Kahntah	Deciduous	64,727	40.1%	64,689	40.8%	32%	48%
	Deciduous Mixedwood	21,274	13.2%	21,153	13.3%	11%	16%
	Conifer Mixedwood	25,395	15.7%	24,673	15.6%	13%	19%
	Conifer	49,940	31.0%	48,004	30.3%	25%	37%
Kahntah Total		161,335	100.0%	158,519	100.0%		
Kobes	Deciduous	34,392	37.0%	32,031	36.3%	30%	44%
	Deciduous Mixedwood	8,578	9.2%	8,097	9.2%	7%	11%

Landscape Unit	Forest Type	Current Status		FDP Status		Baseline Target Range	
		ha	%	ha	%	Min	Max
	Conifer Mixedwood	13,560	14.6%	12,993	14.7%	12%	18%
	Conifer	36,442	39.2%	35,227	39.9%	31%	47%
Kobes Total		92,971	100.0%	88,349	100.0%		
Lower Beatton	Deciduous	58,825	68.6%	55,326	68.0%	55%	82%
	Deciduous Mixedwood	5,372	6.3%	5,053	6.2%	5%	8%
	Conifer Mixedwood	7,624	8.9%	7,353	9.0%	7%	11%
	Conifer	13,976	16.3%	13,631	16.8%	13%	20%
Lower Beatton Total		85,797	100.0%	81,364	100.0%		
Milligan	Deciduous	28,677	26.1%	27,737	25.7%	21%	31%
	Deciduous Mixedwood	22,493	20.4%	21,993	20.4%	16%	25%
	Conifer Mixedwood	25,259	23.0%	24,902	23.1%	18%	28%
	Conifer	33,570	30.5%	33,141	30.8%	24%	37%
Milligan Total		109,999	100.0%	107,773	100.0%		
Sikanni	Deciduous	4,608	3.3%	4,608	3.3%	2%	4%
	Deciduous Mixedwood	2,662	1.9%	2,662	1.9%	1.5%	3%
	Conifer Mixedwood	4,746	3.4%	4,746	3.4%	2%	4%
	Conifer	129,392	91.5%	129,392	91.5%	89%	95%
Sikanni Total		141,408	100.0%	141,408	100.0%		
Tommy Lakes	Deciduous	64,676	24.0%	63,150	24.6%	19%	29%
	Deciduous Mixedwood	19,517	7.2%	18,844	7.3%	6%	9%
	Conifer Mixedwood	31,864	11.8%	30,664	11.9%	9%	14%
	Conifer	153,325	56.9%	144,470	56.2%	46%	68%
Tommy Lakes Total		269,383	100.0%	257,129	100.0%		
Trutch	Deciduous	45,003	23.0%	44,949	23.1%	18%	28%
	Deciduous Mixedwood	10,628	5.4%	10,602	5.4%	4%	7%
	Conifer Mixedwood	18,072	9.2%	17,963	9.2%	7%	11%
	Conifer	122,373	62.4%	121,180	62.2%	50%	75%
Trutch Total		196,076	100.0%	194,694	100.0%		
Grand Total		1,839,761	100.0%	1,780,381	100.0%		

Forecasting Assumptions and Analytical Methods:

- Does forecasting apply (y/n)? Yes

The FDP is incorporated into the forest inventory and stands that are proposed to be harvested are removed from this calculation. This provides an assessment of which type of stands are being harvested and how this is effecting the distribution of the remaining stands and if the forest type distribution is moving away from the baseline targets. This provides direction on what reforestation strategies should be to maintain the percent distribution by landscape unit over time.

The timber supply review divides the landbase into various analysis units based upon species composition and site index. Specific regeneration assumptions are then modeled over time which approximate a similar species composition being reestablished on each site.

Strategy and Implementation Schedule:

Prior to harvest starting each participant must declare to the district manager if the participant proposes to reforest a cutblock as a coniferous area, a deciduous area or a mixedwood area.

It is not the intention to necessarily regenerate an area back to the same species composition as was harvested, however over the landscape and over time the forest type groups will be maintained within the baseline target range for each forest type group.

Long-term monitoring of species composition change within managed stands will occur through Change Monitoring Inventory (CMI) plots established over the DFA. These plots are systematically established across the DFA based on a 3-km grid in stands 15 years after harvesting. These plots will provide a representative sample of all managed stands over time. The first set of 30 plots is being established in 2003. Once the initial backlog of approximately 70 samples is established for stands that have been harvested greater than 15 years ago there will be an additional 3 to 4 samples established each year.

Monitoring Procedure:

Data sources include vegetation resource inventory (VRI), landscape unit maps, and GENUS data.

VRI information is updated either by the Provincial Government or by Forest Licencees under contract with the Government. These data sources are usually only updated/replaced in five to 10 year intervals. The GENUS system is a "real-time, or live" database that is maintained and updated by the participant's staff as they carry out their daily activities.

Reports will be generated at two scales. The first report is a tabular report of the percent of stand composition groups within each landscape unit. The second report is a single number that identifies the consistency between the actual status in any given year compared to the 44 baseline targets, expressed as a percent. The calculation is described below:

- Report 1 calculation: Forest cover is projected to the current date by overlaying GENUS information. Each stand area is assigned a forest type group then summed for each LU and expressed as a percent of the productive forested area of the LU. Only stands above 20 years of age will be monitored and reported in this calculation.
- Report 2 calculation: Number of stand composition groups meeting the baseline targets / the total number of baselines (44), expressed as a percent.

To monitor this indicator, the reports will be run at each SFMP and compared to the overall target.

The CMI plots will be re-measured on an approximately 10 year cycle and will allow comparisons of species composition among other things over time.

Linkages to Operational Plans:

The data will be used at the Forest Development level to guide future harvest planning and will be used by the silviculture staff to review long term trends in reforestation policies and to adjust practices where necessary.

Linkages to LRMP:

This indicator helps to support the following LRMP objectives by ensuring that the forest type groups are maintained over time across the DFA.

- Maintain functioning and healthy ecosystems,
- Enhance timber harvesting and a sustainable long-term supply,
- Maintain timber harvesting and forest management opportunities,
- Manage for forest health.

6.2. SERAL STAGES

Indicator Statement	Target Statement
The minimum proportion (%) of late seral forest by NDU by LU	The minimum proportion (%) of late seral forest by NDU by LU as identified in Table 12, Table 13, and Table 14 will be met within the identified timelines
SFM Objective: The diversity and pattern of communities and ecosystems within a natural range A natural range of variability in ecosystem function, composition and structure which allows ecosystems to recover from disturbance and stress Ecosystem functions capable of supporting naturally occurring species that exist within the range of natural variability	
Linkage to FSJPPR: For the purposes of Section 42 of the FSJPPR this indictor statement, target statement and acceptable variance will be used to determine if forest practices are consistent with the landscape level strategies.	

Acceptable Variance:

Harvesting can continue in late seral stands if at least 50% of the target is met and the time to reach the full target is not delayed by more than 10 years.

Where large natural disturbances occur within Landscape Units with a Low or Intermediate Forest Management Intensity the minimum proportion of late seral may decline to the lower limit of the natural range of variation to relieve salvage pressures and allow young natural forests to persist on the landscape.

A variance of up to 50 ha in each NDU/LU combination is acceptable to allow access location or small inclusions within larger blocks.

What is this indicator and why is it important:

Forests occurring in different seral and structural stages over space and time are recognized as an important part of the landscape that provides distinct habitat elements for a variety of species. Late seral is defined as greater than 120 years for deciduous leading stands and greater than 140 years old for coniferous leading stands. Natural Disturbance Units of the Prince George Forest Region: Guidance for Sustainable Forest Management (DeLong 2002) has estimated the natural range of variation for different Natural Disturbance Units within the DFA.

Deciduous stands are typically a short lived early seral species and if left undisturbed for long periods of time (>150 years) will eventually convert to coniferous stands or die and cycle back to a similar species composition. Therefore it would be inappropriate to manage for the same distribution of ages for deciduous as for conifer species.

Deciduous stands greater than 120 years old are structurally distinct from young and mature stands (Stelfox 1995). These stands provide lower density stands and hence larger diameter trees, higher level of coarse woody debris and are therefore important to maintain some occurrence on the landscape over time. DeLong (personal communication) recommends that 10 to 15% of deciduous dominated landscapes be maintained in stands greater than 120 years old. As deciduous makes up approximately 37% of the land base, targets are applied to both deciduous and coniferous in the Boreal Plains. Deciduous makes up only 3% (1.5% of the 3% is THLB) of the remainder of the TSA and as a result only one late seral target is applied to the entire forested land base in the Boreal Foothills, Omineca and Northern Boreal Mountains NDU's.

There is no separate target for mixedwood stands in the Boreal Plains NDU. Approximately one third (33%) of the productive forested land base of mixedwood stands is within the non-harvesting land base. This provides some assurance that there will be a significant amount of unmanaged mixedwood stands that are captured within the deciduous and conifer leading stands that are managed to meet overall NDU/LU late seral targets.

Targets have been applied to each NDU landscape unit combination. In high forest management intensity LU's the low end of the natural range of variation (NRoV) as described by DeLong (2002) is set as the minimum target for conifer and 10% for deciduous. For moderate and low forest management intensities the mean and high end of the natural range of variation is used for conifer, and 15% and 20% for deciduous respectively.

Current Status, Forecasting Assumptions and Analytical Methods:

The following Table 12, Table 13, and Table 14 show the current and post Forest Development Plan (FDP) status of seral distribution for the NDU/LU combinations for the DFA. The seral distributions reported are based on productive forest area contributing to meeting the seral targets. Non-productive or non-commercial forested areas identified as type id 5 and 6 in the forest inventory file do not contribute to meeting seral targets.

Targets have been applied to each NDU/LU combination and used as a constraint in a timber supply analysis conducted in support of the SFMP. Full targets were applied immediately in the simulation. If the target proportion of area in a late seral condition was not met, no harvesting of late seral occurred. Harvesting of mature stands could continue as long as enough mature was available to meet the late seral target as soon as possible. The forest estate model used in the analysis (Forest Service Simulator FSSIM ver. 3.0) employs a one-decade look ahead function, which will allow some harvesting in the late seral even though the target is not met if it will be met in the next decade. Current harvest levels and seral targets were forecasted and achieved for 400 years into the future. The first 250 years are shown strategy and implementation section.

Some levels of natural disturbances continue to occur over time across the land base. To ensure that we account for disturbance in the non-harvested land base, and the proper contribution of the non-harvesting land base over time to the late seral targets, disturbance was also modeled in the non-harvesting land base. The rate of disturbance was determined by analyzing the amount of fire disturbance since the advent of fire suppression (1960) for each NDU (See Table 11). An average rate of disturbance per year was calculated (%/year)

and applied in the simulation. The following disturbance rates were used in each NDU assuming a total disturbance of 1,100 ha per year for the whole DFA:

Table 11: Natural Disturbance Rates Since Fire Supression

Natural Disturbance Units	Rate of disturbance (% area/year)
Boreal Plains – Upland	0.1%
Boreal Plains – Alluvial	0.05%
Boreal Foothills – Valley	0.1%
Boreal Foothills – Mountain	0.1%
Northern Boreal Mountains	0.08%
Omineca – Valley	0.1%
Omineca – Mountain	0.03%

On the deciduous land base, to account for deterioration of merchantability of older stands, volume recovered from stands between 120 and 150 years old was set to zero depending on inventory type group.

The Boreal Plains Upland Deciduous LU's Milligan and Kahntah, Boreal Plains Upland Conifer LU Lower Beatton, Boreal Plains Alluvial Conifer LU Tommy Lakes and the Northern Boreal Mountains LU Graham are all below the acceptable variance of meeting 50% of the target. No additional harvesting will be proposed in areas above the late seral target age until at least 50% of the target is met.

See the following charts for results of the forecasting of seral stages over time for each NDU/LU combination.

Table 12: Boreal Plains Deciduous Current and FDP Seral Stage and Targets

			Seral Age Group																				
			<40				40-100				101-120				>120						>120 Target	Years to meet Target	Total Area
NDU	NDU Subunit	Landscape Unit	Current Status		FDP Status		Current Status		FDP Status		Current Status		FDP Status		Current Status			FDP Status					
			Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%	Surplus / (Deficit)	Area (ha)	%	Surplus / (Deficit)			
Boreal Plains	Alluvial	Kahntah	8	0.3%	9	0.26%	2,579	79.1%	2,579	79.06%	276	8.5%	276	8.46%	399	12.2%	(91)	399	12.2%	(91)	15%	30	3,262
		Tommy Lakes	215	3.2%	215	3.21%	4,519	67.3%	4,010	59.68%	564	8.4%	1,074	15.98%	1,419	21.1%	747	1,419	21.1%	747	10%	0	6,718
		Trutch	105	1.7%	105	1.74%	4,177	69.1%	3,647	60.31%	320	5.3%	850	14.05%	1,445	23.9%	538	1,445	23.9%	538	15%	0	6,047
	Alluvial Total		329	2.1%	329	2.05%	11,275	70.4%	10,235	63.86%	1,160	7.2%	2,200	13.72%	3,263	20.4%		3,263	20.4%				16,027
	Upland	Blueberry	20,319	11.2%	28,166	15.49%	112,897	62.1%	107,970	59.39%	33,878	18.6%	18,605	10.23%	14,700	8.1%	(3,480)	27,053	14.9%	8,873	10%	0	181,793
		Halfway	2,329	11.0%	2,391	11.29%	10,545	49.8%	10,245	48.37%	4,158	19.6%	3,667	17.31%	4,149	19.6%	2,031	4,878	23.0%	2,760	10%	0	21,181
		Kahntah	1,430	1.7%	1,378	1.65%	67,182	80.3%	67,234	80.40%	8,971	10.7%	8,971	10.73%	6,043	7.2%	(6,501)	6,042	7.2%	(6,502)	15%	50	83,626
		Kobes	3,174	7.1%	5,869	13.08%	13,297	29.6%	11,047	24.62%	16,977	37.8%	11,836	26.38%	11,419	25.5%	6,933	16,115	35.9%	11,628	10%	0	44,867
		Lower Beatton	5,408	8.3%	8,329	12.74%	44,824	68.5%	43,157	65.99%	8,900	13.6%	8,020	12.26%	6,268	9.6%	(3,542)	5,893	9.0%	(3,916)	15%	40	65,399
		Milligan	1,039	2.0%	2,367	4.59%	46,168	89.5%	45,687	88.59%	1,446	2.8%	902	1.75%	2,921	5.7%	(4,815)	2,618	5.1%	(5,118)	15%	90	51,574
		Tommy Lakes	2,690	3.4%	4,417	5.63%	57,290	73.0%	54,057	68.86%	12,148	15.5%	11,091	14.13%	6,374	8.1%	(1,476)	8,937	11.4%	1,086	10%	0	78,502
		Trutch	161	0.3%	176	0.36%	43,790	88.7%	32,398	65.60%	234	0.5%	11,610	23.51%	5,204	10.5%	(2,205)	5,205	10.5%	(2,203)	15%	40	49,390
	Upland Total		36,550	6.3%	53,093	9.21%	395,992	68.7%	371,796	64.51%	86,713	15.0%	74,703	12.96%	57,077	9.9%		76,741	13.3%				576,332
Boreal Plains Total			36,879	6.2%	53,422	9.02%	407,268	68.8%	382,031	64.49%	87,873	14.8%	76,902	12.98%	60,340	10.2%		80,004	13.5%				592,360

Table 13: Boreal Plains Conifer Current and FDP Seral Stage and Targets

			Seral Age Group																				
			<40				40-120				121-140				>140						>140 Target	Years to meet Target	Total Area
NDU	NDU Subunit	Landscape Unit	Current Status		FDP Status		Current Status		FDP Status		Current Status		FDP Status		Current Status			FDP Status					
			Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%	Surplus / (Deficit)	Area (ha)	%	Surplus / (Deficit)			
Boreal Plains	Alluvial	Kahntah	747	21.6%	839	24.2%	672	19.4%	672	19.4%	471	13.6%	471	13.6%	1,570	45.4%	(177)	1,478	42.7%	(269)	50.5%	30	3,460
		Tommy Lakes	708	11.0%	726	11.2%	1,880	29.1%	1,862	28.8%	2,924	45.2%	2,537	39.2%	953	14.7%	(1,892)	1,340	20.7%	(1,505)	44.0%	40	6,465
		Trutch	621	11.8%	621	11.8%	1,912	36.2%	1,912	36.2%	2,075	39.3%	1,319	25.0%	668	12.7%	(1,996)	1,424	27.0%	(1,240)	50.5%	40	5,275
	Alluvial Total		2,076	13.7%	2,185	14.4%	4,463	29.4%	4,446	29.2%	5,470	36.0%	4,327	28.5%	3,190	21.0%		4,242	27.9%				15,200
	Upland	Blueberry	69,618	23.0%	63,952	21.1%	166,768	55.1%	154,452	51.0%	40,567	13.4%	55,341	18.3%	25,775	8.5%	(25,689)	28,983	9.6%	(22,481)	17.0%	20	302,729
		Halfway	14,039	11.7%	14,576	12.1%	46,510	38.6%	44,759	37.2%	25,677	21.3%	22,178	18.4%	34,250	28.4%	13,769	38,963	32.3%	18,482	17.0%	0	120,476
		Kahntah	30,278	21.1%	31,730	22.1%	58,401	40.8%	58,400	40.8%	20,647	14.4%	20,520	14.3%	33,980	23.7%	(1,846)	32,656	22.8%	(3,171)	25.0%	20	143,306
		Kobes	9,306	13.1%	10,399	14.6%	27,189	38.3%	17,758	25.0%	13,470	19.0%	20,665	29.1%	21,070	29.7%	8,994	22,212	31.3%	10,136	17.0%	0	71,034
		Lower Beatton	4,017	13.9%	4,486	15.5%	18,240	63.0%	16,418	56.7%	5,754	19.9%	7,053	24.4%	938	3.2%	(6,300)	993	3.4%	(6,244)	25.0%	40	28,950
		Milligan	23,241	21.9%	24,002	22.6%	58,879	55.5%	58,776	55.4%	10,402	9.8%	9,612	9.1%	13,531	12.8%	(12,982)	13,663	12.9%	(12,850)	25.0%	40	106,053
		Tommy Lakes	32,191	10.4%	34,352	11.1%	181,129	58.6%	169,223	54.7%	60,015	19.4%	58,059	18.8%	35,980	11.6%	(16,603)	47,682	15.4%	(4,901)	17.0%	30	309,315
		Trutch	6,629	3.4%	7,339	3.7%	86,550	43.8%	86,677	43.9%	88,817	45.0%	74,447	37.7%	15,472	7.8%	(33,895)	29,003	14.7%	(20,364)	25.0%	40	197,467
	Upland Total		189,319	14.8%	190,836	14.9%	643,665	50.3%	606,463	47.4%	265,349	20.7%	267,875	20.9%	180,997	14.1%		214,156	16.7%				1,279,329
Boreal Plains Total			191,395	14.8%	193,021	14.9%	648,129	50.1%	610,908	47.2%	270,819	20.9%	272,202	21.0%	184,187	14.2%		218,398	16.9%				1,294,529

Table 14: Boreal Foothills, Northern Boreal Mountains and Omineca Current and FDP Seral Stage and Targets

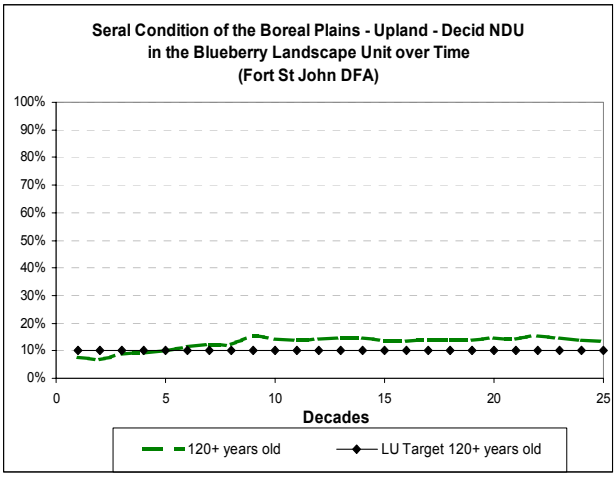
NDU	NDU Subunit	Landscape Unit	Seral Age Group																					
			<40				40-120				121-140				>140						>140 Target	Years to meet Target	Total Area
			Current Status		FDP Status		Current Status		FDP Status		Current Status		FDP Status		Current Status			FDP Status					
			Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%	Surplus / (Deficit)	Area (ha)	%	Surplus / (Deficit)			
Boreal Foothills	Mountain	Crying Girl	2,110	4.9%	2,947	6.8%	17,634	40.8%	15,731	36.4%	8,355	19.4%	8,705	20.2%	15,075	34.9%	(2,626)	15,791	36.6%	(1,911)	41.0%	30	43,175
		Graham	1,076	1.1%	1,315	1.3%	42,797	43.2%	39,980	40.4%	15,608	15.8%	17,914	18.1%	39,523	39.9%	(8,989)	39,795	40.2%	(8,717)	49.0%	30	99,004
		Halfway	26	0.2%	18	0.1%	4,227	35.6%	3,943	33.2%	3,089	26.0%	2,689	22.7%	4,527	38.1%	610	5,219	44.0%	1,303	33.0%	0	11,869
	Mountain Total		3,212	2.1%	4,280	2.8%	64,658	42.0%	59,654	38.7%	27,052	17.6%	29,309	19.0%	59,125	38.4%		60,805	39.5%				154,048
	Valley	Crying Girl	1,762	9.3%	2,331	12.3%	8,804	46.6%	8,190	43.3%	3,396	18.0%	3,716	19.7%	4,947	26.2%	(1,009)	4,673	24.7%	(1,284)	31.5%	30	18,910
		Graham	215	1.5%	455	3.2%	8,759	62.5%	7,586	54.1%	2,196	15.7%	2,678	19.1%	2,851	20.3%	(2,757)	3,302	23.6%	(2,306)	40.0%	50	14,021
		Halfway	0	0.0%	0	0.0%	549	35.7%	515	33.5%	505	32.8%	415	27.0%	484	31.5%	130	608	39.5%	254	23.0%	0	1,538
	Valley Total		1,978	5.7%	2,786	8.1%	18,112	52.5%	16,291	47.3%	6,098	17.7%	6,810	19.8%	8,282	24.0%		8,583	24.9%				34,470
Boreal Foothills Total			5,190	2.8%	7,066	3.7%	82,770	43.9%	75,945	40.3%	33,150	17.6%	36,118	19.2%	67,407	35.8%		69,388	36.8%				188,517
Northern Boreal Mountains		Graham	1,458	14.4%	1,444	14.2%	4,108	40.5%	4,082	40.2%	1,895	18.7%	1,923	18.9%	2,688	26.5%	(3,401)	2,698	26.6%	(3,390)	60.0%	60	10,148
		Sikanni	4,118	4.2%	4,118	4.2%	26,447	26.9%	26,447	26.9%	21,460	21.8%	8,748	8.9%	46,431	47.2%	(12,642)	59,143	60.1%	70	60.0%	0	98,455
	Total		5,575	5.1%	5,562	5.1%	30,555	28.1%	30,529	28.1%	23,355	21.5%	10,671	9.8%	49,118	45.2%		61,841	56.9%				108,603
Northern Boreal Mountains Total			5,575	5.1%	5,562	5.1%	30,555	28.1%	30,529	28.1%	23,355	21.5%	10,671	9.8%	49,118	45.2%		61,841	56.9%				108,603
Omineca	Mountain	Graham	237	0.3%	233	0.3%	19,707	22.5%	18,814	21.5%	9,807	11.2%	8,770	10.0%	57,851	66.0%	(2,594)	59,785	68.2%	(660)	69.0%	20	87,602
	Mountain Total		237	0.3%	233	0.3%	19,707	22.5%	18,814	21.5%	9,807	11.2%	8,770	10.0%	57,851	66.0%		59,785	68.2%				87,602
	Valley	Graham	50	0.6%	50	0.6%	4,925	56.7%	4,636	53.4%	1,581	18.2%	1,718	19.8%	2,123	24.5%	(1,349)	2,276	26.2%	(1,196)	40.0%	40	8,680
	Valley Total		50	0.6%	50	0.6%	4,925	56.7%	4,636	53.4%	1,581	18.2%	1,718	19.8%	2,123	24.5%		2,276	26.2%				8,680
Omineca Total			287	0.3%	283	0.3%	24,633	25.6%	23,450	24.4%	11,388	11.8%	10,488	10.9%	59,974	62.3%		62,061	64.5%				96,282
Grand Total			11,052	2.8%	12,911	3.3%	137,957	35.1%	129,924	33.0%	67,893	17.3%	57,277	14.6%	176,500	44.9%		193,290	49.1%				393,402

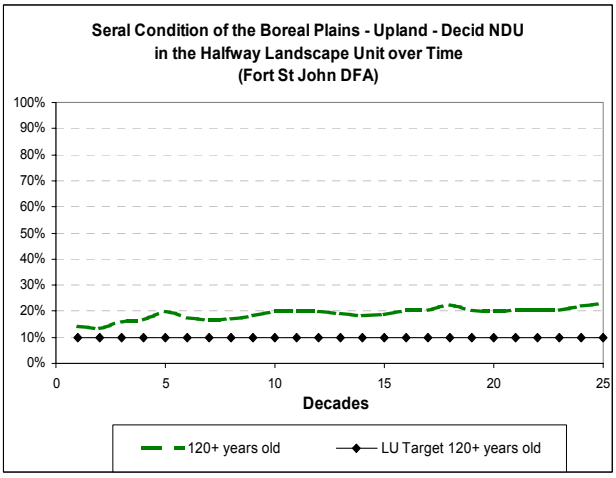
Strategy and Implementation Schedule:

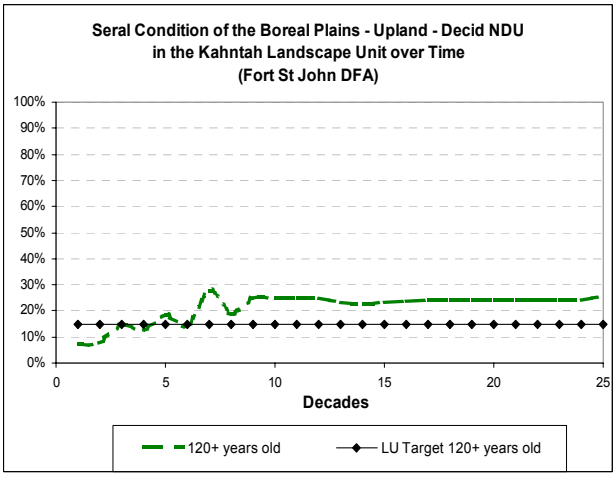
Seral targets as described earlier are based on ranges appropriate to a very large natural disturbance unit. In the Ft St John DFA they are being applied at a smaller landscape unit level to ensure there is some spatial distribution of seral stages and the important habitat features that they provide. As a result of this the targets are not always met initially in each NDU/LU combination.

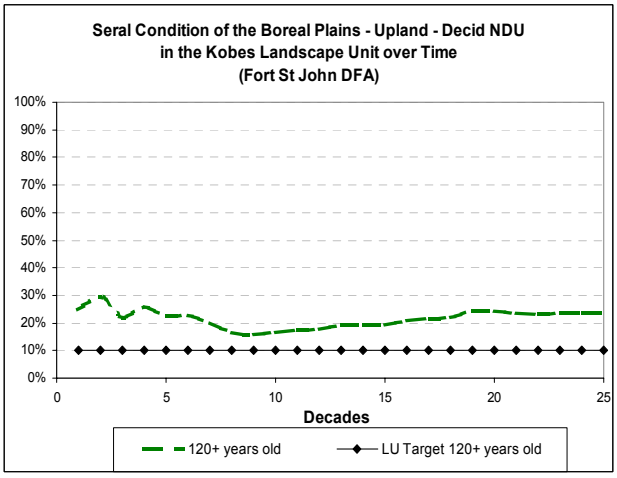
If sufficient amounts of late seral are not available then harvesting may only continue if the proposed harvesting of late seral does not lower the post FDP or FOS status to less than 50% of the late seral target. The proposed harvesting will not impact the forecasted timeline to achieve the target. Harvesting of "mature" seral stages will be planned so as not to compromise recruitment of late seral stages. After replacement stands develop into late seral stages (from mature), then stands that were deferred are available for harvest.

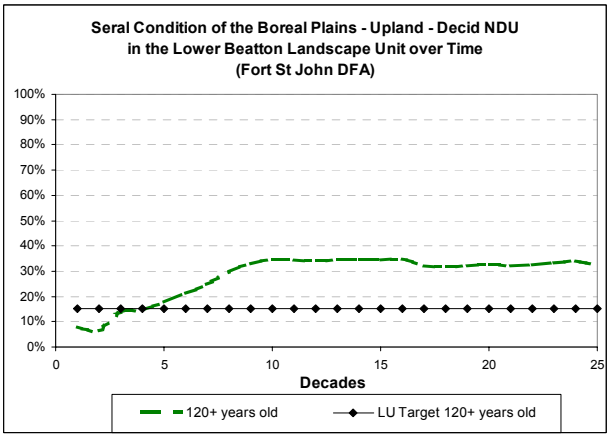
The following graphs indicate the change in status of the seral stage in relation to the target and the natural range of variation. The natural range of variation is not indicated for the deciduous targets as this has not been defined and the target is based upon expert opinion.

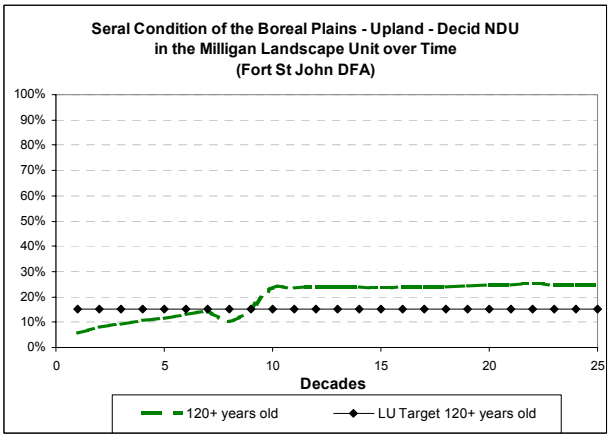


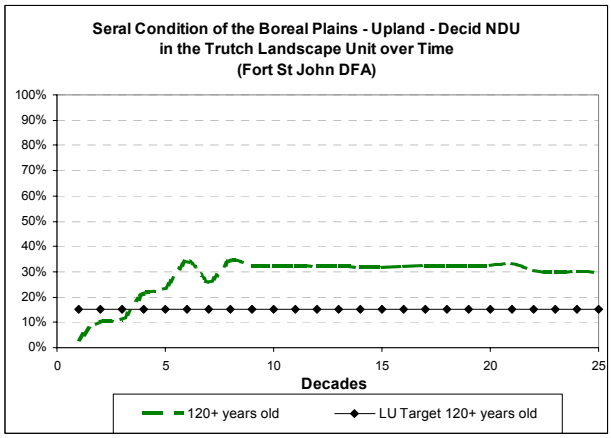


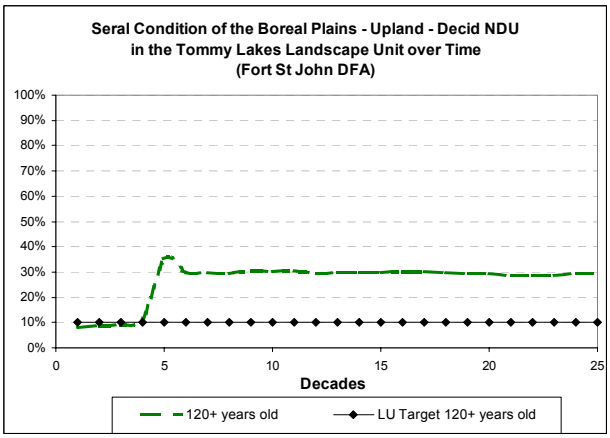


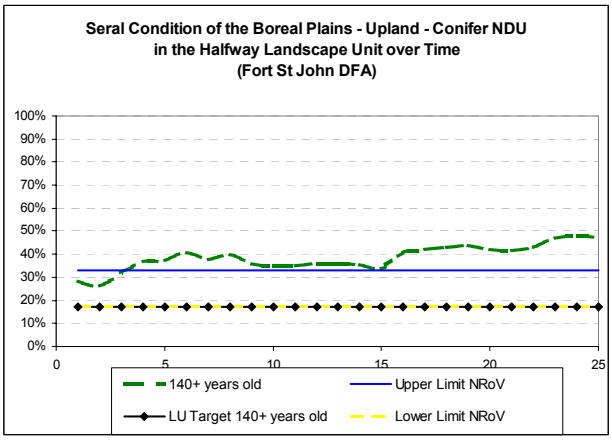


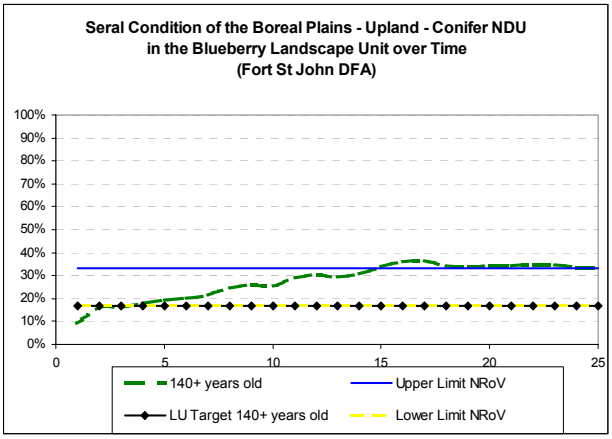

Seral Condition of the Boreal Plains - Upland - Decid NDU
in the Lower Beatton Landscape Unit over Time
(Fort St John DFA)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0
5
10
15
20
25
Decades
120+ years old
LU Target 120+ years old

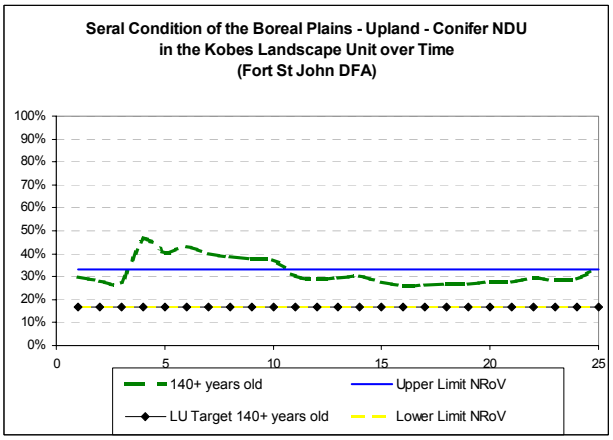

Seral Condition of the Boreal Plains - Upland - Decid NDU
in the Milligan Landscape Unit over Time
(Fort St John DFA)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0
5
10
15
20
25
Decades
120+ years old
LU Target 120+ years old

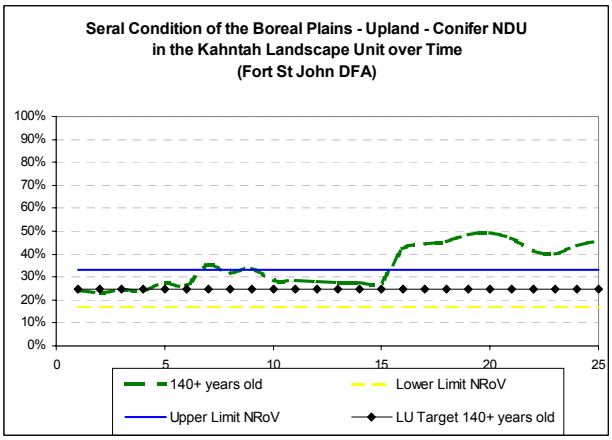

Seral Condition of the Boreal Plains - Upland - Decid NDU
in the Trutch Landscape Unit over Time
(Fort St John DFA)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0
5
10
15
20
25
Decades
120+ years old
LU Target 120+ years old

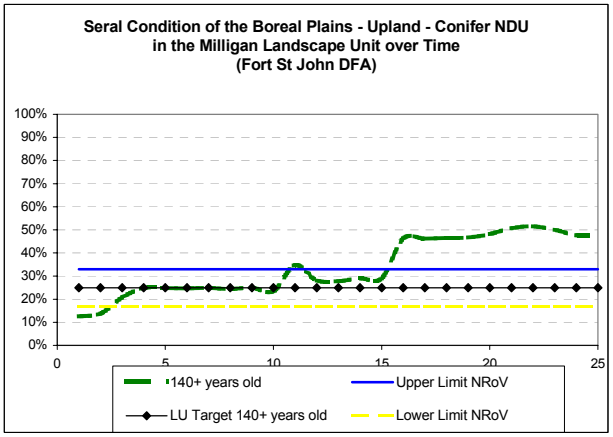

Seral Condition of the Boreal Plains - Upland - Decid NDU
in the Tommy Lakes Landscape Unit over Time
(Fort St John DFA)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0
5
10
15
20
25
Decades
120+ years old
LU Target 120+ years old

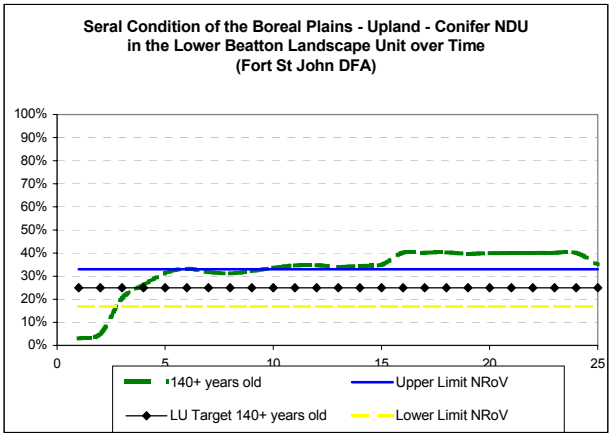

Seral Condition of the Boreal Plains - Upland - Conifer NDU
in the Halfway Landscape Unit over Time
(Fort St John DFA)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0
5
10
15
20
25
140+ years old
Upper Limit NRoV
LU Target 140+ years old
Lower Limit NRoV

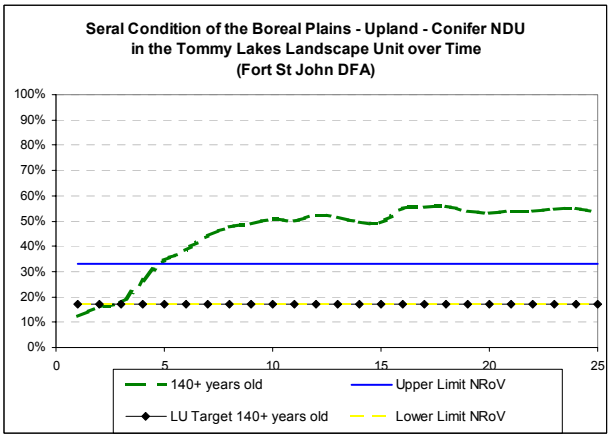

Seral Condition of the Boreal Plains - Upland - Conifer NDU
in the Blueberry Landscape Unit over Time
(Fort St John DFA)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0
5
10
15
20
25
140+ years old
Upper Limit NRoV
LU Target 140+ years old
Lower Limit NRoV

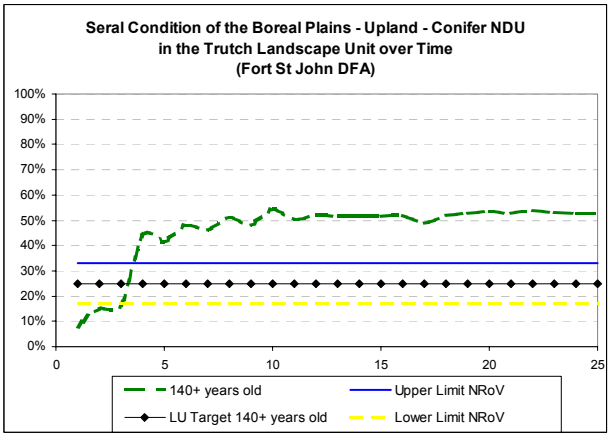

Seral Condition of the Boreal Plains - Upland - Conifer NDU
in the Kobes Landscape Unit over Time
(Fort St John DFA)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0
5
10
15
20
25
140+ years old
Upper Limit NRoV
LU Target 140+ years old
Lower Limit NRoV

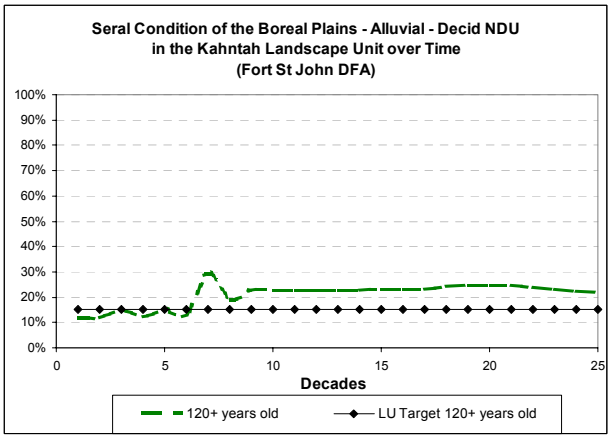

Seral Condition of the Boreal Plains - Upland - Conifer NDU
in the Kahntah Landscape Unit over Time
(Fort St John DFA)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0
5
10
15
20
25
140+ years old
Lower Limit NRoV
Upper Limit NRoV
LU Target 140+ years old

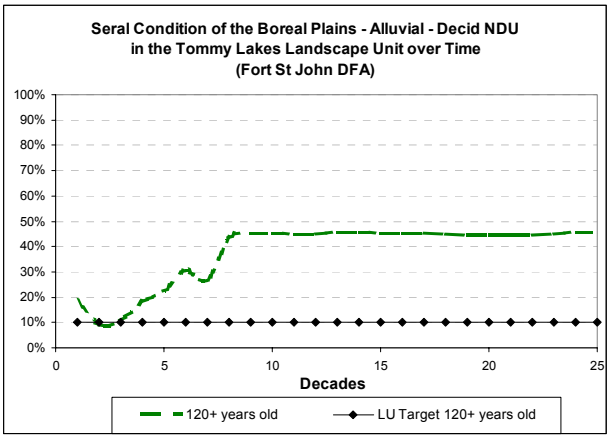

Seral Condition of the Boreal Plains - Upland - Conifer NDU
in the Milligan Landscape Unit over Time
(Fort St John DFA)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0
5
10
15
20
25
140+ years old
Upper Limit NRoV
LU Target 140+ years old
Lower Limit NRoV

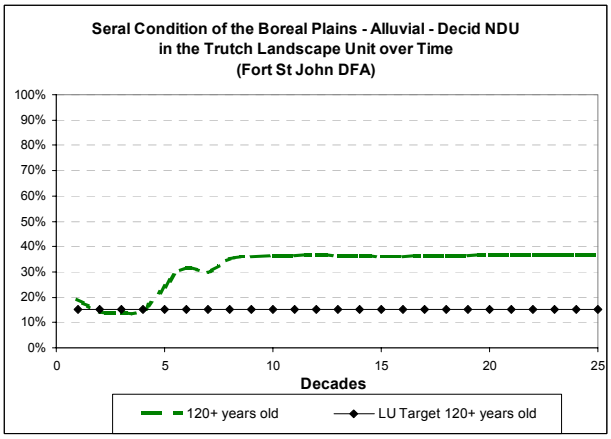

Seral Condition of the Boreal Plains - Upland - Conifer NDU
in the Lower Beatton Landscape Unit over Time
(Fort St John DFA)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0
5
10
15
20
25
140+ years old
Upper Limit NRoV
LU Target 140+ years old
Lower Limit NRoV

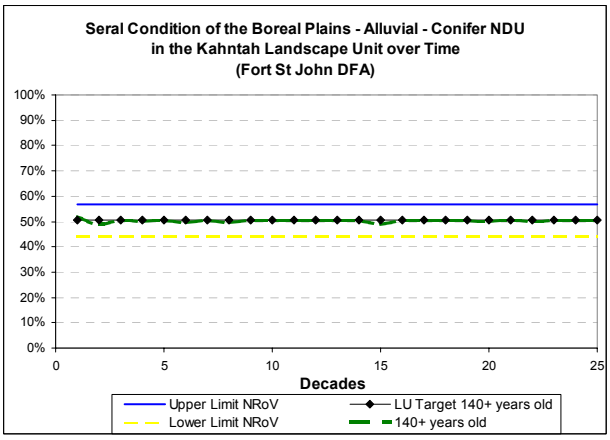

Seral Condition of the Boreal Plains - Upland - Conifer NDU
in the Tommy Lakes Landscape Unit over Time
(Fort St John DFA)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0
5
10
15
20
25
140+ years old
Upper Limit NRoV
LU Target 140+ years old
Lower Limit NRoV

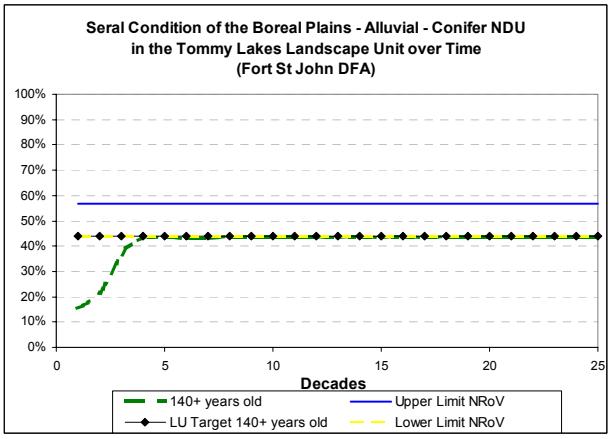

Seral Condition of the Boreal Plains - Upland - Conifer NDU
in the Trutch Landscape Unit over Time
(Fort St John DFA)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0
5
10
15
20
25
140+ years old
Upper Limit NRoV
LU Target 140+ years old
Lower Limit NRoV

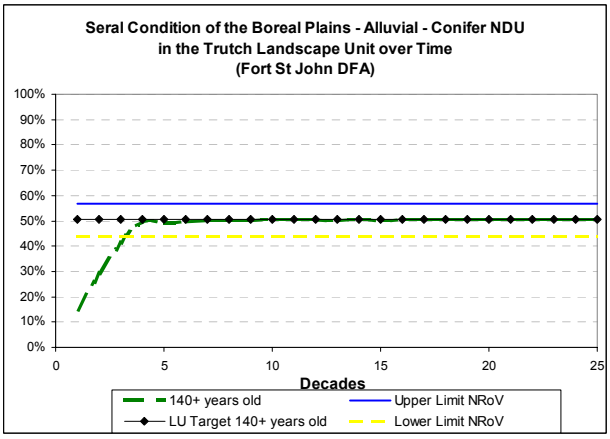

Seral Condition of the Boreal Plains - Alluvial - Decid NDU
in the Kahntah Landscape Unit over Time
(Fort St John DFA)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0
5
10
15
20
25
Decades
120+ years old
LU Target 120+ years old

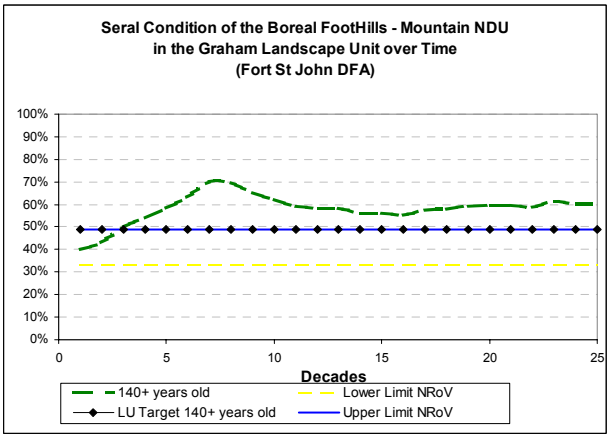

Seral Condition of the Boreal Plains - Alluvial - Decid NDU
in the Tommy Lakes Landscape Unit over Time
(Fort St John DFA)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0
5
10
15
20
25
Decades
120+ years old
LU Target 120+ years old

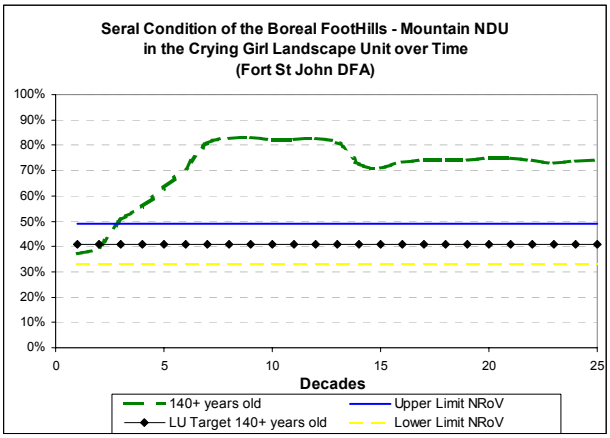

Seral Condition of the Boreal Plains - Alluvial - Decid NDU
in the Trutch Landscape Unit over Time
(Fort St John DFA)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0
5
10
15
20
25
Decades
120+ years old
LU Target 120+ years old

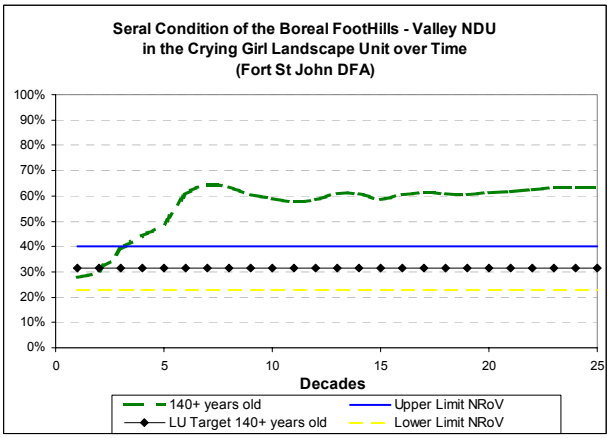

Seral Condition of the Boreal Plains - Alluvial - Conifer NDU
in the Kahntah Landscape Unit over Time
(Fort St John DFA)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0
5
10
15
20
25
Decades
Upper Limit NRoV
LU Target 140+ years old
Lower Limit NRoV
140+ years old

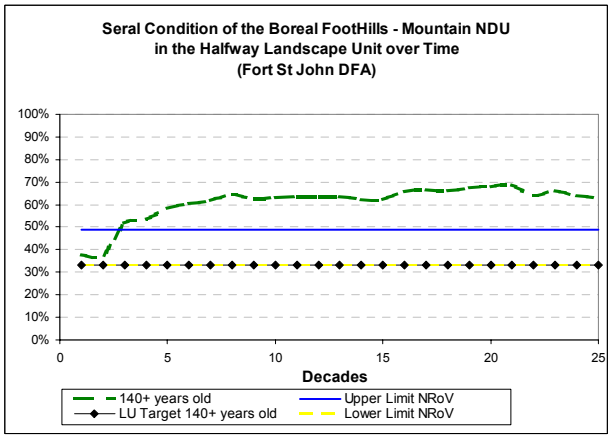

Seral Condition of the Boreal Plains - Alluvial - Conifer NDU
in the Tommy Lakes Landscape Unit over Time
(Fort St John DFA)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0
5
10
15
20
25
Decades
140+ years old
Upper Limit NRoV
LU Target 140+ years old
Lower Limit NRoV

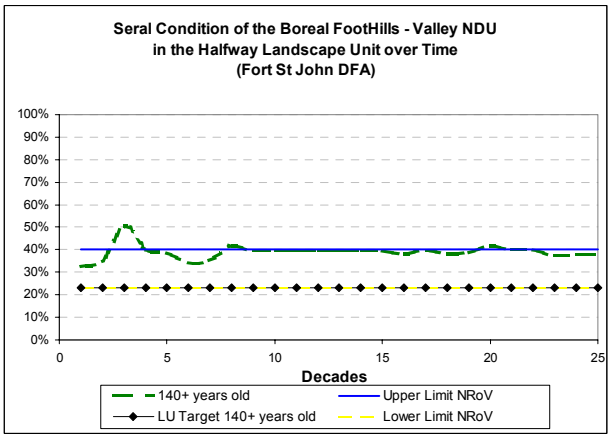

Seral Condition of the Boreal Plains - Alluvial - Conifer NDU
in the Trutch Landscape Unit over Time
(Fort St John DFA)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0
5
10
15
20
25
Decades
140+ years old
Upper Limit NRoV
LU Target 140+ years old
Lower Limit NRoV

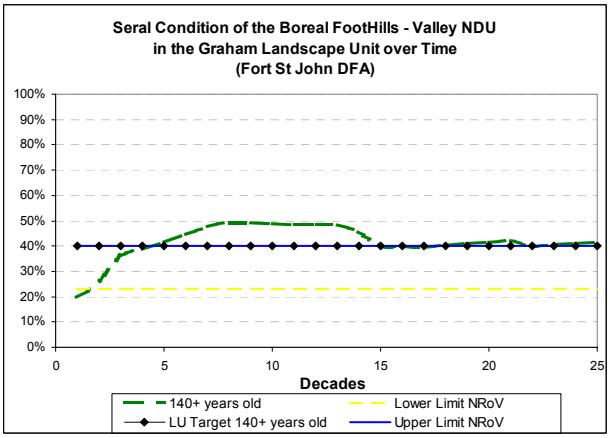

Seral Condition of the Boreal FootHills - Mountain NDU
in the Graham Landscape Unit over Time
(Fort St John DFA)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0
5
10
15
20
25
Decades
140+ years old
Lower Limit NRoV
LU Target 140+ years old
Upper Limit NRoV

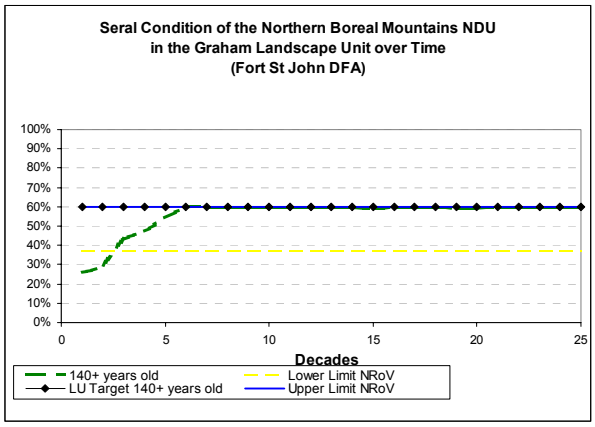

Seral Condition of the Boreal FootHills - Mountain NDU
in the Crying Girl Landscape Unit over Time
(Fort St John DFA)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0
5
10
15
20
25
Decades
140+ years old
Upper Limit NRoV
LU Target 140+ years old
Lower Limit NRoV

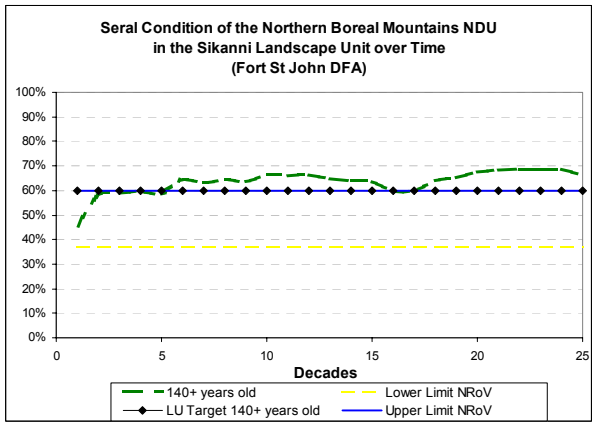

Seral Condition of the Boreal FootHills - Valley NDU
in the Crying Girl Landscape Unit over Time
(Fort St John DFA)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0
5
10
15
20
25
Decades
140+ years old
Upper Limit NRoV
LU Target 140+ years old
Lower Limit NRoV

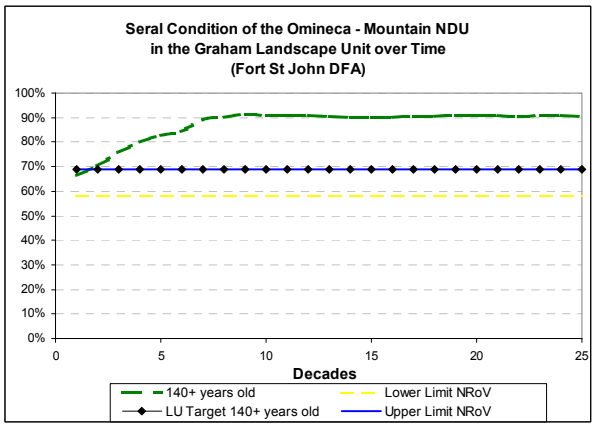

Seral Condition of the Boreal FootHills - Mountain NDU
in the Halfway Landscape Unit over Time
(Fort St John DFA)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0
5
10
15
20
25
Decades
140+ years old
Upper Limit NRoV
LU Target 140+ years old
Lower Limit NRoV

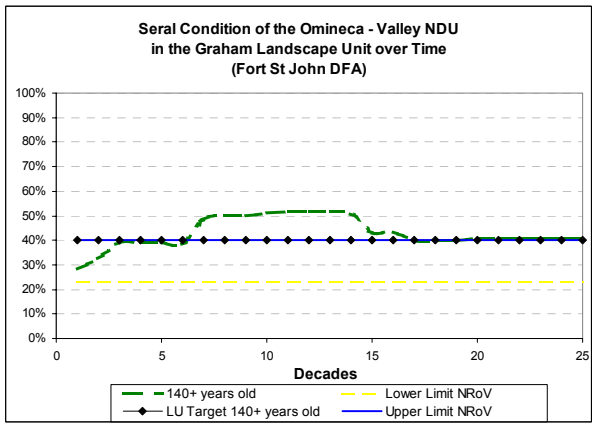

Seral Condition of the Boreal FootHills - Valley NDU
in the Halfway Landscape Unit over Time
(Fort St John DFA)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0
5
10
15
20
25
Decades
140+ years old
Upper Limit NRoV
LU Target 140+ years old
Lower Limit NRoV


Seral Condition of the Boreal FootHills - Valley NDU
in the Graham Landscape Unit over Time
(Fort St John DFA)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0
5
10
15
20
25
Decades
140+ years old
Lower Limit NRoV
LU Target 140+ years old
Upper Limit NRoV









In landscape units where harvesting is proposed and the seral targets are not met, the required recruitment areas to meet the seral targets will be spatially identified in the FOS or FDP. These areas will be set aside as either a rotating or semi-permanent reserve to achieve seral targets and to help support patch size targets.

The Boreal Plains Upland, Boreal Foothills and Omineca Valley NDU's have disturbance cycles <150 years and late seral forest will be managed with a system of rotating reserves. DeLong (2002) recommends that large patches of mature forest (>100 ha) equaling at least 50%of the old target for the landscape unit will be spatially identified. This will be completed for NDU/LU's where a minimum of 50% of the old target is not met by the next FOS/FDP, the remaining NDU/LU's will be completed by the FOS/FDP after that. A reserve may be scheduled for harvest when a reserve area of relatively equal size is identified that can take it's place. The intent is to always have some large reserves of forest that are old but not so old (>150 years for deciduous and >180 years for conifer) as to be unnatural and highly susceptible to stand replacement insect or disease outbreaks. Because not all late seral and mature patches > 100 ha may exist, forest greater than 100 years old may be included in the system of reserves to allow recruitment of late seral over time.

The Boreal Plains Alluvial, Northern Boreal Mountains, and Omineca Mountain NDU's have disturbance cycles between 180 and 300 years. Prior to proposing harvesting in the Northern Boreal Mountains (See section 6.21) the participants will implement a strategy of irregularly dispersed large permanent and semi-permanent reserves.

The following parks or protected areas currently contain significant amounts of area within these NDU's:

- Graham-Laurier Park (99,904 ha) is within the Omineca Mountain and Valley NDU.
- Redfern-Keily Park (80,771 ha) is within the Northern Boreal Mountains NDU.
- Sikanni Old Growth Park (1,439 ha), Ekwan Lake Protected Area (1,892 ha), Sikanni Chief Canyon Protected Area (4,641 ha) are within the Boreal Plains Alluvial NDU's.

The Graham River IRM Plan has identified semi permanent no harvest areas (those areas between the clusters) in the Omineca and Boreal Foothills NDU's. See Sections 6.18, 6.19 and 6.20.

Replacement of the semi-permanent reserves will be necessary over time but not on a continual basis as in the rotating reserve strategy.

The Boreal Plains Alluvial versus Upland NDU is not a spatially mapped unit. As an interim surrogate to differentiate between these areas, the Sikanni-Fontas Valley RMZ was used to approximate the Boreal Plains Alluvial NDU. This unit will require more accurate delineation prior to the next SFMP.

Monitoring Procedure:

Data sources for this include forest cover, GENUS data, Natural Disturbance Unit boundaries, landscape units boundaries and DFA boundaries.

All partners in the FSJRBCPP are using GENUS to track their operational data. Forest cover will be updated with harvesting data from GENUS as required to complete seral stage analysis. Disturbances due to fires and other industrial users are generally updated less frequently (approximately 5 year intervals) and are the responsibility of the Provincial Government.

There are two steps that are required to be completed for reporting this indicator. The calculations are described below:

- The first step will be to update and project the forest cover for all disturbances to the current reporting period based on GENUS data. Each stand is assigned to either the deciduous or coniferous group based on the leading species and a seral stage based on the age of the leading species for the rank 1 layer. The area of each stand is then summed for by NDU/LU and expressed as a percentage of the productive forested area within the NDU/LU.
- The second step is to include all proposed harvesting, project ages to the end of the proposed development period and calculate the seral distribution as described above. The monitoring of this indicator will occur coincident with the development of a FDP or Forest Operations Schedule (FOS).

Linkages to Operational Plans

FDP's or FOS's will be analyzed to ensure they are consistent with the targets and implementation schedule for seral stage prior to publication. Proposed development will be adjusted if necessary to ensure consistency with targets or recruitment strategies.

Linkages to LRMP:

This seral stage indicator helps to support the following LRMP objectives by maintaining late seral forested land base proportions consistent with the natural range of variation:

- Maintain functioning and healthy ecosystems
- Maintain Guide Outfitting opportunities
- Maintain Caribou habitat
- Maintain habitat for priority furbearing species
- Protect or enhance habitats for red and blue listed species

6.3. PATCH SIZE

Indicator Statement	Target Statement
Percent area by Patch Size Class (0-50, 51-100, and >100 ha) by Landscape Unit	A minimum of 19 of 33 (58%) of the baseline targets for early patches will be achieved during the term of this SFMP (Table 15) A minimum of 10 of 11 (91%) of the baseline targets for mature patches will be achieved during the term of this SFMP (Table 16)
SFM Objective: The diversity and pattern of communities and ecosystem's within a natural range Ecosystem functions capable of supporting naturally occurring species that exist within the range of natural variability	
Linkage to FSJPPR: For the purposes of Section 42 of the FSJPPR this indictor statement, target statement and acceptable variance will be used to determine if forest practices are consistent with the landscape level strategies.	

Acceptable Variances:

Natural disturbance events that shift the patch size distribution to such a level that it cannot be accommodated in a short (decade) time frame

Seral spatial distribution does not permit patch size targets in the short term.

Patch size distributions will need to be recalculated as new forest inventory is completed and targets and thresholds assessed to determine if they are still appropriate.

What is this indicator and why is it important?

A patch is defined as a stand of similar-aged forest resulting from either a natural disturbance or created by timber harvesting. A patch may be composed of either a single disturbance event or an aggregate of events (natural, timber harvesting, or a combination of both). In forested landscapes patches represent a legacy or history of disturbances and as such may have a variety of species, stocking and ages contained within one patch. Forest patches are created naturally by disturbances such as fire, wind or pest outbreaks. In the absence of these natural disturbances forest management, through harvesting, affects the distribution and size ranges of forest patches. Over a rotation or more of the forest, harvesting can then lead to either inflating or fragmenting the landscape beyond the limits of the natural variability of the landscape, which has developed over centuries from natural disturbances. It is therefore important to establish target ranges for the size of patches that

are consistent with the natural pattern of forested landscapes. This indicator will monitor the consistency of our harvesting patterns compared to the natural pattern of our landscapes.

With forest management it is then important to manage not only what is created through early patches but also what is left as mature forest patches. As such both early and mature patches are monitored over time. Mature patches are reported in two ways (Table 16), the distribution of each patch class by LU and the relative proportion of each class that is in an interior forest condition.

The distribution of early and mature patches is monitored based on Natural Disturbance Units (NDU's) divided by landscape units (LU). Natural disturbance units are the first stratification level as they represent areas with similar disturbance patterns, and they are expected to have similar landscape level size distributions of young and mature patch sizes. The NDU's are based on natural disturbance regime research by Craig Delong, Regional Ecologist, BC Ministry of Forests, Prince George Forest Region (DeLong 2002). The landscape units have been defined for the Ft St John TSA and are roughly consistent with the Resource Management Zones (RMZ) defined in the Ft St John LRMP

Targets are applied separately for early and mature patches. At this time targets are not applied to the proportion in interior forest condition, as baseline data is not available to determine an appropriate target. The range for each patch size class is applied for early patches and only the lower end of the range is applied for mature patches greater than 100 ha. The targets are established in this way as the distribution of early patches determines the future distribution while the most important aspect of mature patches is to maintain larger intact mature forest over time. In some landscapes where harvesting activity has been low the current condition is weighted towards the larger patch condition and the minimum threshold approach does not penalize this condition.

Current Status:

There are 11 Landscape Units and 3 classes per unit for a total of 33 targets for early patches. Targets are applied by LU to only the greater than 100 ha class for mature patches for a total of 11 targets. There are a total of 19 (58%) for both the current and the FDP condition out of the 33 LU patch classes that meets the baseline targets for early patches (Table 15). Some combinations of patch size class and LU improved to fall within the range and others moved out of the range, however the net difference between the current and FDP condition was zero. A total of 9 (82%) and 10 (91%) out of 11 for the current and FDP condition respectively meet the baseline targets for mature patches (Table 16).

The post FDP condition of early patches is likely slightly weighted to larger patches as blocks are typically depicted larger in development plans than can be laid out in the field. After detailed assessments and logging opportunity determined, boundaries are established in the field and stand level retention areas defined, the total area actually harvested is most often less than that applied for in the FDP.

Table 15: Early Patch Size Class Current and Post FDP Status

NDU	LU	Patch Class	Early Patches				Targets (Acceptable Range)
			Current 2002 (ha)	%	Post FDP 2006 (ha)	%	
Boreal Plains	Blueberry High	0-50	12,804	11.8%	10,601	10.1%	5(5-10)
		51-100	9,101	8.4%	9,512	9.1%	5(5-10)
		100+	86,352	79.8%	84,459	80.8%	90(65-90)
	Blueberry Total		108,257	100.0%	104,573	100.0%	
	Halfway High	0-50	2,209	10.3%	1,965	9.0%	5(5-10)
		51-100	3,300	15.4%	3,410	15.7%	5(5-10)
		100+	15,903	74.3%	16,377	75.3%	90(65-90)
	Halfway Total		21,413	100.0%	21,752	100.0%	
	Kahntah Moderate	0-50	3,194	10.0%	3,571	10.6%	5(5-25)
		51-100	2,539	7.9%	2,821	8.4%	5(5-10)
		100+	26,206	82.1%	27,207	81.0%	90(55-90)
	Kahntah Total		31,939	100.0%	33,599	100.0%	
	Kobes High	0-50	2,544	17.3%	2,721	14.7%	5(5-10)
		51-100	3,243	22.1%	3,405	18.4%	5(5-10)
		100+	8,893	60.6%	12,341	66.8%	90(65-90)
	Kobes Total		14,679	100.0%	18,466	100.0%	
	Lower Beatton Moderate	0-50	5,489	23.8%	4,807	19.5%	5(5-25)
		51-100	2,779	12.0%	3,297	13.3%	5(5-10)
		100+	14,832	64.2%	16,611	67.2%	90(65-90)
	Lower Beatton Total		23,100	100.0%	24,716	100.0%	
	Milligan Moderate	0-50	1,688	6.3%	1,664	5.9%	5(5-25)
		51-100	1,006	3.8%	1,134	4.0%	5(5-10)
		100+	24,029	89.9%	25,350	90.1%	90(65-90)
	Milligan Total		26,723	100.0%	28,148	100.0%	
	Tommy Lakes High	0-50	4,570	11.8%	6,022	14.3%	5(5-20)
		51-100	4,470	11.6%	5,426	12.9%	5(5-10)
		100+	29,545	76.6%	30,694	72.8%	90(65-90)
	Tommy Lakes Total		38,585	100.0%	42,142	100.0%	
	Trutch Moderate	0-50	851	11.8%	1,264	15.9%	5(5-20)
		51-100	820	11.4%	1,333	16.8%	5(5-10)
		100+	5,549	76.9%	5,355	67.3%	90(65-90)
	Trutch Total		7,221	100.0%	7,952	100.0%	
		0-50	33,349	12.3%	32,615	11.6%	
		51-100	27,258	10.0%	30,338	10.8%	
		100+	211,309	77.7%	218,394	77.6%	
Boreal Plains Total			**271,916**	**100.0%**	**281,347**	**100.0%**	
Northern Boreal Mtns	Sikanni Low	0-50	121	4.1%	121	4.1%	5(5-15)
		51-100	58	2.0%	58	2.0%	5(5-10)
		100+	2,765	93.9%	2,765	93.9%	90(65-90)
	Sikanni Total		2,945	100.0%		100.0%	
Northern Boreal Mtns Total			**2,945**	**100.0%**	**2,945**	**100.0%**	
Boreal Foothills	Crying Girl Moderate	0-50	627	15.3%	556	10.1%	20(15-25)
		51-100	283	6.9%	237	4.3%	10(5-15)
		100+	3,176	77.7%	4,700	85.6%	70(55-85)
	Crying Girl Total		4,087	100.0%	5,493		
	Graham High	0-50	930	30.2%	899	25.6%	20(15-25)
		51-100	224	7.3%	590	16.8%	10(5-15)
		100+	1,924	62.5%	2,029	57.7%	70(55-85)
	Graham Total		3,078	100.0%	3,519	100.0%	
		0-50	1,557	21.7%	1,455	16.1%	
		51-100	507	7.1%	827	9.2%	
		100+	5,100	71.2%		74.7%	
Boreal Foothills Total			**7,165**	**100.0%**	**9,011**	**100.0%**	

Table 16: Mature Patch Size Class Current and Post FDP Status

NDU	LU	Patch Class	Current 2002			Post FDP 2006			Target Min % Distribution >100 ha
			Ha	% Distribution	%Interior Forest	Ha	% Distribution	% Interior Forest	
Boreal Plains	Blueberry High	0-50	21,506	24.1%	37%	24,672	19.6%	33%	
		51-100	10,584	11.9%	60%	10,568	8.4%	51%	
		100+	57,043	64.0%	95%	90,439	72.0%	90%	>65%
	Blueberry Total		89,133	100.0%	64%		100.0%	63%	
	Halfway High	0-50	6,730	6.8%	32%	6,826	6.6%	30%	
		51-100	2,452	2.5%	39%	2,054	2.0%	40%	
		100+	90,347	90.8%	91%	94,588	91.4%	90%	>65%
	Halfway Total		99,528	100.0%	78%	103,467		76%	
	Kahntah Moderate	0-50	20,125	27.7%	47%	20,420	28.7%	47%	
		51-100	9,102	12.5%	68%	8,698	12.2%	67%	
		100+	43,545	59.8%	95%	42,094	59.1%	95%	>55%
	Kahntah Total		72,772	100.0%	71%	71,212		70%	
	Kobes High	0-50	4,785	9.8%	32%	4,575	7.3%	29%	
		51-100	1,957	4.0%	47%	1,633	2.6%	42%	
		100+	41,884	86.1%	92%	56,196	90.1%	84%	>65%
	Kobes Total		48,625	100.0%	72%	62,404	100.0%	71%	
	Lower Beatton Moderate	0-50	6,762	35.1%	32%	7,932	37.2%	31%	
		51-100	2,260	11.7%	52%	2,539	11.9%	52%	
		100+	10,240	53.2%	81%	10,832	50.8%	78%	>65%
	Lower Beatton Total		19,262	100.0%	51%	21,303	100.0%	48%	
	Milligan Moderate	0-50	4,756	17.2%	40%	4,877	18.3%	38%	
		51-100	1,994	7.2%	47%	1,970	7.4%	45%	
		100+	20,831	75.5%	94%	19,776	74.3%	93%	>65%
	Milligan Total			100.0%	75%	26,623	100.0%	75%	
	Tommy Lakes High	0-50	20,607	18.0%	43%	21,056	16.5%	41%	
		51-100	7,487	6.5%	61%	7,793	6.1%	53%	
		100+	86,490	75.5%	96%	98,482	77.3%	93%	>65%
	Tommy Lakes Total		114,584	100.0%		127,331	100.0%	74%	
	Trutch Moderate	0-50	10,364	8.4%	46%	10,498	8.6%	46%	
		51-100	6,179	5.0%	66%	6,179	5.0%	63%	
		100+	106,676	86.6%	95%	105,705	86.4%	95%	>65%
	Trutch Total		123,218	100.0%	86%	122,381	100.0%	85%	
		0-50	95,635	16.1%	40%	100,855	15.3%	38%	
		51-100	42,013	7.1%	58%	41,432	6.3%	54%	
		100+	457,055	76.9%	94%	518,112	78.5%	91%	
Boreal Plains Total			594,703	100.0%	75%	660,400	100.0%	73%	
Northern Boreal Mtns	Sikanni Low	0-50	4,309	3.8%	30%	4,309	3.8%	30%	
		51-100	2,969	2.6%	29%	2,969	2.6%	29%	
		100+	107,250	93.6%	78%	107,346	93.7%	78%	>65%
	Sikanni Total		114,527	100.0%	71%	114,624	100.0%	71%	
Northern Boreal Mtns Total			114,527	100.0%	71%	114,624	100.0%	71%	
Boreal Foothills	Crying Girl Moderate	0-50	2,150	10.3%	30%	1,977	9.0%	29%	
		51-100	534	2.6%	56%	454	2.1%	43%	
		100+	18,212	87.2%	94%	19,619	89.0%	90%	>55%
	Crying Girl Total		20,896	100.0%	78%	22,050	100.0%	74%	
	Graham Low	0-50	9,019	6.7%	27%	8,613	6.3%	26%	
		51-100	3,315	2.5%	30%	2,744	2.0%	27%	
		100+	122,428	90.8%	85%	126,252	91.7%	85%	>55%
	Graham Total		134,762	100.0%	71%	137,609	100.0%	72%	
		0-50	11,169	7.2%	28%	10,590	6.6%	27%	
		51-100	3,849	2.5%	33%	3,198	2.0%	29%	
		100+	140,640	90.4%	86%	145,871	91.4%	86%	
Boreal Foothills Total			155,658	100.0%	72%	159,659	100.0%	72%	

Forecasting Assumptions and Analytical Methods:

Forecasting of this indicator was completed to determine the effect of the FDP's within the DFA. Forest cover information was projected to the end of the FDP timeframe (2006) and proposed disturbances incorporated. Seral stages were then calculated and patch size distributions determined and summarized by LU. At the FDP stage stand level reserves have not been included in the design of the blocks and have not been included in the forecasted patch size. Actual harvest area will be less once stand level reserves (WTP) have been designated.

Early patches are defined as those patches of forest that are ≤40 years old. Recognizing that there could be great variability within the defined patch and that the patch may change over time and to ensure that a reasonable functional estimate of the size of early patches is reported, a 100m buffer is applied to early patches. Early Patches that fall within the 100m buffer, or are within 200m of each other have their area's summed and are reported as one patch.

Mature patches are defined as those forested areas greater than 120 years old. Black spruce (Picea mariana) stand with a mean diameter of 16 cm has been shown to provide black-backed and three-toed woodpecker habitat (Hoyt and Hannon 2002). As such black spruce stands greater than 120 years old with more than 25% Crown closure and greater than 10m tall have been included in the mature patch class. This adds approximately 184,000 ha of black spruce or 16% of all black spruce to the mature patch class in 2002.

Interior forest condition is that portion of a patch that is not influenced by edges. Edge effect is thought to be minimized at 2-4 tree lengths from the edge (Biodiversity Guidebook 1995). Approximately 90% of the forests within the Ft St John DFA are less than 25m as such interior forest is defined as that portion of a mature patch that is greater than 100m from a forest edge. Forest edges are all areas ≤40 years old or non-treed areas. Finally the resulting area must be at least 5 ha to be classed as interior forest.

Strategy and Implementation Schedule:

The targets are recognized as being a desired future condition and will not necessarily be initially achievable; in fact it may take more than one forest rotation to fully achieve the desired distributions. Additionally throughout parts of the Ft St John TSA achievement of the patch size targets will be limited due to the large extent of non-commercial and non-forest areas. As well large natural disturbance events may occur which suddenly change the distribution of patch size classes. This will cause planning strategies to adjust to reflect the new distribution, however it may take several decades or more to adjust to a large natural disturbance in any one LU.

In general smaller patches will be planned in more sensitive areas such as visually sensitive areas and in the major river corridors.

The following LU descriptions outline the current status and strategies for each LU to manage the patch size targets.

Blueberry

Over 60% of the forested land base in this LU is considered to be part of the Timber Harvesting Land Base (THLB). Over the term of the FDP the early small patches (0-50 ha) moved near the upper extent of the range so that all groups are with the range at the post FDP condition. The current condition of the mature patches for all classes is outside the

range. In the post FDP condition only large mature patches are within the acceptable range. This is primarily due to a recruitment of mature patch area of over 36,000 ha.

The strategy within this LU will be to amalgamate existing early patches into larger patches while minimizing the development of large mature patches. This would be particularly helpful if the recruitment could come from mature patches less than 50 ha in size.

Halfway

Approximately 43% of the forested land base is part of the THLB. Small early patches have decreased over the term of the FDP and mid size patches have slightly increased during this time as well. Early mid size patches are outside of the acceptable range. There has been almost no change in the distribution of mature patches over the term of the FDP. Both currently and after the FDP large mature patches are well represented (greater than 90%).

The strategy for the Halfway is to increase the proportion of large (100+ ha) early patches. Early mid size patches should be assessed for opportunities to amalgamate into greater than 100 ha patches. Attempts should be made to remove this area from large (100+ ha) mature patches given the lack of mid size mature patches.

Kahntah

Only 22% of the forested land is currently part of the THLB within the Kahntah LU. The distributions of early patches are within the range currently and post FDP. Mature small and mid size patches are over represented and large patches are at the lower end of the acceptable range both currently and post FDP.

Patch size distribution will be difficult to achieve in the Kahntah LU due to the small proportion of THLB (120,000 ha) and its non-contiguous distribution across the 750,000 ha LU. The contiguous patch size distribution of the THLB is 0-50 ha (26%), 51-100 ha (11%), and 100+ ha (63%). Due to the THLB size distribution and the resulting difficulty in managing the natural distribution, the acceptable range for patches is 5-25%, 5-10%, and 55-90% for 0-50, 51-100 and 100+ patch sizes respectively. This is a deviation from the natural range but will provide a reasonable chance of success, while still encouraging the trend toward a more natural condition and not penalizing operations should a large natural disturbance occur.

The strategy for the Kahntah will be to create early patches as large as possible while trying to maintain large mature patches.

Kobes

Approximately 59% of the forested land base is part of the THLB. Currently large early patches are under represented and small and mid sized early patches are over represented. The current FDP has started to correct this imbalance without compromising large mature patches. The relative amount of mature patches has increased due to recruitment and for the most part this has resulted in large mature patches. The greater than 100 ha mature patches are at the upper end of the acceptable range. Mid size mature patches are under represented both currently and post FDP.

Future development should attempt to create larger early patches through patch amalgamation or the development of some large mature patches. This amalgamation can come from the larger mature patches currently on the landscape, but should be taken from the edges of existing large mature patches.

Lower Beatton

The Lower Beatton LU is primarily within the agricultural zone close to Ft St John. Only 51,000 ha (10%) of the LU is within the THLB, of which 61% is deciduous. The THLB makes up 47% of the forested Crown land within this LU. Because of the significant overlap with range tenures, the proportion of smaller patches was increased to a range of 5-25% for this LU. Large early patches have moved into the acceptable range over the term of the FDP, however mid size patches are still over represented and actually increased during this time. Due to the significant conversion of forested land to non forest in this LU it is still desirable to maintain large mature patches greater than 100 ha within the Crown land portion of the LU. Mature patches are outside the acceptable range for all three patch size classes. Small patches have increased, mid size remained constant and large patches decreased during the term of the FDP.

The strategy for the Lower Beatton is to assess the opportunities to amalgamate smaller and mid size patches into larger early patches while maintaining larger mature patches. It is preferred if patch amalgamation can come from small, or to some extent mid sized, mature patches.

Milligan

Approximately 30% of the forested land base contributes to the THLB or 16% of the whole LU. The early patch size distribution is currently very close to the natural range of variation. The mid size early patches are slightly outside the acceptable range both currently and post FDP, although there is a slight improvement during the term of the FDP. The current early distribution is primarily a result of large natural disturbances. This distribution will be difficult to maintain if there is a lack of natural disturbance events, as only 20% of the THLB is in small (0-50 ha) contiguous patches. Mature patches are within the acceptable range for this LU.

The strategy for this LU is to propose future harvesting consistent with the patch size targets. Mid size early patches can be created by amalgamating some smaller patches in the short term.

Tommy Lakes

Approximately 28% of the forested land base contributes to the THLB or 24% of the whole LU. Mid size early patches are over represented in the Tommy Lakes LU. The current mature patch size distribution falls within the acceptable range. Over the period of the current FDP there was an increase of over 12,000 ha of greater than 100 ha mature patches. This was due to recruitment of stands greater than 120-years old.

The strategy for this LU will be to try and conduct patch amalgamation to create larger early patches while still maintaining larger mature patches. In the short term it is preferable to increase the size of mid early patches by adding area from the small mature class if possible.

Trutch

Approximately 27% of the forested land base contributes to the THLB or 25% of the whole LU. Early patches are over represented in the small and mid size classes while the current mature distribution is within the target distribution. Large early patches are near the lower end of the range in the post FDP condition.

The strategy for the Trutch LU will be to conduct patch amalgamation where possible and create early patches as large as possible. Early patches greater than 100 ha should be created where the THLB and current seral structure allows.

Sikanni

Only 21% of the forested land base contributes to the THLB or 10% of the whole LU. There has never been any harvesting activity within this LU. The current patch size distribution is based only on natural disturbances.

The strategy for the Sikanni will be to propose harvesting activities that are consistent with the natural range of variation. Any proposed developments will need to be consistent with the objectives for the special management zone direction from the LRMP. Given the very small proportion of the LU being THLB the long term achievement of the acceptable range may largely depend on natural disturbance. Any proposed harvesting should build off natural disturbances as they occur.

Crying Girl

Over 89% of the THLB within the Crying Girl LU is in contiguous areas greater than 100 ha. The current FDP will increase the area in large early patches by following the clustered harvesting pattern outlined in the Graham River IRM Plan. Mid size patches are below the acceptable range for early patches in the post FDP condition, and for mid size mature patches both currently and post FDP.

Future harvest can come from the large mature patches and should be consistent with the Graham River IRM Plan. A pattern approaching the natural range should be possible for this LU in the long term.

Graham

Only 25 % of the forested land base contributes to the THLB or 16 % of the whole LU. A large part (30%) of this LU is within the Graham-Laurier Protected Area. The contiguous THLB patch size distribution does fall within the acceptable patch size range. The current versus post FDP condition has seen the amount of small early patches decrease and the mid size patches increase, although there is very little area (<4000 ha) in early patches. Large mature patches are over represented in this LU.

Future harvest patterns should attempt to create larger early patches. Opportunities to amalgamate existing patches should be determined and implemented where possible. The selection of mature should come from large (>100 ha) patches as these are over represented and will likely continue to be so for some time especially given the area within the Graham-Laurier park is made up of almost one large mature patch.

Monitoring Procedure:

Data sources for this include forest cover, GENUS data, landscape units boundaries and DFA boundaries.

All partners in the FSJRBCPP are using GENUS to track their operational data, which includes harvesting and silviculture information. Forest cover will be updated with harvesting data from GENUS as required to complete patch size analysis. Disturbances due to fires and other industrial users are generally updated less frequently (approximately 5 year intervals) and are the responsibility of the Provincial Government.

There are two steps that are required to be completed for reporting this indicator. The calculations are described below:

- The first step will be to update and project the forest cover for all disturbances to the current reporting period based on GENUS data. Contiguous areas are dissolved into each other based on age of the leading species for the rank 1 layer. Early patches are then grouped together if they are within 200m of each other. The area of an early patch is then summed and treated as one patch. Mature patches are reported as they occur no additional grouping is done. The area of each group is then summed by patch size class by LU and expressed as a percentage of either early of mature area within the LU. Leading black spruce stands that are >10 m tall and >25% Crown closure are included as mature patches. Leading mature larch stands are excluded analysis. All stands less than 40 years old are included in the early patch classes. Forest edges are buffered 100m out. This buffer is then overlaid on the mature patches and the area outside this buffer and greater than 5 ha is considered to be interior forest.
- The second step is to include all proposed harvesting, project ages to the end of the proposed development period and calculate the post FDP condition patch size distribution as described above.

The monitoring of this indicator will occur coincident with the development of a FDP or Forest Operations Schedule (FOS).

Linkages to Operational Plans:

FDP's or FOS's will be analyzed and adjusted if necessary to ensure they are consistent with the targets and implementation schedule for seral stage prior to publication.

Linkages to LRMP:

This indicator while providing a range of patches for both early and mature stands over time and space helps to support the following LRMP objectives:

- Maintain functioning and healthy ecosystems.
- Maintain caribou habitat.
- Maintain habitat for priority furbearing species.
- Minimize wildlife habitat fragmentation and maintain existing large mammalian predator/prey system.
- Protect or enhance habitats for red and blue listed species.

6.4. SHAPE INDEX

Indicator Statement	Target Statement
Average shape index of young patches in a landscape unit	Patches 50 -100 ha: The average Shape Index of young patches in a LU will be at least 2.0 Patches 100 -1000: The average Shape Index of young patches in an LU will be at least 3.0 Patches 1000+: The average Shape Index of young patches in an LU will be at least 4.0
SFM Objective: The diversity and pattern of communities and ecosystems within a natural range	
Linkage to FSJPPR: For the purposes of Section 42 of the FSJPPR this indictor statement, target statement and acceptable variance will be used to determine if forest practices are consistent with the landscape level strategies.	

Acceptable Variance:

The average Shape Index maximum variance will be 10% less than the target.

What is this indicator and why is it important?

Shape index is one measure employed to assess the complexity of edge characteristics of openings.

Shape index is calculated as follows:

$$\text{Shape Index} = \frac{P}{2\sqrt{\Pi} \bullet \sqrt{A \bullet 10000}}$$

P = perimeter (m), A = area (ha)

Young patches are defined as all patches less than 40 years of age and greater than 50 hectares.

Block shape, particularly in larger openings, is an important feature which increases the functional habitat for animals (e.g. ungulates) which utilize edge habitat. (DeLong 1999). It is therefore desirable to have block designs emulate the natural range of shapes which may occur in a landscape. This supports a pattern of communities and ecosystems within a natural range.

Fire, the predominant agent throughout the DFA, has resulted in relatively even aged forests, with species composition significantly influenced by subtle topographic and edaphic factors which effect moisture regimes. These factors result in a landscape mosaic, with potentially commercial spruce, pine and aspen forests of varying ages, interwoven with non-commercial, predominantly black spruce stands, on wetter sites. Patches of merchantable stands therefore tend to be highly variable in size, and have naturally irregular shaped boundaries. Cutblock design has to date primarily utilized natural edges between forest stands, or significant topographic features to define block boundaries.

Complex block shapes can provide relatively more edge habitat than simple shapes. Edge effects are considered to have significant importance for habitat, particularly on larger openings greater than 50 hectares. Shape index is a common measure of edge effects relative to the size of the openings, and estimates of the natural range of shape index have

been developed by DeLong (1999). See Figure 4 for an example of the different shape index classes proposed for this indicator.

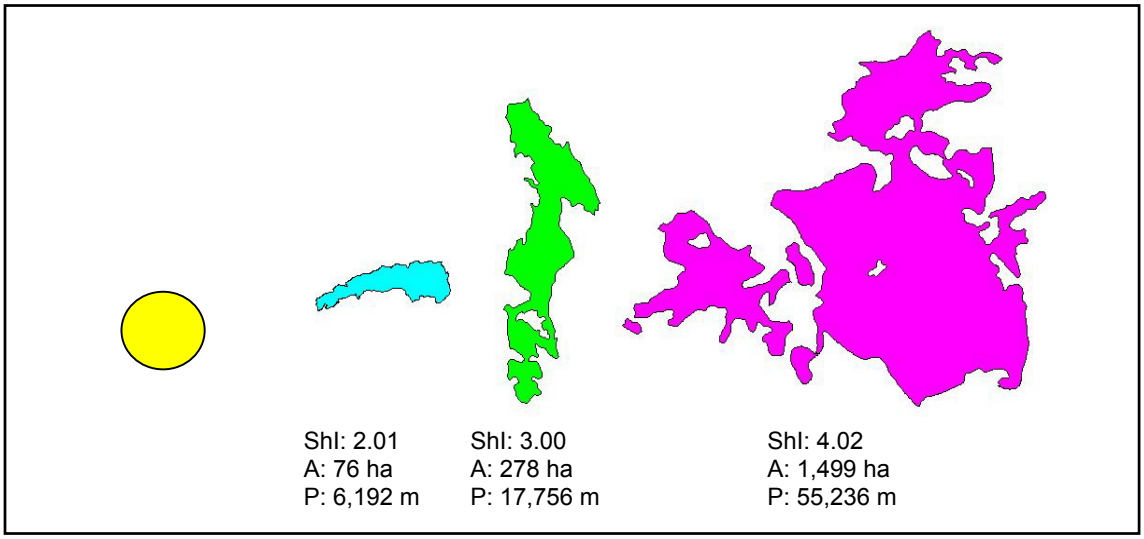


Figure 4 : Shape Index Examples

Management at the landscape level should produce shape index levels which exceed the minimum, so targets have been set based on estimated average shape index for modified patch size groupings (Delong, personnel communication). One of eleven landscape units in the 100-1000 ha size (i.e. Trutch), currently do not meet the average target shape index for this patch size (2.89 versus a target of 3.0). This appears to be due to a relatively small sample size, and natural variability. To account for these anomalies, a 10% variance to the target is allowed.

Edge characteristics are considered most important in large openings greater than 50 hectares in size (DeLong 1999). Openings less than 50 hectares generally do not have a significant portion of the block large distances from an edge hence targets are not necessary for blocks less than 50 hectares.

Current Status:

An analysis of the current and FDP condition shape indices of early seral patches is presented in Table 17 and Table 18 respectively. These tables illustrates average shape indices, including cutblocks designed using the current block design criteria, which are within the theoretical natural range of variation for different sized openings. The strategy for block design is therefore expected to provide the desired complex shape indices consistent with these recommendations to support edge habitat needs.

Table 17: Early Patch Shape Index - Current Condition

LU	Early Patch Size Class												Total	Total n	Ave Shl
	51-100				101-1000				1000+						
	Area	%	n	Ave Shl	Area	%	n	Ave Shl	Area	%	n	Ave Shl			
Blueberry	9,101	9.5%	125	2.51	31,271	32.8%	134	3.74	55,080	57.7%	11	11.63	95,453	270	3.49
Crying Girl	283	8.2%	3	2.30	3,176	91.8%	11	3.83		0.0%			3,459	14	3.50
Graham	224	10.4%	3	3.12	1,924	89.6%	8	4.07		0.0%			2,148	11	3.81
Halfway	3,300	17.2%	45	2.22	7,327	38.2%	35	3.14	8,576	44.7%	5	6.22	19,203	85	2.83
Kahntah	2,539	8.8%	35	2.75	11,488	40.0%	45	3.77	14,718	51.2%	7	8.09	28,745	87	3.71
Kobes	3,243	26.7%	46	2.22	8,893	73.3%	39	3.54		0.0%			12,135	85	2.83
Lower Beatton	2,779	15.8%	39	2.90	10,885	61.8%	50	3.61	3,946	22.4%	3	7.69	17,610	92	3.44
Milligan	1,006	4.0%	14	2.81	6,739	26.9%	19	4.04	17,290	69.1%	2	13.77	25,035	35	4.10
Sikanni	58	2.1%	1	2.25	1,205	42.7%	3	3.08	1,560	55.3%	1	5.18	2,823	5	3.34
Tommy Lakes	4,470	13.1%	63	2.91	12,866	37.8%	54	3.68	16,679	49.0%	6	10.07	34,015	123	3.60
Trutch	820	12.9%	12	2.37	2,076	32.6%	7	2.89	3,473	54.5%	2	4.52	6,370	21	2.75
Grand Total	27,824	11.3%	386	2.58	97,852	39.6%	405	3.65	121,322	49.1%	37	9.22	246,998	828	3.40

Table 18: Early Patch Shape Index - FDP Condition

LU	Early Patch Size Class												Total	Total n	Ave Shl
	51-100				101-1000				1000+						
	Area	%	n	Ave Shl	Area	%	n	Ave Shl	Area	%	n	Ave Shl			
Blueberry	9,512	10.1%	135	2.43	41,219	43.9%	161	3.70	43,240	46.0%	11	10.32	93,971	307	3.38
Crying Girl	237	4.8%		2.33	3,683	74.6%	15	3.50	1,017	20.6%	1	7.12	4,937	19	3.50
Graham	590	22.5%	8	2.73	2,029	77.5%	9	3.56		0.0%			2,619	17	3.17
Halfway	3,410	17.2%	47	2.27	8,945	45.2%	41	3.15	7,432	37.6%	4	5.92	19,787		2.82
Kahntah	2,821	9.4%	39	2.77	12,489	41.6%	48	3.76	14,718	49.0%	7	8.09	30,028	94	3.67
Kobes	3,405	21.6%	48	2.45	10,815	68.7%	44	3.46	1,525		1	7.36	15,745	93	2.98
Lower Beatton	3,297	16.6%	45	2.65	11,850	59.5%	53	3.35	4,761	23.9%	3	8.22	19,908	101	3.19
Milligan	1,134	4.3%	16	2.76	5,634	21.3%	15	4.08	19,716	74.4%	2	16.08	26,484	33	4.17
Sikanni	58	2.1%	1	2.25	1,205	42.7%	3	3.08	1,560	55.3%	1	5.18	2,823	5	3.34
Tommy Lakes	5,426	15.0%	78	2.81	15,969	44.2%	69	3.78	14,724	40.8%	5	9.20	36,120	152	3.46
Trutch	1,333	19.9%	20	2.28	2,076	31.0%	7	2.89	3,278	49.0%	2	4.32	6,688	29	2.57
Grand Total	31,223	12.0%	440	2.55	115,916	44.7%	465		111,973	43.2%	37	8.78	259,111	942	3.31

Forecasting Assumptions and Analytical Methods:

- Does forecasting apply (y/n)? No

Strategy and Implementation Schedule:

Strategy: Create irregular windfirm block shapes to provide edge habitats consistent with the natural range of variation in a landscape, by designing blocks to following natural timber type edges, topographic, or other windfirm boundaries as much as possible.

Implementation: Proposed block boundaries will be largely based on natural timber type edges, topographical features, or other windfirm boundaries. During the preparation of FOS's, shape index will be analyzed to determine consistency of the FOS with this SFMP strategy in those LU's in which harvesting is proposed. If shape index is projected to be less than the targets, as might occur if blocks deviate substantially from the design criteria, actions will be identified which will enable achievement of these targets. This may result in revisions to the FOS block design, or the identification of specific objectives to be met during field layout to achieve the targets.

During field layout, changes to proposed boundaries may be made where necessary to follow the design criteria as close as possible. Boundary changes resulting from actual field layout will be considered minor amendments to FOS's, if they are done to follow the block design criteria.

Monitoring Procedure:

Average Shape index in LU's with active harvesting, including proposed harvesting from the most recent FDP or FOS, will be included in Annual reports, commencing in the report for the 2003-2004 operating year. In LU's where no new harvesting is proposed, changes due to natural disturbances will be captured at the SFMP stage.

An assessment of the overall shape index of all new young patches in each patch size grouping will be done at the next SFMP to determine the actual average Shape Index achieved since the previous SFMP.

Linkages to Operational Plans:

Shape index will be run for proposed blocks included in new FDP's and FOS's. If discrepancies become apparent within an LU, action plans will be determined to increase shape index on certain blocks, which will be incorporated into field layout and subsequently SLP's.

Linkages to the LRMP:

Designing blocks to meet these criteria reduce the potential for harvesting induced blowdown, creates edge effects which support species that thrive in edge habitats, and minimizes unnecessary isolation of small patches of timber.

This strategy therefore supports the following LRMP objectives.

- Maintain functioning and healthy ecosystems
- Manage for forest health
- Enhance timber harvesting and a sustainable long-term timber supply
- Minimize losses to the timber harvesting land base
- Maintain site-specific habitats

6.5. SNAGS/CAVITY SITES

Indicator Statement	Target Statement
Number of snags and/or live trees (>17.5cm dbh) per ha on prescribed areas	Retain annually an average of at least 6 snags and/or live trees (>17.5 cm dbh) per hectare on prescribed areas
SFM Objective: Suitable habitat elements for indicator species to promote species richness A natural range of variability in ecosystem function, composition, and structure which allows ecosystems to recover from disturbance and stress	
Linkage to FSJPPR: N/A	

Acceptable Variance:

It is expected that implementation success will increase as new operations learn to adjust practices as needed to fully meet this indicator's target.

2003-2004: Retain an average of at least 3 snags and/or live trees/ha on prescribed areas.

2005: Retain an average of at least 4 snags and/or live trees/ha on prescribed areas.

2006+: Retain an average of at least 6 snags and/or live trees/ha on prescribed areas.

What is this indicator and why is it important?

Snags refer to dead standing trees. Snags, or live trees greater than 17.5 cm diameter (i.e. merchantable sized trees) are capable of providing cavity and foraging sites now, or at some future point in the development of a stand.

The prescribed area refers to those portions of cutblocks to which the SLP prescribes the retention of snags or live trees to provide potential future cavity sites.

These elements can provide important habitats for at least portions of life cycles of a wide variety of animals. Snags or live trees retained within the perimeter of a block can provide cavity sites and other habitat values for several decades following disturbance, provided they remain standing. Hoyt and Hannon (2002), for example, note that trees averaging 16 cm and 23 cm dbh provide feeding and nesting habitat respectively for black backed and three toed woodpeckers in recent burns.

Snags and/or residual live trees are a common component of young stands following natural disturbance. Fires (the predominant natural disturbance in the DFA) burn at different intensities, depending on site and climatic conditions. This results in the natural retention of live trees and snags at variable densities across the landscape.

Retaining some dispersed snags or live trees in suitable portions of managed stands supplements sources of this habitat element from wildlife tree patches, unsalvaged natural disturbances, and from the non timber harvesting landbase. All of these sources of this habitat element supports reestablishment of the many species dependent on this element.

While the retention of standing material in managed stands may be at relatively low levels, the duration of retention of the vertical structure is likely longer than average, due to the lack of fire damage. This indicator thereby contributes to maintaining ecosystem function, composition and structure that assists the ecosystem in recovering quicker from logging disturbance.

Harvested stands on the DFA tend to be relatively uniform, with smaller tree sizes, and fewer dead trees than similar stands in other parts of the province. This is apparently due to the frequency of fires on the landscape, and the relatively young age of the forest stands. Delong (2002) reports densities of snags greater than 15 cm averaging 12, 59,73, and 126 per ha in young, mature, remnant and old stands, within the SBS mk1. While direct comparisons are difficult, analysis of cruise results on 234 mature and older coniferous blocks planned for harvest in the DFA indicates an average of 27.9 merchantable sized snags/ha, with a range from 0.5 snags/ha to 172/ha, with 9.4% of the blocks having 6 snags/ha or less.

Relatively little research exists on desired levels of retention, particularly in the boreal forest. Bunnell ("Vertebrates and stand structure within the Arrow TSA") reports that in conifer types little use is gained by sustained provision of more than about 3 snags/ha greater than 30 cm. Hiebert reports (personal communication) that bird species presence in managed stands did not increase significantly above 6 snags/ha, attributing it to territoriality. Six snags per hectare is proposed as a reasonable retention level in other jurisdictions (Forest management Guide for Natural Disturbance Pattern Emulation-Ontario Nov. 28,2001), consequently this level has been adopted as the target average for this indicator.

The target will be assessed as an average retention level achieved on prescribed areas, as there are logistical, safety and economic considerations which preclude the retention of dispersed snags or trees in some areas.

The extent of prescribed area will vary annually depending on the site conditions where harvesting operations are occurring. Minimum levels of prescribed areas are based on current status of SLP's and estimated average conditions.

Current Status:

A review of recent SLP's from participants shows a wide variety of current approaches to retention.

Of 77 SLP's reviewed from coniferous licensees, where dispersed retention was proposed, in all cases snags or live trees were required to be stubbed to address safety issues. 26 blocks, representing approx. 20% of the area had no specific provisions, 36 SLP's representing 54% of the area had provisions for stub trees between 0.1 /ha and 5 /ha, and 15 blocks (26% of the area) prescribed 6 per hectare or more. This latter group indicated that snags included in any WTP's would count towards the total of 6 per hectare.

A review of 25 BCTSP SLP's from Dec 1999 to July 2002 showed 48.3% required the retention of a specified number of snags or live trees (between 1 and 5), with the general comment being to have live trees or snags cut off at 5 metres. Live trees and full snags were retained only in mappable wildlife tree patches greater than 0.25 ha in size. SLP's prepared after January 1, 2001 had no requirement for the retention of snags or live trees, opting instead for all retention to be within WTP's.

No harvesting has occurred from deciduous licences other than BCTSP. Five initial silviculture documents for planned deciduous harvesting do not require the retention of dispersed stubs or snags, but do provide for retention of some live trees dispersed in specific portions of the blocks, and the retention of WTP's.

While harvesting supervisors assess conformance to SLP measures during harvesting inspections, which includes prescribed snag or live tree retention, no information is currently available on actual densities of retained snags, live trees or stub trees following the completion of operations.

Forecasting Assumptions and Analytical Methods:

- Does forecasting apply (y/n)? No

Strategy and Implementation Schedule:

Subsequent to harvesting, with consideration for safety and economic limitations, dispersed snags or live trees are retained in some suitable areas within managed stands to provide potential cavity sites through time.

This strategy is designed to encourage the retention of some snags or live trees capable of providing cavity sites, within the harvested portion of the timber harvesting landbase. The strategy is intended to supplement the retention of this habitat element found in wildlife tree patches, unsalvaged burns, and the approximately 50% of the DFA that is not in the timber harvesting landbase.

Snags or trees may be stubbed at 3-5 metres to meet safety requirements and ensure windfirmness. It is not required that retention be evenly distributed across an area, rather retention should be distributed in areas which minimize the risk of damaging the retained snags or trees.

Operational Foresters will identify in SLP's to which blocks, or specific portions of blocks, this indicator will be applied (i.e. the prescribed area), using the following guidelines:

- For blocks that have at least 10% of the gross area designated as wildlife tree patches, this indicator need not be applied, as the habitat element will be well represented within the WTP's.
- In salvage (e.g. beetle) operations, if forest health or worker safety is a potential concern, this indicator need not apply.
- In stands which average less than 17.5 cm DBH (e.g. height class two pine stands), this indicator need not apply, due to the lack of suitable candidate trees.
- This indicator need not apply in blocks less than 50 hectares. Smaller blocks in the boreal are often very irregularly shaped, which restricts equipment maneuverability. These blocks typically have forestland in close proximity which can contribute to the retention of this habitat element on the landscape.
- This indicator need not apply to areas where steep slopes (>30%) or in narrow fingers of harvested blocks (less than 40 metres wide) which restrict machine maneuverability. These factors may limit the capability to safely and economically stub snags or live trees, or limit the ability of skidding or site preparation equipment to avoid significantly damaging stubbed trees.
- For areas where cable harvesting or partial cut systems are employed this indicator need not apply.

Prior to the commencement of operations, Operational Supervisors are advised if this indicator is applicable to a block, and if so specifically to which sections of the block it applies.

Supervisors review the requirements pertaining to this indicator in preworks with harvesting and silviculture workers, and discuss methods and procedures to create and/or retain these habitat elements to the target levels.

A phase-in period is required to fully implement this indicator, as some existing SLP's that prescribe retention of snags or live trees at levels lower than the target may not be harvested for 1 to 3 years, and post harvest actual measures of the achieved stubs per hectare has not yet commenced.

March 2004: Silviculture Supervisors will determine the specific methodology for assessing the average level of post harvest retention concurrent with the initial silviculture survey.

April 2004: Foresters will identify in all new SLP's if the indicator will be applied to a block or a portion of the block, using the above guidelines, and their professional judgment.

Prior to the commencement of operations, Operational Supervisors are advised if this indicator is applicable to a block, and if so specifically to which sections of the block it applies.

Supervisors review the requirements pertaining to this indicator in preworks with harvesting and silviculture workers, and discuss methods and procedures to create and/or retain these habitat elements to the target levels.

May 2004: Surveys will commence the monitoring of implementation of this indicator on those blocks which have harvesting start dates after January 1, 2003, and have areas identified to which this indicator applies.

Monitoring Procedure:

Monitoring and reporting to assess implementation will occur in 2 phases:

1. Where SLP's identify this indicator applies to all or part of a block, operations supervisors note in harvesting inspections whether or not operational activities are in general compliance with the SLP, which includes snag or live tree retention where applicable. In annual reports, the harvesting supervisor will report:
   a) The total number of blocks on which harvesting was finished.
   b) How many of these blocks had at least some of the area to which this indicator applied.
   c) According to the inspections, how many of the candidate blocks indicated general conformance with this indicator.
2. The actual average retention level of snag or live tree retention on areas prescribed in a given years harvesting will be determined during silviculture monitoring following reforestation commencing in May 2004, using a sub-sample of the silviculture plots, and the methodology determined by the silviculture supervisor. The surveyor will determine from the SLP if the plot falls in an area to which this indicator applies. The survey will be used to estimate the number of snags or live trees actually being created per hectare of prescribed area to which this indicator is being prescribed. Survey results will be reported in annual reports.
3. The effectiveness monitoring program (see section 3.2) will address long term effectiveness of this and other indicators.

Linkages to Operational Plans:

SLP's will identify whether cutblocks or portions thereof are candidate areas for dispersed snag or live tree retention.

Linkages to the LRMP:

Cavity sites provide important niche habitats for a variety of species. Residual snags, live trees and stub trees provide cavity and foraging sites for birds and animals such as furbearers, and functional habitats that support fungi, lichens, and other organisms that contribute to maintaining ecosystem function (Bunnell 1999).

This indicator therefore supports the following LRMP objectives:

- Maintain functioning and healthy ecosystems.
- Maintain habitat for furbearer species.
- Maintain site specific habitats

6.6. COARSE WOODY DEBRIS VOLUME

Indicator Statement	Target Statement
Average Coarse Woody Debris volume/ha on blocks logged in the DFA	Minimum average retention level over the DFA will be 46 m^3/ha (50% of average pre-harvest volume) on harvested blocks assessed between December 1, 2003 and November 30, 2008
SFM Objective: A natural range of variability in ecosystem function, composition and structure which allows ecosystems to recover from disturbance and stress Suitable habitat elements for indicator species	
Linkage to FSJPPR: For the purposes of 29(2) of the FSJPPR the applicable performance standard is specified by this indicator statement, target statement and acceptable variance.	

Acceptable Variance:

N/A

What is this indicator and why is it important?

Coarse Woody Debris (CWD) refers to sound and rotting logs or stumps, which can provide important habitats for a wide variety of organisms, including invertebrates, vertebrates, fungi and cryptograms (mosses, liverworts and lichens). CWD refers to material greater than 7.5 cm in diameter, which is consistent with VRI and NIVMA measurement criteria. Maintenance of CWD across the DFA within natural ranges of variability provide for the specific habitat needs of numerous organisms. CWD retention management within managed stands is necessary, as there is often an economic incentive to minimize debris, which could, over time, have significant habitat implications for many organisms.

CWD is a common component of natural stand replacement, and plays important roles in nutrient recycling, and assisting in the reestablishment of organisms after disturbance. The occurrence of CWD following harvesting, therefore, is also an indicator of the ability of the ecosystem to recover from disturbance.

Based on NIVMA information, the target is set at a minimum average of 46 m^3/ha (50% of the estimated average pre-harvest volume) for this SFMP. It is recognized that a range of CWD levels is desirable, and it is expected that this will be achieved with the measures proposed in SLP's, as is demonstrated in existing NIVMA plots. Using the average volume/ha of CWD in the DFA is intended to provide a reasonable indication if, on average, operational measures to protect CWD within the DFA are effective.

CWD within cutovers is complemented by CWD retained within wildlife tree patches, unsalvaged burns, and the substantial component of non-timber harvesting landbase within the DFA. Assessing post harvest CWD levels compared to pre harvest CWD levels provides an assessment of the relative effectiveness of SLP measures to retain CWD on the site. While there appears to be limited scientific information on CWD volumes pre or post disturbance in the boreal forests, Delong (2002) does quote data from Lee et al (1995) that reports boreal mixedwood average CWD volumes in young stands (20-30 years) of 108.8 m^3/ha, versus old stand CWD average volumes of 124.3 m^3/ha (120+) years. Delong also reports CWD ranges in young coniferous stands of 5.6-590.3 m^3/ha compared to 23.4-283.3 m^3/ha in mature stands. Based on this data, the target level is a minimum average that significantly exceeds the lower CWD range limit for either young or mature stands. The target therefore should provide CWD levels which fall within the natural range of variation.

Current Status:

The current performance standard for blocks harvested under the pilot project states that for each calendar year, at least 50% of the estimated total amount of pre-harvest coarse woody debris remains among the cutblocks in which harvesting was competed that year.

Coniferous Licensee's SLP's currently have standard statements requiring a minimum of 50% of the estimated total amount of pre-harvest CWD retained in cutblocks in which harvesting is completed in a year. Most SLP's have a general statement of the pre-harvest level of CWD as low, medium or high, based on an ocular assessment. Strategies stating what activities will contribute to maintaining CWD are normally included in the SLP's as well. Examples of strategies in the SLP's include minimizing burning of dispersed slash, retaining non-merchantable fibre on the cutblock, stub tree creation to recruit CWD, and identification of WTP's with characteristics which support short or long term CWD development. As the preexisting CWD levels consist predominantly of non-merchantable material, it is assumed that the strategies are meeting the 50% retention objective. Formal measurement of the actual CWD level on each block has therefore not been completed, although NIVMA research plots measure some pre and post harvest CWD levels.

For the 2001-2006 BCTS (Small Business) Forest Development Plan, the following guidelines were included for managing coarse woody debris:

- Reduce the number and size of CWD accumulations on roadsides and landings by encouraging TSL holders to distribute waste on block;
- Reduce incorporation of large CWD pieces in the remaining accumulations;
- Provide sources of CWD.

During the development of the BCTS SLP, an ocular assessment of the CWD on site is made. A common SLP statement is "maintain or enhance the current level of CWD present on the block estimated at "X". Current ocular estimates have ranged from 1 m^3 to 50 m^3 per hectare.

While deciduous Licensees are currently not harvesting on the DFA, baseline pre-harvest CWD levels are provided in some preliminary silviculture documents from cruise and line

transect information. Each of the 5 Silviculture Rationale documents prepared to date contains a commitment to leave a minimum of 50% of pre-harvest level CWD post harvest randomly distributed in the cutblock. The Forest Development Plan points to exceptions to the 50% retention rule in Range areas or where over-riding values occur.

CWD measurements done on 27 NIVMA plots in the DFA between 1997 and 2002 show an average pre-harvest volume of 92 m^3/ha, but with a wide variation (21-224 m^3/ha) between blocks (see Table 19 and Figure 4). On 12 blocks in which both pre-harvest and post harvest assessments have been done at the same location, results vary widely, with the lowest post harvest retention of 38 m^3/ha, and the highest of 368 m^3/ha. Two blocks (16%) had post harvest retention levels less than 50% of the pre-harvest levels.

Table 19: CWD

DISTRICT	AGENCY	Timber Mark	CP	Block	Year Measured	BGCZ	Pre-harvest CWD Volume (m^3/ha)
FSJ	MOFFSJ	A60185	0	1	2000	BWBS	20.81
FSJ	**CFPJO**	**EK8616**	**616**	**6**	**1999**	**BWBS**	26.69
FSJ	MOFFSJ	A54844	0	1	2000	BWBS	28.09
FSJ	**CFPJO**	**EK8616**	**616**	**8**	**1997**	**BWBS**	33.23
FSJ	CFPJO	EK8123	123	1	2001	BWBS	42.48
FSJ	MOFFSJ	A54848	0	1	2000	BWBS	43.30
FSJ	**CFPJO**	**EK8623**	**623**	**12**	**1997**	**BWBS**	52.47
FSJ	MOFFSJ	A59303	0	1	2000	BWBS	57.00
FSJ	**CFPJO**	**EK8142**	**142**	**1**	**1997**	**BWBS**	69.05
FSJ	CFPJO	EK8144	144	9	2001	BWBS	69.38
FSJ	CFPJO	EK8121	121	3	2001	BWBS	74.56
FSJ	**CFPJO**	**EK8120**	**120**	**5**	**1999**	**BWBS**	78.30
FSJ	MOFFSJ	A52313	0	1	2000	BWBS	79.12
FSJ	**CFPJO**	**EK8122**	**122**	**9**	**2000**	**BWBS**	84.34
FSJ	**CFPJO**	**EK8123**	**123**	**8**	**2000**	**BWBS**	89.03
FSJ	**CFPJO**	**EK8622**	**622**	**7**	**1999**	**BWBS**	94.87
FSJ	MOFFSJ	A59644	0	1	2000	BWBS	95.28
FSJ	MOFFSJ	A59642	0	1	2000	BWBS	98.61
FSJ	**CFPJO**	**EK8635**	**635**	**2**	**2000**	**BWBS**	110.83
FSJ	CFPJO	EK8632	632	13	2002	BWBS	120.66
FSJ	MOFFSJ	A60195	0	1	2000	BWBS	121.07
FSJ	MOFFSJ	A56946	0	1	2000	BWBS	125.18
FSJ	CFPJO	EK8100	100	14	2002	BWBS	143.64
FSJ	MOFFSJ	A63019	0	1	2000	BWBS	148.00
FSJ	**CFPJO**	**EK8151**	**151**	**8**	**1999**	**BWBS**	172.43
FSJ	CFPJO	EK8627	627	1	2002	BWBS	193.44
FSJ	**CFPJO**	**EK8151**	**151**	**4**	**1999**	**BWBS**	224.41
	Total m^3						2496.27
	# blks						27.00
	Ave m^3/ha						**92.45**
	Range						20.8-224.4

Note: Blocks sampled were primarily coniferous blocks, except A59305 and A56946 which are mixedwood blocks.

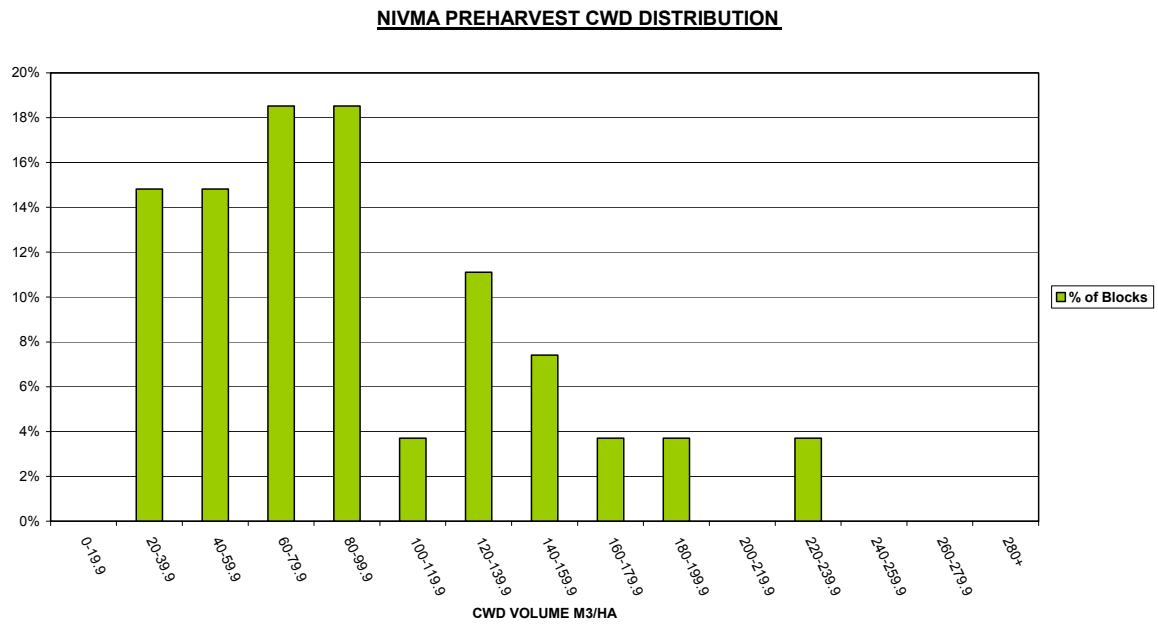


Figure 5: CWD

Forecasting Assumptions and Analytical Methods:

- Does Forecasting apply (y/n)? No

Strategy and Implementation Schedule:

Management practices will be identified in SLP's which promote the retention of CWD within harvested cutblocks, with a target to maintain at least 50% of the estimated average pre-harvest levels of CWD ha on harvested blocks assessed between Dec 1, 2003 and Nov 30 2008. SLP's will identify site-specific management strategies to contribute to the maintenance of CWD levels at the DFA level which fall within the natural range of variation. These strategies will complement the retention or recruitment of CWD from WTP's, riparian areas, unsalvaged burns, and the non-timber harvesting landbase.

The objective of CWD management strategies will be to maximize the ecological value of the CWD left on site without increasing logging costs, within the constraints of current utilization standards and avoidable waste bench marks.

The following principles will be considered when developing site specific SLP strategies:

- Minimize CWD accumulations at roadside or landings to the extent practical. Small CWD piles dispersed in blocks may be appropriate to provide habitat for some mammals.
- Larger pieces of CWD are more valuable than smaller pieces.
- Maintaining a wide range of decay and diameter classes is ecologically desirable.
- Retention of a variety of species is advantageous.
- Standing live and dead trees and/or stubs retained on cutblocks can provide important sources of CWD recruitment.
- CWD within riparian areas can be particularly beneficial ecologically.

- The retention of CWD should be harmonized with other silvicultural objectives.
- Maintain variability in the levels of CWD at the landscape level.

Measures should include retention of CWD in both concentrations and dispersed patterns, as different organisms favour each of these strategies. Concentrating solely on one method could disadvantage some groups of species (Bunnell).

In each SFMP, the most current cumulative pre-harvest information will be summarized to determine a projected average CWD volume from forest cover types that may be targeted from harvest. This may include information from NIVMA, Phase II VRI, or other monitoring systems. The minimum target for the duration of the SFMP will be 50% of this average CWD.

Where management priorities are specifically designed to minimize CWD volumes to protect other non-timber resource values (e.g. community pastures, etc), these blocks will be excluded from the population used to determine post harvest CWD levels.

Monitoring Procedure:

Average post harvest CWD will be estimated from measurements taken at the 3 km long-term monitoring points during a silviculture survey subsequent to harvesting of these sample locations. Sampling methodology will follow the Resource Inventory Committee standard described in the Vegetation Resource Inventory ground sampling procedures. The average CWD volume will be monitored annually, and depending on the results of this monitoring, revisions to the prescribed management practices within the SLP's may need to be implemented to achieve the SFM targets.

The average CWD volume attained at all 3 km sample points in blocks logged from the pilot effective date until the next SFMP will be reported in the next SFMP.

Linkages to Operational Plans:

SLP's will identify site-specific management strategies to retain CWD. Annual reviews of CWD plot information will provide feedback on the appropriateness of SLP CWD management measures, and changes to procedures can be made accordingly.

Linkages to the LRMP:

Coarse Woody Debris is an important habitat element for a variety of plants, insects, cryptograms, invertebrates, and vertebrates, particularly furbearers. CWD is known to play an integral role in nutrient cycling, and therefore contributes significantly to ecosystem function.

This indicator therefore supports the following LRMP objectives:

- Maintain functioning and healthy ecosystems
- Maintain habitat for furbearer species
- Maintain site-specific habitats

6.7. RIPARIAN RESERVES

Indicator Statement	Target Statement
The number of non-compliances to riparian reserve zone standards	No non-compliances to riparian reserve zone standards
SFM Objective: Suitable habitat elements for indicator species Maintenance of water quality	
Linkage to FSJPPR: For the purposes of Section 42 of the FSJPPR this indictor statement, target statement and acceptable variance will be used to determine if forest practices are consistent with the landscape level strategies.	

Acceptable Variance:

No variances, unless authorized by the district manager.

What is this indicator and why is it important?

Riparian areas occur adjacent to wetlands or bodies of water such as rivers, streams, or lakes. Riparian habitats include the stream bank and flood plain area adjacent to streams or waterbodies. On larger streams particularly, riparian areas often provide productive, structurally diverse habitats. In addition to providing ready access to water, these areas also support important characteristics such as coarse woody debris, cavity sites, shrubs and broadleaf trees, which have been identified as key habitat elements necessary to support species richness.

Riparian reserve zones (RRZ's) are specific areas on larger fish bearing steams, in which harvesting is not normally permitted, in order to protect significant riparian and aquatic habitats. Maintaining RRZ's provides many of the habitat elements needed to support a diverse species mix across the landscape.

Minimum RRZ's widths are identified in Schedule D of the FSJPR, and relate to activities carried out under the pilot regulation by the participants, exclusive of road right of ways necessary to cross streams. An indication of the success in protecting riparian areas and the associated habitat elements is the number of non-compliances to the Schedule D requirements.

Minimum RRZ's do not apply to the right of ways of roads that are crossing streams.

Current Status:

A review of compliance issues from December 1, 2001 to March 31,2003 for participants indicates there have been no non-compliances to riparian reserve zone standards identified in inspections. No new variances to riparian reserve zone standards were authorized in the current approved FDP's.

Forecasting Assumptions and Analytical Methods:

- Does forecasting apply (y/n)? No.

Strategy and Implementation Schedule:

All streams, wetlands, and lakes in or immediately adjacent to a planned harvest area will be classified in the field prior to the commencement of operations. Riparian Reserve Zones (RRZ) that meet or exceed the RRZ widths noted in Schedule D of the FSJPR will be

located and clearly marked in the field. Site specific management practices will be included in SLP's to maintain regulatory riparian reserve zones, and protect them from significant blowdown where needed.

Current practice when establishing reserve boundaries in the field on S1, S2 and S3 streams is to utilize natural topographic breaks and timber type boundaries that result in irregular shaped edges. In practice buffer widths are normally wider than the minimum, but vary significantly in distance from the stream, based on the natural breaks that are typically used for the boundary. These natural boundaries are usually inherently more windfirm than fixed width RMZ's, and easier to implement, so this practice is the preferred strategy for delineating RRZ's in the field.

One of the primary objectives of riparian management is to protect reserve zones on larger (e.g. S1, S2 and S3) fish bearing streams from subsequent damage by blowdown etc. In some areas within the DFA, blowdown in riparian reserve zones is a low risk, and measures to protect riparian reserves from blowdown are not necessary. In areas where blowdown or other factors have a significant potential to impact the core RRZ, measures to minimize damage, such as utilizing natural timber type boundaries, topographic features (e.g. slope breaks), increasing reserve widths, or feathering of edges, may be implemented, depending on the site characteristics.

Monitoring Procedure:

Inspections will be completed on harvesting, road construction and silviculture activities by operations supervisors, and information on any transgressions into the RRZ will be noted and tracked by the participant. Non-compliances will also be reported promptly to the appropriate government officials. Annual reports will summarize the number of compliance issues identified, specifically identifying any incidents involving RRZ's.

Linkages to Operational Plans:

The location, classification and, where applicable, RRZ requirements of waterbodies will be included in SLP's and/or operational maps used for timber harvesting, road construction and silviculture activities.

Field foresters will identify site specific requirements for the protection of reserve zones, and management practices will be included in SLP's.

Preworks completed prior to harvesting, road construction or silviculture activities will review RRZ's size and location, and any site specific protection measures.

Linkages to the LRMP:

Riparian Reserve Zones are an important source of habitat elements that support ecological function. They also serve to protect aquatic habitats and water quality from forestry activities, and provide forested habitats adjacent to water that are important to furbearers and other species.

This indicator therefore supports the following LRMP objectives:

- Maintain functioning and healthy ecosystems
- Maintain fish habitat and water quality for priority fish species
- Maintain habitat for priority furbearing species
- Maintain site specific habitats
- Manage critical wetland habitats for waterfowl and other wildlife species
- Sustain natural stream flow regime

6.8. SHRUBS

Indicator Statement	Target Statement
The proportion of shrub habitat (%) by Landscape Unit	Each landscape unit will meet or exceed the baseline target (%) proportion of shrub habitat
SFM Objective: Suitable habitat elements for indicator species	
Linkage to FSJPPR: N/A	

Acceptable Variance:

Acceptable variance is ± 20% of the baseline target.

What is this indicator and why is it important?

Shrubs are defined in the Vegetation Resource Inventory (VRI) BCLCS Level 4 as either shrub low (SL) or shrub tall (ST). Forest or harvested sites less than 20 years old are also considered to contribute to shrub habitat in the DFA.

Shrubs are common in riparian areas, and readily enter larger forest openings, especially on moist sites. As the stand closes they are suppressed by the taller trees, and remain uncommon until the stand naturally opens. Many species respond positively to shrub abundance, and shrub abundance is influenced by forest practices (Bunnell 1999).

In a review of the vertebrates in the Sub-boreal Spruce (SBS) zone of BC, Bunnell (1999) found that 42% of birds and 59% of mammals depended on a shrub structural stage for their breeding habitats. In the Ft St John DFA Manning and Cooper (2003) indicates that 6 out of 20 birds and 1 out of 7 mammals considered to be species at risk or of regional significance are dependent on shrub habitats for some part of their life requisites.

Current Status:

The following table (Table 20) indicates the current and post FDP condition of shrub habitat within the DFA. Targets were established for this indicator by reviewing the amount of naturally occurring shrub areas by landscape unit as well as forested areas less than 20 years old. Landscape units with low levels of naturally occurring shrubs generally have lower targets than areas with higher levels of shrubs. The Boreal Plains natural disturbance unit generally has higher levels of shrubs than the other units within the DFA.

Table 20: Shrub Habitat Current, FDP Condition and Targets

Landscape Unit	Landscape Unit Total Area	Total Shrub Habitat				
		Current Condition		FDP Condition		Baseline Target (%)
		ha	% shrub of LU	ha	% shrub of LU	
Blueberry	595,158	117,486	19.7%	141,951	23.9%	15%
Crying Girl	66,918	4,040	6.0%	7,897	11.8%	5%
Graham	334,869	56,373	16.8%	56,974	17.0%	16%
Halfway	195,853	33,980	17.3%	37,437	19.1%	11%
Kahntah	749,001	214,661	28.7%	217,893	29.1%	25%
Kobes	143,556	20,694	14.4%	25,394	17.7%	10%
Lower Beatton	156,195	22,728	14.6%	27,190	17.4%	12%
Milligan	453,688	178,220	39.3%	180,487	39.8%	34%
Sikanni	311,908	18,298	5.9%	18,298	5.9%	5%
Tommy Lakes	705,096	115,965	16.4%	129,362	18.3%	14%
Trutch	436,283	39,674	9.1%	41,232	9.5%	8%
Grand Total	4,148,524	822,120	19.8%	884,114	21.3%	

Forecasting Assumptions and Analytical Methods:

- Does forecasting apply (y/n): Yes

Forecasting was completed for this indicator by tracking the proportion of forest stands that are less than 20 years old over the full 250-year planning horizon. There was no site conversion or brush rehabilitation to forest forecasted in the analysis.

Strategy and Implementation Schedule:

Early forest less than 20 years old can provide important shrub habitat and this can be created through harvesting. Harvesting and silviculture practices can influence the abundance and distribution of shrubs over time.

Long-term monitoring of shrub abundance change within managed stands will occur through Change Monitoring Inventory (CMI) plots established over the DFA. These plots are systematically established across the DFA based on a 3-km grid in stands 15 years after harvesting. These plots will provide a representative sample of all managed stands over time. The first set of 30 plots is being established in 2003. Once the initial backlog of approximately 70 samples is established for stands that have been harvested greater than 15 years ago there will be an additional 3 to 4 samples in conifer stands and eventually 4 to 5 in deciduous stands established each subsequent year.

Monitoring Procedure:

Data sources include vegetation resource inventory (VRI), landscape unit maps, and GENUS data.

VRI information is updated either by the Provincial Government or by Forest Licencees under contract with the Government. These data sources are usually only updated / replaced in five to 10 year intervals. The GENUS system is a "real-time or live" database that is maintained and updated by the participant's staff as they carry out their daily activities.

Reports will be generated at two scales. The first report is a tabular report of the percent of stand composition groups within each landscape unit. The second report is a single number that identifies the consistency between the actual status in any given year compared to the 11 baseline targets, expressed as a percent. The calculation is described below:

- Report 1 calculation: Forest cover is projected to the current date by overlaying GENUS information. Stands less than 20 years old plus stands identified as SL or ST in the VRI are summed for each LU and expressed as a percent of the total area of the LU.
- Report 2 calculation: Number LU's meeting the baseline targets / the total number of LU's (11), expressed as a percent.

To monitor this indicator, the reports will be run at each SFMP and compared to the overall target.

The CMI plots will be re-measured on an approximately 10 year cycle and will allow comparisons of shrub composition and abundance among other things over time.

This information will feed back to operational practices overtime to determine which practices are adversely impacting the habitat element and corrective action will be taken if necessary.

Linkages to Operational Plans:

The data will be used at the Forest Development level to guide future harvest planning and will be used by the silviculture staff to review long term trends in reforestation policies and to adjust practices where necessary.

Linkages to LRMP:

This indicator provides for the maintenance of a key habitat element, which numerous species including species at risk are dependant on and therefore supports the following LRMP objectives.

- Maintain functioning and healthy ecosystems
- Maintain site specific habitats
- Protect or enhance habitats for red and blue listed species

6.9. WILDLIFE TREE PATCHES

Indicator Statement	Target Statement
Aggregate Wildlife Tree Patch percentage in blocks harvested under the FSJPPR in each Landscape Unit	Cumulative Wildlife Tree Patch % will meet or exceed the minimum target in each LU Landscape Unit — WTP % Blueberry 6% Halfway 3% Kahntah 7% Kobes 5% Lower Beatton 8% Milligan 6% Tommy Lakes 3% Trutch 5% Sikanni 4% Graham 4% Crying Girl 6%
SFM Objectives: Suitable habitat elements for indicator species A natural range of variability in ecosystem function, composition, and structure which allows ecosystems to recover from disturbance and stress	
Linkage to FSJPPR: For the purposes of 29(1) of the FSJPPR the applicable performance standard is specified by this indicator statement, target statement and acceptable variance.	

Acceptable Variance:

Aggregate WTP percentages will only apply if 200 hectares or more has been harvested under the FSJPR in a landscape unit.

What is this indicator and why is it important?

Wildlife tree patches (WTP's) are forested areas of timber within or immediately adjacent to a cutblock which are retained primarily for their value in providing a source of habitat elements, or for the protection of important habitat features.

WTP's provide sources of shrubs, large live trees, broadleaf trees, coarse woody debris (CWD), and snag/cavity sites. These elements can provide key habitat components that support the residual populations, the reintroduction of populations expatriated by the disturbance, and overall ecosystem function (Bunnell et al 1999).

Wildlife Tree Patches (WTP's) within managed stands have been shown to be important in the reestablishment or maintenance of a variety of species, including moose (Gasaway and Dubois 1985), and birds (Seip 1997). Residual patches include both islands within the block (internal WTP's) and patches immediately adjacent to logged areas that are also adjoined to unharvested areas (external WTP's). Both internal and external residual patches may be suitable for WTP's provided they can function as sources of habitat elements, which will depend on their site specific attributes. External WTP's connected to adjacent unharvested areas are typically more windfirm within the DFA, and may receive higher initial use by wildlife due to the proximity of adjacent unharvested habitats.

Maintaining habitat elements in wildlife tree patches contributes to enhancing species richness by providing the critical features needed to support a variety of species. Retaining WTP's with similar composition and structure to natural remnants, will contribute to maintaining a natural range of variability in ecosystem function, composition, and structure, which allows ecosystems to recover from disturbance and stress.

Providing diverse habitat structures, including WTP's, within managed stands is consistent with natural disturbances. Fire is the most prevalent natural disturbance in the DFA. Maintaining a component of wildlife tree patches in managed stands over the landscape is analogous to fire skips which occur where large areas may be burnt, where undamaged or lightly burnt patches may persist within the perimeter, or on the edge of the fire within a similar forest type. These residual patches in disturbed areas typically vary substantially in size, shape and composition, so variability in these characteristics of WTP's is desirable.

WTP's can also be used to protect site-specific habitats, such as mineral licks and raptor nesting sites and provide a source of local genetic material.

The establishment of WTP targets by L.U. was based on the following factors:

1. The relative importance of WTP's as sources of habitat elements in a landscape unit is somewhat related to the amount of unharvested areas that may function as alternate sources of habitat elements. This is particularly significant in this DFA, where a very high percentage of the DFA is in the non-timber harvesting landbase. The non-THLB areas will not be significantly affected by harvesting and will still provide some habitat elements which contribute to ecological function. Only the productive forest that contributes to seral targets within the non-THLB was considered in determining the contribution from the non-THLB. In LU's with relatively low levels of harvesting, the larger undisturbed forest acts as a source of habitat elements, therefore the retention of WTP's can play a smaller role in providing these habitat elements. In areas with relatively high levels of logging, the importance of retention patches such as WTP's to contribute to these elements becomes more significant, so it is generally desirable to maintain relatively higher levels of WTP's in these areas. Utilizing information from the

biodiversity guidebook provides one methodology for addressing this factor. This methodology provides for 2 separate determinations. A lower WTP retention level results in those LU's with defined objectives, which provides a higher risk to biodiversity. A higher WTP retention level is required in areas without LU's objectives, which is intended to provide a lower risk to biodiversity.

2. The forest management intensity levels will be a modifier of WTP levels, with a greater relative emphasis placed on biodiversity in low and medium management intensity zones. In low and medium management intensity LU's, WTP retention levels will account for this by using targets consistent with lower biodiversity risk (i.e. utilize retention levels targets assuming LU objectives are not in place). Conversely, in high management intensity LU's, retention levels will be consistent with a higher biodiversity risk (i.e. utilize the WTP retention level targets consistent with LU objectives being in place).
3. While there is limited information specific to the western boreal forest on retention levels in natural disturbances, Delong quotes Eberhart and Woodward (1987) findings that 3% - 15% of the total area of a fire can be composed of unburned mature forest. Targets were increased where necessary to fall within this range of variation.

The WTP levels are intended to be a source of habitat elements. In those LU's with less than 200 hectares cumulative logging under the pilot project, there is unlikely to be a significant concern with habitat, so the WTP levels will not be applied until after harvesting exceeds 200 hectares.

Current Status:

Table 21 summarizes current status of WTP retention levels for pilot project blocks on which harvesting has commenced under the approved Forest Development Plans, to March 31, 2003. WTP levels exceed the minimum target, except in the Milligan LU, where only 1 small block has been logged.

Table 21: Cumulative WTP % by LU Projected to March 31, 2003

CURRENT all Licencees				
Landscape Unit	**Total WTP ha**	**Block Area**	**WTP %**	**Target %**
Blueberry	241.7	2328.2	10.4%	6%
Crying Girl	73.7	615.2	12.0%	6%
Graham	0.0	0.0		4%
Halfway	65.2	513.9	12.7%	3%
Kahntah	59.6	583.4	10.2%	7%
Kobes	20.0	116.6	17.2%	5%
Lower Beatton	14.7	116.4	12.6%	8%
Milligan	0.0	7.2	0.0%	6%
Sikanni	0.0	0.0		4%
Tommy Lakes	237.3	2848.6	8.3%	3%
Trutch	0.0	0.0		5%

Forecasting Assumptions and Analytical Methods:

- Does forecasting apply (y/n)? Yes

Existing SLP's were developed using WTP targets approved in Forest Development Plans for each participant. To determine if any phase in to the proposed standards is required, the current status from the pilot project initiation to March 31,2003 (i.e. consistent with the Annual reporting period) was projected. Prorated average wildlife tree patch retentions by

LU were calculated for blocks in which harvesting commenced during that time period. This provided the up to date actual cumulative WTP% by Landscape Unit for blocks harvested under the pilot.

Prorated average wildlife tree patch retentions by LU were then calculated for blocks planned for harvest start dates between April 1, 2003 and March 31, 2004, based on those blocks that have SLP's prepared, and a projected cumulative WTP% by LU as of March 31, 2004 was determined. Table 22 summarizes the projected WTP retention levels. This table show all active LU's in which harvesting has or will be complete except Milligan LU, are expected to exceed the target retention levels.

Table 22: Projected Cumulative WTP levels to December 2004 on Pilot Blocks

Landscape Unit	WTP ha	Block ha	LU WTP%	Min. Target
Blueberry	323.6	3117.6	10.4%	6%
Crying Girl	116.9	1321.4	8.8%	6%
Graham	0.0	0.0	0.0%	4%
Halfway	65.2	513.9	12.7%	3%
Kahntah	63.6	658.0	9.7%	7%
Kobes	27.5	175.0	15.7%	5%
Lower Beatton	44.4	264.5	16.8%	8%
Milligan	0.0	7.2	0.0%	4%
Sikanni	0.0	0.0	0.0%	6%
Tommy Lakes	264.6	3198.5	8.3%	3%
Trutch	36.5	521.1	7.0%	5%

Strategy and Implementation Schedule:

Wildlife tree patches will be established across landscape units to act as sources of key habitat elements, provide stand level structural characteristics, and protect site-specific habitats. WTP retention levels will be assessed at the landscape level to reflect the natural variability in residual retention levels in natural disturbance patches. Retention targets will consider the relative potential importance of WTP's to contribute to habitat element supply, the intended forest management intensity consistent with the LRMP timber strategies, and the range of forested cover retained following natural disturbances. In order to manage the entire landscape, consistent WTP retention levels have been developed which are intended to replace the Applicable Performance Standard, and apply to all the participants.

New WTP's will be designed using the following guidelines:

Wildlife tree patch minimum size will be 0.25 hectares, as this is the minimum mappable size. WTP's should be of various sizes, including some areas larger than 1 hectare in larger blocks particularly (i.e. greater than 100 ha), if possible.

It is ecologically prudent when designing larger openings (i.e. greater than 500 ha) to increase the proportional amount of wildlife tree patch area (Delong 1999). Delong and Tanner (1996) reported average remnant area of about 6% for 500-1000 ha fires, and about 9% for fires greater than 1000 ha. Blocks greater than 500 hectares in size therefore, will have at least 7%WTP retention, unless requirements are waived due to forest health concerns, as determined by a professional forester.

WTP's should contain proportional representation of the vegetation contained in the general cutblock area, both merchantable and non merchantable

General priorities for WTP placement will be as follows:

1. Areas of key site specific habitat importance, such as eagle, osprey, or blue heron nests, mineral licks, and riparian areas.
2. WTP's will be distributed such that no area of the block will be greater than 250 metres from a WTP or forested boundary edge.
3. Areas of operational concern which can contribute significantly to the provision of key habitat elements (riparian habitats, large live trees, snags or declining trees, large trees, broadleaf trees, CWD, or shrubs).
4. Tree species which are uncommon in the LU and may provide some unique niche habitats (eg. cottonwood or birch in the Graham River LU-see Representation indicator)
5. Other windfirm forested stands which can provide these habitat elements.
6. WTP's will be retained for the full rotation, unless otherwise approved by the MOF.

A business objective of the participants is to integrate the management of all licences as much as possible. Consequently the revised wildlife tree patch applicable performance standards will apply to all harvesting within an LU.

Implementation:

April 2004: A common methodology will be developed for recording and tracking WTP areas, block areas, and cumulative WTP % by LU for all participants.

May 2004: WTP targets and current status will be considered in the delineation of WTP's in new SLP's, using the current status results and projections for previously prepared SLP's planned for harvesting in 2004.

Monitoring Procedure:

Participants will track the WTP areas and SU areas to calculate prorated, cumulative WTP percentages by LU in a common database.

In the event a participant's blocks planned in an LU for the year have less than the LU target WTP%, that participant will notify the other participants, and either a) demonstrate to the others satisfaction that this will not result in a non-conformance to the overall target, b) obtain their formal consent to proceed, if WTP's from other participants will assist in avoiding a non-conformance, or c) revise the proposed blocks as needed to ensure a non-conformance is avoided.

October 2004 and subsequent annual reports: Reporting of Cumulative Actual WTP% by LU in annual report, for all pilot project blocks on which harvesting commenced from November 15, 2001 to March 31 of the reporting year.

Linkages to Operational Plans:

Prior to completion of SLP's, field foresters will note the current status of WTP retention within the LU, and the SFMP target. Using the guidance provided in the SFMP, WTP's will be delineated in SLP's to meet the objectives, and achieve the WTP targets.

Annual reports will utilize areas from SLP's for those blocks in which harvesting started during the year, to update the cumulative actual WTP areas by LU.

Linkages to LRMP:

Specific areas such as dens, raptor nests, and mineral licks will be focal points in many areas for wildlife tree patch location. WTP's will also provide sources of key habitat

elements, including shrubs, large live trees, snags, broadleaf trees, and coarse woody debris that are integral to maintaining ecosystem function.

This indicator therefore supports the following LRMP objectives:

- Maintain site specific habitats.
- Maintain functioning and healthy ecosystems.

6.10. NOXIOUS WEED CONTENT

Indicator Statement	Target Statement
The % prohibited and primary noxious weeds, and known invasive weed species of concern, in seed mix analysis	Seed mix analysis will have 0% content of prohibited and primary noxious weeds as identified in the most current publication of "Noxious Weeds in the Peace River Regional District", and known invasive weed species of concern
SFM Objective: Suitable habitat elements for indicator species	
Linkage to FSJPPR: For the purposes of Section 42 of the FSJPPR this indictor statement, target statement and acceptable variance will be used to determine if forest practices are consistent with the landscape level strategies.	

Acceptable Variance:

The primary objective of seeding is to control erosion to protect water resources, with a secondary objective to discourage the establishment of invasive weeds. In some isolated instances suitable seed mixes having appropriate government approved analysis may not be available in a timely manner. If seeding must urgently be done to control erosion, it may, in rare instances, be necessary to proceed without assurances of the seed source being free of noxious weeds. A maximum of 1 exception annually will be allowable to provide for this eventuality. In the event of an exception, the participant will subsequently inspect the seeded areas to assess weed concerns, and will develop and document appropriate action plans to eliminate prohibited and primary noxious weeds, in consultation with the appropriate government agencies.

What is this indicator and why is it important?

Natural species diversity can be negatively impacted by the aggressive germination and growth of noxious weeds. These weeds may occupy sites that might normally be occupied by naturally occurring vegetation such as shrubs. Following road construction, right-of-ways are grass seeded to minimize erosion, and provide forage. This is the most significant manageable potential source of weed introduction to forested landscapes. By using only Canada #1 seed mixes, complete with government approved seed analysis, forestry companies can minimize the likelihood of accidentally introducing weeds which have the potential to significantly impact the occurrence of native species.

Current Status:

Following road construction, right-of-ways are grass seeded using standard seed mixes, with the primary objective being erosion control, and secondary objective to provide forage for wildlife or domestic animals. Participants currently require all seed purchased be

Canada # 1 seed. To date the participants have not been tracking seed application records or attaining the seed analysis certificates.

Participants have not been advised of any occurrence of noxious weeds occurring on forestry right-of-ways to date as a result of grass seeding.

Forecasting Assumptions and Analytical Methods:

- Does forecasting apply (y/n)? No

Strategy and Implementation Schedule:

Commencing in April of 2003, the participants will request and retain the seed analysis certificates when purchasing seed to confirm that prohibited and primary noxious weeds of the Peace River Regional District are not present. A current list of these weeds is included in Appendix 8.

The supervisor responsible for grass seeding will confirm from the certificate that the seed is free of prohibited and noxious weeds, and file the seed analysis certificate for future reference. In the rare event that urgent circumstances require the use of seed that does not meet the target, the supervisor will report the variance to the person responsible for the SFMP annual report. For these variance areas the supervisor will schedule action items to inspect the seeded areas within 1 year, and consult with government agencies on a site specific basis on how to address the occurrence of any prohibited or noxious weeds.

Monitoring Procedure:

This indicator will be monitored by reviewing the seed analysis certificates annually and reporting on the occurrence of any variance to the target.

Inspection and actions for variances will be recorded and tracked by the responsible supervisor. Action plans proposed to address the variances will also be monitored by the SFMP Working Group members, and progress reported annually.

Linkages to Operational Plans:

Supervisors purchasing seed for grass seeding programs will be familiar with this indicator, and will be responsible for attaining seed analysis certificates, and forming and implementing action plans where necessary to address variances.

Linkages to LRMP:

This indicator should assist in minimizing the spread of noxious weeds, which will enhance the establishment of species which meet other objectives, such as erosion control and habitat needs. Controlling noxious weeds also has positive impacts on other resource values, such as agriculture and range.

This indicator therefore supports the following LRMP objectives:

- Control the spread of noxious weeds
- Restore functioning and healthy ecosystems

6.11. SPECIES AT RISK FOREST MANAGEMENT STRATEGIES

Indicator Statement	Target Statement
The percent of species at risk with management strategies developed and being implemented	Develop forest management strategies for all species at risk in the DFA by June 2004 On an annual basis, ensure that 100% of species at risk management strategies are being implemented as scheduled
SFM Objective: Maintain habitats for species at risk	
Linkage to FSJPPR: N/A	

Acceptable Variance:

None.

What is this indicator and why is it important?

Application of landscape and stand level biodiversity management measures contribute to the maintenance of most of the biodiversity needs in the planning area. These management approaches are "coarse filter", i.e., they represent general measures to conserve a variety of wildlife species.

However, coarse filter guidelines may not be sufficient to ensure the conservation of special status species. Fine filter management guidelines are therefore required to ensure that species at risk are maintained within our ecosystems. This indicator will ensure that specific management strategies (fine filter) are in place to conserve and manage specific habitat needs for species at risk.

The habitat requirements of most species at risk are sufficiently known to allow the development of special management areas, or prescribe activities that will not interfere with the well being of these species. The Management strategies will be based on information already in place (e.g., National Recovery Teams of Environment Canada, IWMS Management Strategy) and on recent scientific literature. Management strategies will be implemented in operational plans to ensure the development/maintenance of species' habitats.

Species at risk are derived from three sources:

1. *Red listed species:* Defined by COSEWIC as taxa being considered for or already designated as extirpated, endangered, or threatened. Extirpated taxa no longer exist in the wild in British Columbia, but occur elsewhere. Endangered taxa are facing imminent extirpation or extinction. Threatened taxa are likely to become endangered if limiting factors are not reversed.
2. *Blue listed species:* Defined by COSEWIC as taxa considered being vulnerable in British Columbia. Vulnerable taxa are of special concern because of characteristics that make them particularly sensitive to human activities or natural events. Blue listed taxa are at a lower level of risk than red listed species.
3. *Identified Wildlife:* Defined by the BC Provincial Government as those species at risk that require special management attention within the Province of BC. These species are listed as Identified Wildlife Management Species (IWMS) and are protected under the Forest Practices Code of BC.

Committee On the Status of Endangered Wildlife in Canada (COSEWIC): Committee of representatives from federal, provincial, territorial and private agencies as well as independent experts that assigns national status to species at risk in Canada.

Current Status:

A tabular summary of global and regional rankings, national (COSEWIC) and provincial (Red or Blue) listings, and IWMS status, is provided in Appendix 9 for 73 species at risk in the Fort St. John TSA (20 birds, 7 mammals, 3 fish and 43 plants). None of the plant species currently have COSEWIC status or IWMS status designations, but are described according to their provincial listing.

Specific management strategies are implemented for caribou. See section 6.12.

Forecasting Assumptions and Analytical Methods:

- Does Forecasting apply (y/n)? Yes, for caribou. See section 6.12.

Strategy and Implementation Schedule:

To implement our approach to Sustaining Biological Richness (section 3.1) a species habitat synthesis needs to be conducted. The habitat synthesis (Wells et al. 2003) integrates habitat and landscape elements and species productivity and distribution. The synthesis might also incorporate ecosystem representation, where a species association is found with the ecosystem types that are used to evaluate representation. Key structural components and habitat requirements of forest-dwelling species that potentially occur in the management area are reviewed and synthesized. Some goals of this type of synthesis are:

1. *To identify major structural features of forests that relate directly to biological diversity, connect directly with species, and are manipulated by forest practices.* This provides information on the kinds, amounts, and heterogeneity of forest structures necessary to sustain organisms in the management area (habitat and landscape elements). It also provides indications on the levels of habitat measures that appear to become limiting to forest-dwelling organisms (Bunnell et al. 1999). See indicators 1 though 10 inclusive.
2. *To identify the forest-dwelling species that potentially occur in the management area, and review their habitat requirements.* This information helps evaluate the importance of forest structural attributes in sustaining species and biological richness. For some species of special concern, distribution maps may be developed.

   Developing strategies for species at risk is one step in support of goal #2.

Interim Measures: Until management strategies are available and being fully implemented, species at risk will be managed by:

- consulting with wildlife specialists within government agencies and in the private sector when preparing FDP's or FOS's, PMP's and SLP's, as appropriate.
- protecting wetlands and other water bodies adjacent to forest operations with riparian management practices,
- no harvesting or constructing roads within class A parks, protected areas, ecological reserves or LRMP designated protected areas (see 6.15), and
- being consistent with the objectives of Wildlife Habitat Areas (see 6.16), and
- protecting site specific habitats (i.e. dens, mineral licks, nests, etc.) with placement of wildlife tree patches or excluding the site specific features from harvest areas.

Monitoring Procedure:

The data source for the indicator will be the Status of Endangered Wildlife in Canada (COSEWIC) for red, and blue, listed species available on Environment Canada's website.

Identified wildlife will be monitored via the BC Provincial Government's Listing of Identified Wildlife.

The British Columbia Conservation Data Centre systematically collects and disseminates information on the rare plants and rare plant communities of British Columbia. This information is compiled and maintained in a database, which provides a centralized and scientific source of information on the status, locations and level of protection of these rare plants/ecosystems. Each of these rare plant communities is assigned a global and provincial conservation status rank according to an objective set of criteria established by the US Nature Conservancy. They are also placed on the BC Ministry of Sustainable Resource Management's "red" and "blue" lists, according to the degree of rarity.

Each year the pilot participants will review the status of the species at risk and provide a report of changes in status. Management strategies will be updated depending on changing circumstances and status of species.

Linkages to Operational Plans:

Until management strategies are available and being fully implemented species at risk will be primarily managed by consulting with wildlife specialists within Government Agencies and in the private sector when preparing FDP's or FOS's, PMP's and SLP's.

Linkages to LRMP:

- Maintain caribou habitat
- Protect or enhance habitats for red and blue listed species

6.12. CARIBOU

Indicator Statement	Target Statement
Proportion of area (%) of forest greater than the baseline target age by caribou management zone	40% of forests will be greater than the baseline target age by caribou management zone
SFM Objective: Suitable habitat elements for indicator species	
Linkage to FSJPPR: N/A	

Acceptable Variance:

No acceptable variance.

What is this indicator and why is it important?

Caribou are a listed species under various national and provincial systems as indicated in the following table (Table 23).

Table 23: Species Risk Listings for Caribou

Caribou Ecotype	COSEWIC	BC Provincial	IWMS
Northern Ecotype	Special Concern	Blue	No
Northern Ecotype (those herds which are included in the Southern Mountain National Ecological Area, which includes the Graham Herd)	Threatened	Blue	No
Boreal Ecotype	Threatened	Blue	No

Two ecotypes of woodland caribou occur in the Fort St. John DFA (Houde et al. 2002). The northern ecotype (or northern caribou) mainly uses mountainous open alpine and subalpine habitats in summer, where they feed on grasses, sedges, forbs and terrestrial lichen. Calving takes place primarily at high elevations, although some animals disperse throughout forested habitats as well (Stevenson 1990). In winter they are found in mature coniferous forest, especially lower elevation lodgepole pine (Pinus contorta) or pine/spruce stands, where they feed primarily on terrestrial lichens. Dry meadows are used when the snow depth is low or moderate, but are abandoned during periods of deep snow. Under deep or heavily crusted snow conditions where it is difficult to crater for terrestrial forage, northern caribou may switch to arboreal lichens. Some herds seem to prefer windblown alpine slopes in winter, where high winds minimize snow accumulation and expose terrestrial forage. During spring migration, caribou tend to use low elevation movement routes and feed on green vegetation in openings. Immature forests (<80 years) are usually avoided, while mid-successional fire originated stands (~80-120 years) and old forest stands (>140 years) are preferred because of the presence of terrestrial lichen. (Stevenson 1990).

The latest TSR 2 included targets for forest age by Caribou management zone for the Northern Ecotype. These targets are shown in the following table (Table 24) under current status.

In 2000, Canadian Forest Products Ltd. (Canfor) – Fort St. John Division, in cooperation with Forest Renewal BC (FRBC) and BC Environment, initiated a Global Positioning System (GPS) telemetry study to identify seasonal movements and potential migration routes of woodland caribou (Rangifer tarandus caribou) in the Graham River watershed of northeastern British Columbia. The Graham River watershed falls within the range of a population of northern ecotype caribou known as the Graham herd (Heard and Vagt 1998). Analysis of this data is ongoing and will direct future management direction for Caribou in this area of the DFA.

Less information is known about the boreal ecotype in British Columbia. It prefers muskeg/spruce peat bog habitats in the BWBS, and feeds mainly on terrestrial lichens on raised microsites, and sometimes arboreal lichens in black spruce (Picea mariana) stands (D. Seip, pers. comm.). Since boreal caribou utilize a dispersed distribution strategy to avoid predation, the availability of large areas of habitat is important to their survival (BCC 2001).

The Milligan caribou management zone represents the range for the Boreal Ecotype within the Ft St John DFA. There are approximately 511,684 ha of forested land within this area of which only 127,684 ha (25%) are considered to contribute to the long-term timber harvesting land base. Given the low proportion of THLB within this area and caribou use of stands primarily outside of the THLB no specific target is required.

Current Status:

The following table (Table 24) indicates the current status FDP status and targets for each of the Northern Ecotype caribou management zones.

Table 24: Current FDP Status and Targets for Caribou Management Zones

Caribou Management Zone	Age Group and Targets										Total Forested Area	Total THLB
	2002 ha	%	FDP ha	%	THLB ha	2002 ha	%	FDP ha	%	THLB ha		
Graham	<140 Years Old					Target: 40% >140						
	66,053	58.5%	64,956	57.6%	26,388	46,796	41.5%	47,893	42.4%	15,684	112,850	42,072
Kobes	<120 Years Old					Target: 40% >120						
	17,209	49.6%	13,968	38.5%	8,246	17,459	50.4%	20,701	59.7%	10,367	34,669	18,613
Hackney	<100 Years Old					Target 40%: >100						
	55,438	45.5%	54,683	41.5%	22,994	66,342	54.5%	67,097	55.1%	32,829	121,780	55,823

Forecasting Assumptions and Analytical Methods:

Targets indicated in the above section were modeled in the current TSR 2. The approved harvest levels and targets were maintained for the full 250 year planning horizon.

Strategy and Implementation Schedule:

The current strategy to manage caribou habitat is to maintain areas of forest older than the minimum target indicated for each caribou management zone. Each FDP or FOS will be analyzed to ensure that the minimum thresholds of area of forest above the target is maintained and not impacted by the proposed operations.

Portions of the Graham and Kobes caribou management zones are covered by the Graham River IRM Plan area. This area has designated harvest clusters and forest ecosystem networks defined. Harvesting will follow the sequential harvesting outlined in the Graham River IRM plan as described in indicators 18,19 and 20.

There is currently a caribou study underway of the Boreal Ecotype in the Ft Nelson area. As information becomes available from this study and strategies are developed this indicator will be reviewed to determine if it is still appropriate.

Monitoring Procedure:

Data sources include vegetation resource inventory (VRI), caribou management zone maps, and GENUS data.

VRI information is updated either by the Provincial Government or by Forest Licensees under contract with the Government. These data sources are usually only updated / replaced in five to 10 year intervals. The GENUS system is a "real-time or live" database that is maintained and updated by the participant's staff as they carry out their daily activities.

Reports will be generated at for each caribou management zone. The report is a tabular report of the percent of forest area above the baseline target for each caribou management zone. The calculation is described below:

Report calculation: Forest cover is projected to the current date by overlaying GENUS information. Area greater than the baseline target is summed for each management zone and expressed as a percent of the forested area of the management zone. The FDP or

FOS is then overlaid with the forest cover and projected to the end of the development period and the calculation redone to determine the FDP/FOS condition.

Linkages to Operational Plans:

To monitor this indicator, the reports will be run at each FDP or FOS plan and compared to the target for each management zone and proposed development adjusted to be consistent with the target if necessary.

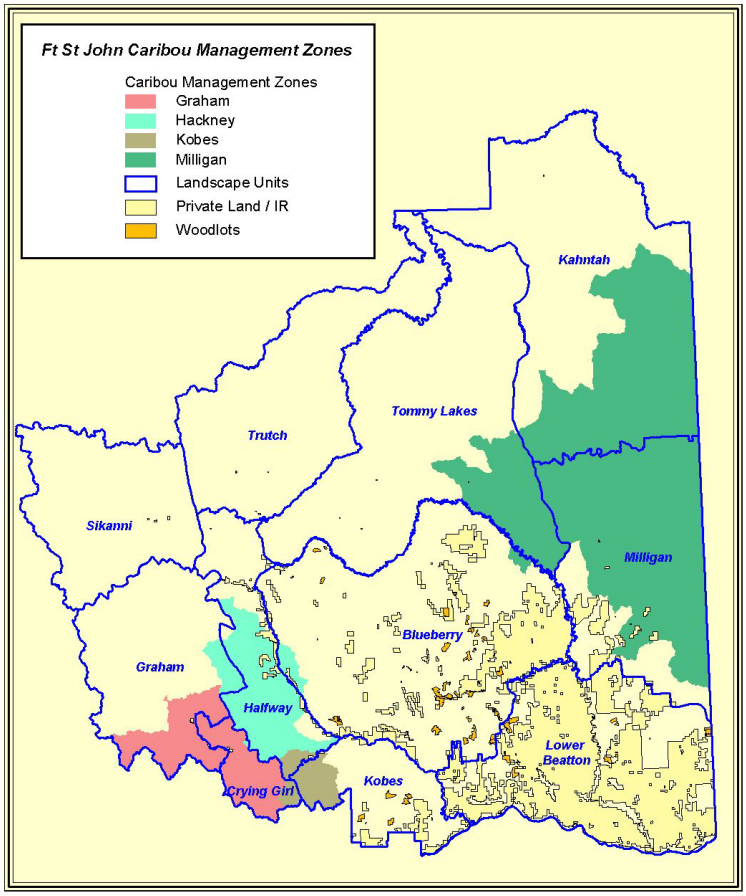


Figure 6: Caribou Management Zones within the Ft St John DFA

Linkages to LRMP:

This indicator helps to support the following LRMP objectives:

- Maintain functioning and healthy ecosystems
- Maintain caribou habitat.
- Maintain high capability ungulate winter habitat.
- Maintain habitat for priority furbearing species.

6.13. CONIFEROUS SEEDS

Indicator Statement	Target Statement
The proportion of seeds for coniferous species collected and seedlings planted in accordance with the regulation	All coniferous seeds will be collected and seedlings will be planted in accordance with the regulations
SFM Objectives: Conserve genetic diversity of tree stock	
Linkage to FSJPPR: N/A	

Acceptable Variance:

The acceptable variance is zero unless the District Manager authorizes a transfer variance request.

What is this indicator and why is it important?

Genetic diversity of seedlings used for reforestation is ensured through the ministry's seedlot registration policies and standards. Cones and seed obtained from wild forest stands must be collected from a minimum of 10 trees. The ministry licences tree seed orchards to ensure that their design and management practices maintain genetic diversity. Seed derived from licensed orchards must also contain a minimum level of genetic diversity - or effective population size (Ne) – as measured by the quantity of pollen and cones from each contributing tree in the orchard. Orchard seedlots must have a minimum Ne of 10. Similar registration requirements also apply to vegetatively propagated reforestation materials. These rules ensure that planted forests contain sufficient genetic diversity so they are able to withstand any biotic (e.g. insect or disease) or abiotic (e.g. wind, snow, frost, or climate change) event as well as a naturally regenerated forest."

"Transfer guidelines minimize the risks of maladaptation or growth loss associated with moving seed or vegetative material from its source to another location. Exceeding the transfer limits may decrease productivity or increase susceptibility to frost, insects or disease. Poor survival or outright mortality may occur when seed is transferred past its ecological tolerance; however, losses in productivity can be substantial even over relatively short distances, particularly where elevation is concerned (Ministry of Forests Tree Improvement Branch publication).

Current Status:

All (100%) trees grown to be planted within the DFA are registered in accordance with the Tree Cone, Seed and Vegetative Material regulation.

All seeds have been registered with and tracked by the Ministry of Forests Seed Center since 1995.

In 2002 all coniferous seeds were collected and seedlings were planted in accordance with the regulations.

Forecasting Assumptions and Analytical Methods:

- Does forecasting apply (y/n)? No

Strategy and Implementation Schedule:

Seeds will be collected and planted in accordance with the Tree Cone, Seed and Vegetative Material regulation. Based upon the seedlot registration information seeds are planted only where they are genetically and ecologically appropriate for the site.

Monitoring Procedure:

All reforestation activities are documented and tracked in Genus. Seedlots are tracked and recorded for every area planted.

Linkages to Operational Plans:

SLP's prescribe the areas to be reforested. This information is used by Silviculture staff to determine appropriate Seedlots to use that conform to transfer guidelines.

Linkages to LRMP:

Maintain functioning and healthy ecosystems.

6.14. ASPEN REGENERATION

Indicator Statement	Target Statement
% Natural Regeneration of aspen	We will use 100% natural regeneration for aspen to ensure the conservation of genetic diversity of tree stock
SFM Objectives: Conserve genetic diversity of tree stock	
Linkage to FSJPPR: N/A	

Acceptable Variance:

The acceptable variance is zero unless the District Manager authorizes an exemption; for example operational trials of vegetative propagules or deciduous seedlings.

What is this indicator and why is it important?

Natural regeneration maintains the genetic diversity of harvested deciduous species. Maintenance of genetic diversity is important for adaptive processes of deciduous species, and for the maintaining the health, productivity and resiliency of the tree species and ecosystems in the face of changing environmental conditions.

Current Status:

All deciduous reforestation is currently from natural regeneration (coppice system; meaning root and stump suckering).

Forecasting Assumptions and Analytical Methods:

- Does forecasting apply (y/n)? No

Strategy and Implementation Schedule:

Natural reforestation will follow all harvesting of deciduous species. Reforestation failures will generally be reforested to coniferous species.

Monitoring Procedure:

All reforestation activities are documented and tracked in Genus.

Linkages to Operational Plans:

SLP's describe the areas to be reforested and the method of reforestation.

Linkages to LRMP:

Maintaining and conserving genetic diversity supports biological diversity at the genetic level. This indicator therefore supports the following LRMP objective:

- Maintain functioning and healthy ecosystems.

6.15. CLASS A PARKS, ECOLOGICAL RESERVES AND LRMP DESIGNATED PROTECTED AREAS

Indicator Statement	Target Statement
Hectares of Forestry Related Harvesting or Road Construction within Class A parks, protected areas, ecological reserves and LRMP designated protected areas	Zero hectares of forestry related harvesting or road construction within Class A parks, protected areas, ecological reserves or LRMP designated protected areas
SFM Objective: To have representative areas of naturally occurring and important ecosystems, and rare physical environments protected at both the broad and site specific levels across or adjacent to the DFA	
Linkage to FSJPPR: N/A	

Acceptable Variance:

No variance, other than government direction requiring the forest industry to move operations into these areas.

What is this indicator and why is it important?

This indicator identifies whether the values protected within Class A parks, protected areas, ecological reserves and LRMP designated protected areas are going to be impacted by forestry related harvesting and road construction. Targeting for no forestry related harvesting or road construction will contribute to the protection of these ecosystems.

Current Status:

In order to avoid operating in these areas, forestry activities need to clearly identify the status and location of Class A parks, protected areas, ecological reserves and LRMP designated protected areas.

Protected areas and sites of special biological significance within or adjacent to the DFA have been identified through a variety of processes.

LRMP Protected Areas and Parks

Goal 1 protected areas are established primarily for ecological representation to protect viable examples of natural diversity such as major terrestrial, marine, and freshwater systems, characteristic habitats, hydrology and landforms and/or characteristic backcountry recreational or cultural and heritage features.

Goal 2 protected areas represent special features such as cultural, heritage and recreation sites, rare and endangered species and critical habitats, outstanding or unique botanical, zoological, geological and palaeontological features, outstanding or fragile culture and heritage features, and outstanding outdoor recreational features such as trails.

Potential protected areas were initially identified through a technical team formed from government agencies (RPAT). This group delineated Areas of Interest which met the above criteria. The Fort St. John LRMP then used this information to finalize proposed Protected Area (PA) boundaries.

Following is a summary of the classified protected areas in or adjacent to the DFA, and their major characteristics.

Milligan Hills Provincial Park (7226 ha) is located in the Alberta Plateau, Milligan Hills Park and provides representation of the Clear Hills ecosection and the BWBS wk2 biogeoclimatic subzone. The area is characterized by level to rolling plateaus with mixed boreal white and black spruce and deciduous forests. The park provides woodland caribou habitat for endangered Alberta populations.

Graham-Laurier Park (99,904 ha) is located in the southwest part of the DFA, and provides representation of ESSF mv2 and 4, BWBS mw 1 and wk2 and Alpine Tundra biogeoclimatic zones. These zones illustrate the transition from river bottom, old-growth forests to sub-alpine and alpine areas. The Boreal Black and White Spruce zone is found in the southeast corner of the park along the Graham River and contains extensive stands of old-growth habitat. The Engelmann Spruce Sub-alpine Fir occurs along the lower elevations of each drainage. This is a sub-alpine zone characterized by severe climatic conditions; heavy growth of Engelmann spruce and sub-alpine fir thins rapidly to scrubby sub-alpine fir. This vegetation is replaced by the Alpine Tundra zone at higher elevations.

The Graham-Laurier Park provides landscape transition from the foothills to the Rocky Mountains through representation of the Misinchinka Ranges and Peace Foothills ecosections. The Misinchinka Ranges, found in the western portion of the park, are unlike the rest of the Rocky Mountains due to their lower elevation and relief and reduced alpine and valley glaciation.

The park contains medium or high capability habitat for caribou, grizzly bear, moose and furbearers, high fisheries values in the Graham River system, First Nations traditional use values, and several undeveloped intact watersheds. Christina Falls is a significant physical feature which a popular destination for backcountry recreationalists. Virtually all of the primitive ROS areas in the DFA is located in this protected area. The area has significance to First Nations as well.

Redfern-Keily Park (80,771 ha) provides representation of the Eastern Muskwa Range eco-section and the SBS and BWBS Biogeoclimatic zones. The park provides high capability habitat for moose, caribou, Stone's sheep and Rocky Mountain elk, as well as old growth furbearer habitat as well as First Nations values, major lake systems, and a full range of backcountry recreation opportunities.

Butler Ridge Provincial Park (6,134 ha) is located in the Peace Foothill ecosection just east of the Rocky Mountains, adjacent to the DFA. The area provides important winter range for caribou and stone sheep habitat in the higher elevations as well as moose and elk winter range in the lower elevations. A blue-listed species, the Arkansas rose, has been recorded in the park.

Peace-Boudreau Protected Area (19,741 ha) is an undesignated protected area located in the Peace Lowlands ecosection adjacent to the south boundary of the DFA, and provides representation of the BWBS mw1 Biogeoclimatic zones.

The Northern Rocky Mountains Park (665,709 ha) is located adjacent to the northwestern boundary of the DFA, provides representation of the Eastern Muskwa Ranges, Muskwa Foothills and Muskwa Plateau ecosections. The park landscape consists of a series of northwest-southeast trending valley and ridges. Glaciation has resulted in broad U-shaped river valley bottoms, mountain cirques and moraine ridges. One of the notable features of the Northern Rocky Mountains Park is the diversity of water features. The area is accentuated by major rivers, clear, cold streams, waterfalls, rapids, small glaciers and lakes, and includes a number of undeveloped watersheds.

The Boreal White and Black Spruce, Spruce Willow Birch and the Alpine Tundra biogeoclimatic zones are found in the Northern Rocky Mountains Park. Forests in the valley bottoms are dominated by white spruce and aspen, and are replaced by sub-alpine fir and white spruce at higher elevations. Alpine plant communities consist of dwarf willows, grasses, sedges, forbs and lichens. The park also has numerous wetlands and native grasslands. Old growth white spruce forests can be found along the major river valley bottoms.

Pink Mountain Provincial Park (92 ha) is located in the Muskwa Foothills eco-section. This area represents a part of the eastern foothills of the Rocky Mountains. The subalpine zone, located at 1100 to 1550 m elevation consists primarily of black and white spruce, lodgepole pine, willow and birch. Above 1550 m, the area consists of alpine tundra vegetation. The vegetation consists of shrubs, herbs, mosses and lichens which all contribute to support the significant diversity of wildlife species. The park also features palaeontological sites.

Sikanni Old Growth Provincial Park (1,439 ha) is located within the Fort Nelson Lowlands eco-section and Boreal White and Black Spruce biogeoclimatic zone. It protects locally significant alluvial old growth white spruce forests of the Muskwa Plateau and the associated wildlife species typical of old growth forests.

Sikanni Chief Canyon Protected Area (4,641 ha) encompasses a distinct section of two river canyons within the Sikanni Chief - Buckinghorse drainage of the Muskwa Plateau eco-section. Boreal white and black spruce forests dominate the landscape above the canyon. The park features alluvial stands of white spruce along the Sikanni Chief River and locally significant mountain goat populations.

Ekwan Lake Protected Area (1892 ha) is situated in the Fort Nelson Lowlands which includes the Clear Hills. Boreal white and black spruce forests surrounds Ekwan Lake. The lake features First Nations and fish and wildlife values.

Beatton-Doig Canyon Protected Area (948 ha) is an undesignated protected area that features unique cutbank and grassland areas in the Peace Lowlands eco-section.

Sikanni Chief Falls Protected Area (606 ha) features recreational and palaeontological values.

Chinchaga Lakes Protected Area (1,475 ha) is an undesignated protected area that provides representation of the Clear Hills ecosection and wet cool Boreal White and Black Spruce biogeoclimatic zone typical of the boreal plains. The primary role is to protect the ecological values of the local lakes and critical habitat for an endangered Alberta population of woodland caribou, and First Nations values.

Peace River Corridor Provincial Park (2,014 ha) is located in the Boreal White and Black Spruce (BWBS) biogeoclimatic zone within the Peace Lowlands ecosection. This park is straddles the DFA's south boundary. The open aspen and south facing grassland hillsides provide important wintering habitat for ungulates such as mule and white-tailed deer and the islands provide important moose calving sites in the spring. The area is a prime migratory waterfowl staging area. Old growth cottonwood with mixed stands of spruce and aspen dominate the area. Bald eagles and other raptors nest within the large cottonwoods located alongside the Peace River.

Various red and blue-listed species have been identified within the corridor. These species include fennel-leaved desert parsley (Lomatium foeniculaceum var foeniculaceum) and slender penstemon (Penstemon gracelis). Although not a red or blue-listed plant species, prickly pear cactus is abundant throughout the area.

Beatton River Provincial Park (185 ha) is located at the Beatton River and Peace River junctions in the BWBS mw1 and Peace Lowlands ecosection; The park is typical riparian habitat for the area.

Beatton Provincial Park (312 ha) and Charlie Lake (92 ha) are recreational campgrounds located on Charlie Lake, in typical upland aspen and spruce forests within the BWBS mw1.

Taylor Landing Provincial Park (2 ha) is located in the Peace Lowland ecosection and is covered by the boreal white and black biogeoclimatic subzone. Forest cover is comprised of balsam poplar, trembling aspen, willows, alders and white spruce. The park is immediately adjacent to the DFA's south boundary.

Peace River/Boudreau Protected Area (6,750 ha) is located adjacent to the south boundary of the DFA, and provides representation for the BWBS mw1 biogeoclimatic subzone provides habitat for a number of wildlife species including trumpeter swan nesting sites around Boudreau Lake. The area also contains a number of cultural heritage sites, including the first site of European settlement on mainland BC at Rocky Mountain Fort, and a historic travel corridor for First Nations, early European explorers and fur traders.

Only very minor amounts of logging occurred in any of the protected areas prior to their establishment. Since establishment, no industrial timber harvesting operations have occurred.

Ecological Reserves

Ecological reserves are areas selected to preserve representative and special natural ecosystems, plant and animal species, features and phenomena. The key role of ecological reserves is to contribute to the maintenance of biological diversity and the protection of genetic materials. Scientific research and educational purposes are the principle uses of ecological reserves. The benefits of these areas are the provide for the maintenance of biological diversity, they provide outdoor laboratories and classrooms for studies, and they can act as benchmarks against which environmental changes can be measured.

Three ecological reserves are identified in the DFA.

The Cecil Lake Reserve (129 ha) is located in the BWBS mw1 in an important waterfowl area. Its stated goal is preservation of aspen, fen, and bog ecosystems representative of the Peace River area of the Alberta Plateau.

The Clayhurst Reserve (316 ha) was established to conserve grassland and aspen grove communities on the slopes along the Peace River.

The Sikanni Chief River Reserve (2401 ha) was established for conservation of alpine and subalpine ecosystems representative of the Northern Rocky Mountains, and overlaps some of the protected areas noted above.

No previous or current harvesting activities have occurred near these Ecological Reserves.

Forecasting Assumptions and Analytical Methods:

- Does forecasting apply (y/n)? No

Strategy and Implementation Schedule:

As new areas are identified and declared for protection and made known to the participants, within one month detailed location and management information will be requested from the government by the Planning Supervisor.

Map information will be digitally stored by the GIS Supervisor within 1 month of this information being made available by the government, and planning maps will display this information, provided the data is not considered sensitive (e.g. Some WHA's will not be shown on public maps).

Applicable management information will be circulated to effected staff by the Planning Supervisor for consideration in all planning activities within 1 month of receipt of this information from government.

Monitoring Procedure:

Changes to protected areas will be reported in future annual reports.

Linkages to Operational Plans:

Staff members will refer to base maps to locate protected areas when preparing operational plans. When planned activities are in the general vicinity of the identified areas, staff members will ensure operational plans are consistent with any management guidelines for these protected areas.

Linkages to LRMP:

This indicator supports the following LRMP objectives:

- Maintain functioning and healthy ecosystems
- Maintain fish habitat and water quality for priority fish species
- Maintain high quality fisheries in natural settings
- Maintain site-specific habitats
- Minimize wildlife habitat fragmentation and maintain existing large mammalian predator/prey system
- Protect or enhance habitats for red and blue listed species
- Provide a full range of wilderness recreation opportunities identified in the ROS as primitive, semi-primitive non-motorized, and semi-primitive motorized
- Maintain the headwaters of major rivers and streams as a source of water for current and future generations
- Manage backcountry recreation and tourism opportunities in a natural or natural appearing condition

6.16. UNGULATE WINTER RANGES, WILDLIFE HABITAT AREAS AND MKMA

Indicator Statement	Target Statement
Proportion of activities consistent with objectives of Ungulate Winter Ranges (UWR) and the Muskwa-Kechika Management Area (MKMA) and general wildlife measures for Wildlife Habitat Areas (WHA)	All pilot participant activities will be consistent with objectives of Ungulate Winter Ranges and the MKMA and general wildlife measures for Wildlife Habitat Areas
SFM Objective: To have representative areas of naturally occurring and important ecosystems, and rare physical environments protected at both the broad and site specific levels across or adjacent to the DFA	
Linkage to FSJPPR: N/A	

Acceptable Variance:

No variances unless authorized by the Regional Manager MWLAP.

What is this indicator and why is it important?

Consistency with the objectives of WHA's and UWR's ensures the protection of specific features and critical habitat. The objectives designed for these areas generally allow activities provided that protection of the special features of these areas is maintained.

Wildlife Habitat Areas are mapped areas of habitat that are biologically limiting to a species or are remaining examples of identified plant communities. They are established by MWLAP to protect critical habitat elements for one or more species of Identified Wildlife. Identified Wildlife are considered to be sensitive to habitat alteration associated with forest and range practices and are considered to be at risk (i.e. endangered, threatened, vulnerable, or regionally important).

Ungulate Winter Range refers to an area that is identified as being necessary for the winter survival of an ungulate species.

Appendix 10 provides additional information on establishment criteria for WHA's and Ungulate Winter Ranges.

MKMA objectives as specified in the LRMP are found referencing the Sikanni LU in Table 2.

Current Status:

Wildlife Habitat Areas

Currently within the DFA, 7 wildlife habitat areas (WHA's) have been identified and approved for bull trout (1154 ha) and 8 WHA's (approx. 399 ha) delineated for mountain goats in the DFA. These areas have general wildlife measures established. Currently no activity occurs in or near these areas.

Ungulate Winter Ranges

Currently no ungulate winter ranges have been established in the DFA.

MKMA

No new activities have been proposed within the MKMA since the enactment of the MKMA Act. Grandparented blocks are identified in 6.21.

Forecasting Assumptions and Analytical Methods:

- Does forecasting apply (y/n)? No

Strategy and Implementation Schedule:

The locations of the WHA's are maintained within the pilot participants GIS. The pilot participants will identify any activities proposed near or within WHA's and UWR's. All SLP's within Ungulate Winter Ranges and Wildlife Habitat Areas will be referred to government to ensure consistency with the objectives.

Implementation to ensure consistency with the objectives of the MKMA is primarily detailed in sections 6.18, 6.19, 6.21, 6.45.

Monitoring Procedure:

When activities are proposed and/or implemented within Ungulate Winter Ranges and Wildlife Habitat Areas a summary of these activities will be presented in the annual report.

Linkages to Operational Plans:

FOS's and SLP's will be developed in accordance to the objectives of the WHA's ands UWR's.

Linkages to LRMP:

LRMP objectives include:

- Maintain fish habitat and water quality for priority fish species
- Protect or enhance habitats for red and blue listed species

6.17. REPRESENTATIVE EXAMPLES OF ECOSYSTEMS

Indicator Statement	Target Statement
Proportion of area (%) of forest stands by leading species by NDU in an unmanaged condition	100% of baseline targets for forested stands by leading species by NDU will be met
SFM Objective: To have representative areas of naturally occurring and important ecosystems, and rare physical environments protected at both the broad and site-specific levels across or adjacent to the DFA	
Linkage to FSJPPR: N/A	

Acceptable Variance:

No acceptable variance for DFA targets.

10 ha or 10% of area, which ever is greater for Leading Species by NDU that have an uncommon distribution if required for access purposes.

No acceptable variance for Leading Species by NDU that are not identified as uncommon in Table 25.

What is this indicator and why is it important?

The following is adapted from Bunnell 2002 and Wells et. al. 2003 a, b.

Habitat structures and patterns that are monitored by the indicators of, forest type, seral stage, patch size, snags/cavity sites, coarse woody derbies, riparian, shrubs, and wildlife tree patches. These are designed as "medium filter" to capture the habitat requirements of many species. There are, however, many more species about which we know little, but that

may be restricted to particular ecosystem types or geographic localities. Most species, but especially those for which knowledge is sparse or absent, are best sustained by ensuring that some portion of each distinct ecosystem type is represented in a relatively unmanaged state.

Unmanaged stands also play an important role as a precautionary buffer against errors in efforts intended to sustain species in the managed forest. While we can develop management practices intended to keep many forest-dwelling species in managed forests, we also recognize that we have insufficient knowledge to ensure that proposed practices will meet all species' requirements in managed stands. That is particularly true of the many poorly known, or completely unknown, organisms. Unmanaged stands are an ecological safeguard against the inevitable errors that occur during management.

Poorly understood functions also will be sustained in unmanaged areas. For example, natural disturbances can occur that would otherwise be suppressed or reduced. While some aspects of natural disturbance can be mimicked in managed stands, other aspects cannot be (e.g., large patches of burned snags, or large areas attacked by spruce or balsam bark beetles). Some species benefit from or rely on these features of natural disturbance, so may not be productive in managed landscapes.

A final function of unmanaged areas in the landscape is to provide an ecological baseline against which the effects of human activities can be compared (Arcese and Sinclair 1997). This role as a benchmark is especially critical in the long-term monitoring required to assess effectiveness of forest practices.

It is preferable to conduct this type of representative management based on site series or clusters of site series or plant associations. Until such time as this type of information is available leading species shall be the coarse filter for representativeness. An unmanaged condition for the purposes of this indicator is considered as areas not contributing to the long-term harvest level within the DFA or non-timber harvesting land base (Non-THLB)

Current Status:

The following tables indicate the current status of forest stands by leading species and NDU for Ft St John.

Table 25: Proportion of Leading Species by NDU Unmanaged

Natural Disturbance Unit	Sub NDU	Leading Species	Total Forested Area	Unmanaged Forests		
				Non-THLB	%Non-THLB	Baseline Target %
Boreal Plains		AC	22,037	9,592	43.5%	12%
		AT	550,261	225,543	41.0%	12%
		BL	1,161	846	72.9%	12%
		Ep	39,348	38,773	98.5%	12%
		LT	14,752	14,752	100.0%	12%
		PL	510,157	189,727	37.2%	12%
		SX	362,294	79,930	22.1%	12%
		SB	1,122,681	1,122,393	100.0%	12%
Boreal Plains Total			2,622,690	1,681,555	64.1%	
Boreal Foothills	Valley	AC	173	168	97.0%	80%
		AT	2,589	1,170	45.2%	12%
		BL	0	0	0.0%	0%
		Ep**	5	5	100.0%	100%
		PL	14,623	6,609	45.2%	12%
		SX	15,673	2,930	18.7%	12%
		SB	1,363	1,363	100.0%	12%
	Valley Total		34,425	12,244	35.6%	
	Mountain	AC	92	92	100.0%	100%
		AT	2,616	1,779	68.0%	12%
		BL	13,742	13,599	99.0%	12%
		Ep	28	28	100.0%	100%
		PL	35,835	26,600	74.2%	12%
		SX	100,822	59,842	59.4%	12%
		SB	924	924	100.0%	12%
	Mountain Total		154,058	102,864	66.8%	
Boreal Foothills Total			188,483	115,108	61.1%	
Northern Boreal Mountains		AC	626	557	89.0%	70%
		AT	8,558	8,514	99.5%	12%
		BL	5,384	5,361	99.6%	12%
		PL	31,874	19,943	62.6%	12%
		SX	114,208	94,445	82.7%	12%
		SB	4,913	4,912	100.0%	12%
Northern Boreal Mountains Total			165,562	133,732	80.8%	
Omineca	Valley	AC	33	33	100.0%	100%
		AT	364	248	68.2%	50%
		BL*	8	8	100.0%	100%
		PL	3,773	2,763	73.2%	12%
		SX	4,445	2,737	61.6%	12%
		SB	269	269	100.0%	12%
	Valley Total		8,892	6,059	68.1%	
	Mountain	AC*	2	2	100.0%	100%
		AT	510	432	84.8%	50%
		BL	17,861	17,674	99.0%	12%
		PL	9,945	8,291	83.4%	12%
		SX	59,039	51,187	86.7%	12%
		SB	313	313	100.0%	100%
	Mountain Total		87,669	77,899	88.9%	
Omineca Total			96,561	83,958	86.9%	
Grand Total			**3,073,297**	**2,014,353**	**65.5%**	

* 100% contained within a Park

** Polygon is a portion of polygon split by the NDU Line between Boreal Foothills Valley and Mountain.

Areas highlighted in Table 25 above have an uncommon distribution within the NDU. These areas have a higher potential to provide unique habitat values for the landscape that they occur in and as such have had a higher level of protection afforded to them.

The current FDP has only one block with harvesting proposed in an uncommon Leading Species/NDU combination. Canfor block 20016 FDP area has 4 ha of Boreal Foothills-Valley AC within its proposed boundary. This area will be assessed in the field to confirm species composition and included in riparian or WTP if the stand type is leading AC.

Forecasting Assumptions and Analytical Methods:

This indicator is forecasted at each TSR. Forested areas and types undergo an extensive review to see whether they contribute to timber supply. The current status was derived from the base case analysis definition of the timber harvesting land base conducted in support of TSR 2.

Strategy and Implementation Schedule:

Setting aside a large percentage of the land base as unmanaged forest to ensure that biological richness is sustained is not compatible with economic and social objectives of managed forests. Fortunately, forest tenures in BC typically have 20% to 50% or more of the forest in an unmanaged state. This unmanaged area is of two types: 1) areas that are not harvested or are harvested only lightly because of concerns other than conserving biological diversity (e.g., operability, visual quality, watershed protection, favoured-species management[7]); and 2) areas intentionally set aside to protect biological diversity (e.g., wildlife tree patches, riparian buffers). This unmanaged proportion of the land base exceeds the objective for protected areas of most jurisdictions (typically 12%, following the Brundtland commission), and is comparable to many recommendations derived from principles of conservation biology (e.g., 33 to 50%; Noss 1993; Sætersdal and Birks 1993; Stokland 1997; Soulé and Sanjayen 1998) (Bunnell 2002).
On the Ft St John DFA, wholly constrained areas represent 64.5% of the forest. Partially constrained areas, having 50 to 90% of the volume constrained, represent only 1% of the forest area.[8]

When inventories such as VRI and ecosystem (site series) inventories are completed the intention is to conduct a representative analysis to ensure that ecologically distinct habitats are maintained in an unmanaged status. Until this is completed forest stands by leading species will be used as a surrogate.

Monitoring Procedure:

Data sources for this include forest cover, GENUS data, Natural Disturbance Unit boundaries and DFA boundaries.

All partners in the FSJRBCPP are using GENUS to track their operational data. Forest cover will be updated with harvesting data from GENUS as required to complete leading species analysis. Disturbances due to fires and other industrial users are generally updated less frequently (approximately 5 year intervals) and are the responsibility of the Provincial Government.

[7] Even though favoured species, such as caribou and Northern Goshawk, are a component of biological richness, such species-specific approaches can work against sustaining all of biological diversity. It is important to assess how areas set aside for a single species contribute to the broader goals of representation.

[8] A "net-down" of 50 to 90% in the Timber Harvest Analysis should ensure that there will be unharvested portions of each leading species in the area.

During each TSR process this indicator will be analyzed to ensure that the required representation of forest types by leading species is met.

Each FOS or FDP will have the leading species NDU combinations highlighted in the above Table 25 reviewed and plans adjusted if necessary to ensure that the targets for these species are achieved.

As new inventory information is collected and incorporated into timber supply analysis this indicator will be reviewed and confirmed that it is still being met.

Linkages to Operational Plans:

FDP or FOS's will be reviewed to ensure that those NDU species combinations identified as important and at low levels are not effected by operations.

Linkages to LRMP:

This indicator helps to support the following LRMP objectives:

- Maintain functioning and healthy ecosystems
- Maintain site specific habitats
- Protect or enhance habitats for red and blue listed species.

6.18. GRAHAM HARVEST TIMING

Indicator Statement	Target Statement
Relative timing of commencement of operational harvesting within clusters in the Graham River IRM Plan area	Harvesting will not commence prior to the planned harvest start date for any cluster
SFM Objective: Provide opportunities for a feasible mix of timber, recreational activities and non-timber commercial activities Management strategies address important values in SMZ areas.	
Linkage to FSJPPR: For the purposes of Section 42 of the FSJPPR this indictor statement, target statement and acceptable variance will be used to determine if forest practices are consistent with the landscape level strategies.	

Table 26: Graham River IRM Plan- Cluster Area and Timing Schedule

Definitions:

Total Area:	The total size of a Cluster including inoperable areas
Gross Contributing Area:	The Contributing Area (base area) for FPC Biodiversity calculations
IRM Net Harvest Area:	Estimated amount of Gross Operable area considered harvestable after IRM factors are taken into account
Proposed Schedule:	General timing of harvest sequence over the course of the Plan
Maximum Cumulative Merch ha	**The maximum cumulative merch hectares (all previous periods) allowed in cutblocks to period end (indicator)**

Cluster #	Resource Management Zone	Total Area (ha)	Gross Contrib. Area (ha)	Est. IRM Net Harvest Area (1) (ha)	Est. Proportion of Cluster Proposed for Harvest	Proposed Harvest Schedule Start-End	Harvest Period	# of Years	Maximum Cumulative Merch ha within blocks to be harvested
1	Graham-South	1,946	1,922	**706.0**	36.3%	June 1998 July 1999			
17	Graham-South	627	620	**294.0**	46.0%	Nov. 1999 April 2000			
2	Graham-South	2,208	2,085	**312.9**	14.2%	July 2000 April 2002			
3	Crying Girl	2,439	2,115	**620.5**	25.4%	Nov 2002 April 2003			
4	Graham-South	3,975	3,705	**1162.0**	29.2%	**July 2003** April 2007			
Sub-total		11,195	10,447	**3095.4**		1998 2007	Period 1	9	**3869**
5	Crying Girl	2,228	2,181	**748.6**	33.0%	**April 2007** Nov. 2008			
6a	Graham-South	2,508	2,369	**893.4**	35.0%	**Nov. 2008** Nov. 2009			
6b	Graham-South	884	775	**257.5**	29.0%	**Nov. 2009** April 2010			
6c	Graham-South	726	541	**260.0**	35.0%	**April 2010** April 2012			
Sub-total		6,346	5,866	**2159.5**		2007 2012	Period 2	5	**6569**
7	Crying Girl	1,848	1,812	**577.2**	31.0%	**April 2012** April 2013			
8a	Crying Girl	1,904	1,638	**840.0**	44.0%	**April 2013** April 2014			
8b	Crying Girl	2,184	1,877	**812.3**	37.0%	**April 2013** April 2017			
Sub-total		5,936	5,327	**2229.5**		2012 2017	Period 3	5	**9355**
9	Crying Girl	952	840	**291.0**	30.0%	**April 2017** Nov. 2017			
10	Crying Girl	966	788	**317.0**	32.0%	**Nov. 2017** April 2018			
11	Graham-South	1,768	1,717	**594.0**	33.0%	**April 2018**-April 2022			
Sub-total		3,686	3,345	**1202.0**		2017 2022	Period 4	5	**10858**
12	Graham-North	3,439	3,249	**1289.0**	37.0%	**April 2022** April 2024			
13	Crying Girl	2,493	2,359	**745.0**	29.0%	**April 2024** April 2027			
Sub-total		5,932	5,608	**2034.0**		2022 2027	Period 5	5	**13400**
14	Crying Girl	2,643	2,583	**1034.0**	39.0%	**April 2027** April 2028			
15	Graham-North	3,258	2,666	**1072.0**	32.0%	**April 2028** April 2032			
Sub-total		5,901	5,249	**2106.0**		2027 2032	Period 6	5	**16033**
16	Graham-North	2,108	1,917	**903.0**	42.0%	**Apr. 2032** April 2035			
Sub-total		2,108	1,917	**903.0**		2032 2035	Period 7	3	**17162**
18	Graham-North	1,341	1,217	**468.0**	34.0%	**Nov. 2035** Nov. 2037			
19	Graham-North	3,121	2,782	**1022.0**	32.0%	**Nov. 2037** April 2040			
Sub-total		4,462	3,999	**1490.0**		2036 2040	Period 8	5	**19024.**
20	Crying Girl	1,317	1,188	**527.0**	40.0%	**Nov. 2041** April 2045			
Sub-total		1,317	1,188	**527.0**		2042 2045	Period 9	5	**19683**
Totals (Cluster only)		46883	42946	**15746.4**			Period 1-9	47.0	**19683**
D. Total Plan Area		**198,140**	145,053	**15,746**	**8%**				**10%**

1) IRM Plan area based on available operability data and subject to change. Proposed Blocks are estimates at time of this plan (1997) and will be refined as a portion of the "Operable Area" as they become included in successive FDP's.

2) as per the FPC Biodiversity Guidelines with new blocks in an undisturbed area

Acceptable Variance:

Harvesting of clusters may be delayed at the discretion of the participants, but not advanced, unless the timing advancement is designed to achieve the original goals of coordination of access with other industries, or otherwise to confine the overall disturbance in the drainage (e.g. fire salvage, etc).

Cluster12 is the exception in which no harvesting will be allowed prior to 2006.

Variances to advance timing of any cluster will be submitted with a rational, and require the approval of the district manager.

What is this indicator and why is it important?

This measures the time sequencing of harvesting of the clusters in the Graham drainage relative to the timing in the long-term plan.

The intent of the harvest scheduling was to concentrate harvesting in one area or subdrainage (i.e. cluster) at a time, and to spread the harvest of the Graham drainage over at least the time frame outlined in the plan. This is designed to minimize the extent of disturbance to wildlife, recreational, and other non-timber values over the entire Graham drainage at any one time, and supports the objective of providing opportunities for a mix of activities within the Graham drainage.

The location of the clusters is shown in Figure 7.

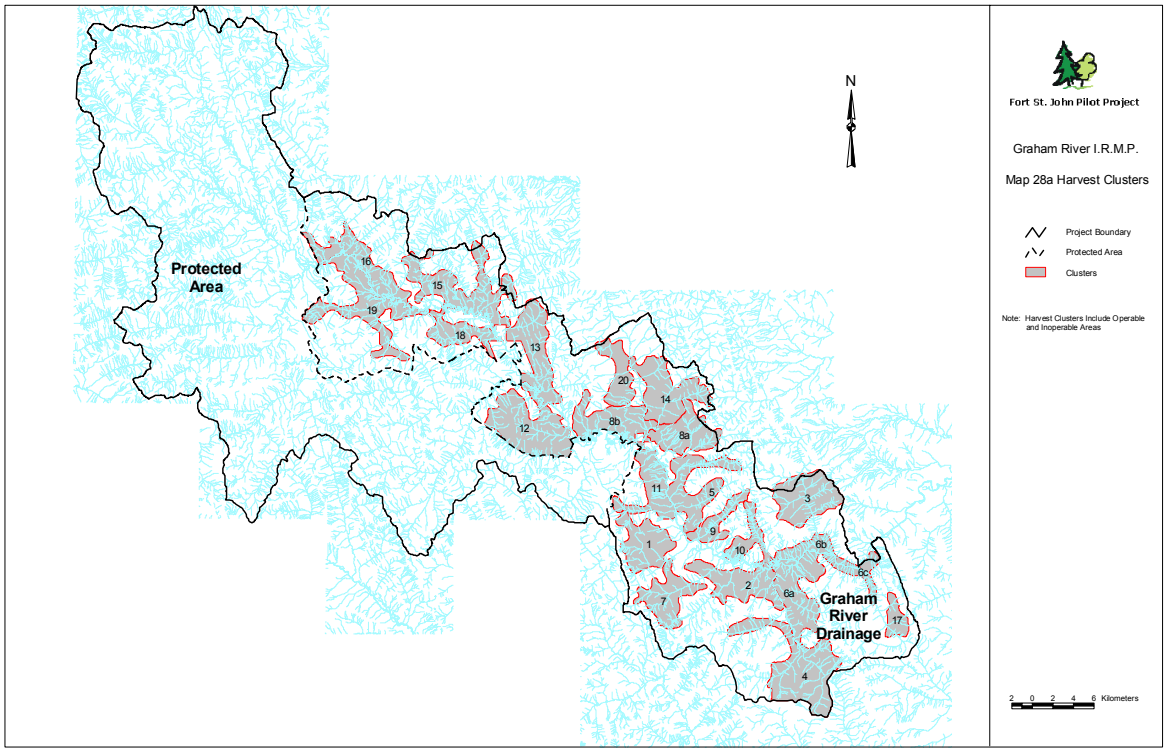


Figure 7: Graham Harvest Clusters

Current Status:

Clusters 1, 2, 3 and 17 have been harvested to date. Cluster 17 had been advanced in the schedule with MOF approval in order to coordinate a proposed development with an oil and gas company. The remaining clusters were subsequently put further back in the schedule.

The current FDP indicates proposed dates for the commencement of harvesting which are consistent with this indicator.

Forecasting Assumptions and Analytical Methods:

- Does forecasting apply (y/n)? No

Strategy and Implementation Schedule:

Harvest planning will ensure that the commencement of harvesting in a cluster is not advanced prior to the schedule outlined in Table 26.

In order to attempt to minimize the overall disturbance, operational harvesting (falling and/or skidding other than for road development) will not be planned to be conducted concurrently in different clusters. It is recognized that predevelopment of access routes in a future cluster may be necessary to allow orderly development, and this is acceptable while operational harvesting is being completed in the current cluster.

In the event that other industries propose development in a separate cluster, the participants will review the feasibility of modifying harvest schedules to accommodate a joint entry into the cluster. In the event this is feasible, the participants will request MOF approval of the change, with a submission of a revised schedule indicating which clusters will subsequently be delayed.

Monitoring Procedure:

Updated status of harvest timing for the Graham River IRM Plan area will be presented in Annual Reports.

Linkages to Operational Plans:

FDP's and FOS's will be refer to the schedule in Table 26 for guidance on timing of operations in the Graham River IRM area, and this information will be included in these plans for the Graham River IRM area. Activity timing in the FDP may not be advanced from the schedule without prior approval, but may be delayed later by the participants without approval.

SLP's and harvest plans will refer to the FDP or FOS and Table 26. Operational harvesting activities may not be advanced without MOF approval, but may be deferred.

Linkages to the LRMP:

The sequential development strategy assists in access control, provides some flexibility to coordinate access with other industries, and restricts the amount of harvesting disturbance at any point in time. This provides for greater proportions of the drainage to be available for wilderness recreation, guide outfitting, and other non timber uses, by providing larger areas of forested wildlife habitat availability than provided by conventional harvesting patterns. Deferral of cluster 12 to 2006 meets guide outfitting objectives from the LRMP. The strategy also minimizes development costs, thereby enhancing the efficiency of timber harvesting operations.

This strategy therefore supports the following LRMP objectives:

- Maintain functioning and healthy ecosystems
- Manage access to protect significant wildlife and recreation values
- Maintain guide outfitting opportunities
- Maintain caribou habitat
- Maintain habitat for priority furbearing species
- Maintain high capability ungulate winter habitat
- Minimize wildlife habitat fragmentation and maintain existing large mammalian predator/prey system
- Provide a full range of wilderness recreation opportunities
- Enhance timber harvesting and a sustainable long term timber supply
- Maintain the headwaters of major rivers and streams as a source of water for current and future generations
- Ensure that timber harvesting in the Graham River watershed recognizes the other important resource values

6.19. GRAHAM MERCH AREA

Indicator Statement	Target Statement
Cumulative merchantable hectares within blocks harvested within the Graham River IRM area	The cumulative merchantable hectares within blocks will be consistent with the estimated total harvest area, as measured at the end of each time period
SFM Objective: Provide opportunities for a feasible mix of timber, recreational activities and non-timber commercial activities Management strategies address important values in SMZ areas	
Linkage to FSJPPR: For the purposes of Section 42 of the FSJPPR this indictor statement, target statement and acceptable variance will be used to determine if forest practices are consistent with the landscape level strategies.	

Acceptable Variance:

The cumulative area may be less than the target, but may not exceed the target by more than 25% at the end of each harvest period.

What is this indicator and why is it important?

This indicator measures the relative level of conformance to the estimated areas planned for harvest in the Graham River IRM Plan area. The estimated area planned for harvest in each time period is shown in the column entitled “Estimated IRM net area”, and the allowable maximum cumulative harvest, as measured at the end of each of the 9 time periods, is in the column “Maximum Cumulative Merch ha within blocks” in Table 26.

The Graham River IRM Plan area covers 198,140 hectares. As a result of the LRMP discussions approximately 50% (99,904 ha) of the plan area was incorporated into protected areas, which is intended to meet the vast majority of biodiversity needs in the drainage. The

plan identifies an estimated 15,748 ha of area for logging based on broad operability mapping, over the rotation (1997-2042). This is 7.9% of the total landbase in the plan area.

The plan noted that that the delineation of actual harvest areas needed more detailed work. As better information becomes available, including inventory and operability information, changes to the timber harvesting plan should be made (Lance 1997 p. 43). Providing a potential maximum variance of 25% for additional refinements in the block locations puts the maximum harvest level at 19,685 ha (9.9% of the plan area). This leaves a minimum of approximately 90% of the landbase within the plan area available for the maintenance of other forest values, and not available for inclusion into cutblocks.

General consistency with the intent of the harvest schedule allows for timber harvesting activities to occur while maintaining other values in the large areas not planned for harvest, and supports many of the objectives associated with this special management zone.

Current Status:

To date, clusters 1, 2, and 17 have been harvested. 2158 ha has been logged, which is approximately 12% more than initial estimates for these clusters of 1933 ha.

Forecasting Assumptions and Analytical Methods:

Using the most current information from FDP's, updated SLP's, and GPS information, the estimated areas for cluster 4 were added to existing harvesting information to determine a projected status of this indicator to April 2007, which is the end of the first time period for assessment. The projections indicate an expected cumulative harvest area of 3358 ha, or 9% more than the original table estimate of 3095 ha.

Strategy and Implementation Schedule:

Harvest areas from the approval date of the Graham River IRM Plan onwards will be included in assessing this indicator.

General scheduling of harvesting will be consistent with Table 26. Detailed aerial photo inventory, and reconnaissance work will refine proposed cutblock boundaries and road locations within the clusters, consistent with the target range for this indicator. These refined boundaries will be included in FDP's or FOS's. SLP fieldwork may further refine boundary locations in the field based on detailed reviews of site conditions, however all proposed changes must still fall within the indicator's target range.

Monitoring Procedure:

Updated status of harvest areas logged within a time period will be presented in Annual Reports as needed.

Linkages to Operational Plans:

FDP's and FOS's will schedule harvesting areas and timing that are consistent with the targets. SLP's must be consistent with the FDP's or FOS's.

Linkages to the LRMP:

Harvesting clusters at levels that are generally consistent with the schedule in Table 23 provides increased certainty on the maintenance of large forested areas in the Graham River IRM Plan area. It ensures large proportions of the drainage are available for wilderness recreation, guide outfitting, interior forest habitat, and other non-timber uses.

This strategy therefore supports the following LRMP objectives:

- Maintain functioning and healthy ecosystems
- Manage access to protect significant wildlife and recreation values.
- Maintain caribou habitat
- Maintain habitat for priority furbearing species
- Maintain high capability ungulate winter habitat
- Minimize wildlife habitat fragmentation and maintain existing large mammalian predator/prey system
- Provide a full range of wilderness recreation opportunities.
- Enhance timber harvesting and a sustainable long term timber supply
- Ensure that timber harvesting in the Graham River watershed recognizes the other important resource values

6.20. GRAHAM CONNECTIVITY

Indicator Statement	Target Statement
Hectares harvested in cutblocks in the Graham River IRM area, within the permanent alluvial and non-productive/non-commercial components of the connectivity corridors	No harvesting within the permanent alluvial and non-productive/non-commercial components of the connectivity corridors
SFM Objective: Ecosystem functions capable of supporting naturally occurring species exist within the range of natural variability Management strategies address important values in SMZ areas	
Linkage to FSJPPR: For the purposes of Section 42 of the FSJPPR this indictor statement, target statement and acceptable variance will be used to determine if forest practices are consistent with the landscape level strategies.	

Acceptable Variance:

Variances may be allowed on a site specific basis where government approval is attained.

What is this indicator and why is it important?

This indicator measures the level of harvesting in cutblocks within the two important designated long term connectivity corridors. It excludes road right of ways needed to cross streams.

There are two key permanent components of the connectivity corridors that are expected to remain relatively constant, and provide for the essential habitat requirements of most species in the Graham River valley (Lance, 1997):

1. **The alluvial valley floors of the Graham River and major streams which flow into the Graham River.**

   The riparian corridors provide a habitat complex consisting of shelter, foraging sites and travel routes, and were identified in the Graham River IRM Plan as the most important habitats in the plan area.

   The Graham River IRM Plan specifically notes that within these alluvial areas, provided that a suitable silviculture regime can be applied, timber harvesting could potentially be

beneficial in places where forest cover has been encroaching onto open ground, as open grown forage has decreased significantly over the past few decades in the plan area. Such places were also identified as priority candidates for monitoring and adaptive management (Lance, 1997)

In the event harvesting is proposed in a riparian corridor, government staff responsible for wildlife habitat will be consulted, and operations will only proceed where mutually agreed plans can be developed for these areas. Such agreements have been made previously for strip cuts in some of the blocks within the Meadow Creek drainage.

2. **The non-productive, non commercial areas, including treeless or low productivity forested alpine areas, and meadows, swamps, and other NP areas.**

   Other than the riparian habitats, the alpine habitats and wetlands have been identified as the next most important habitats to key species such as caribou within the Graham. The approximate location of these corridors is shown in Figure 8.

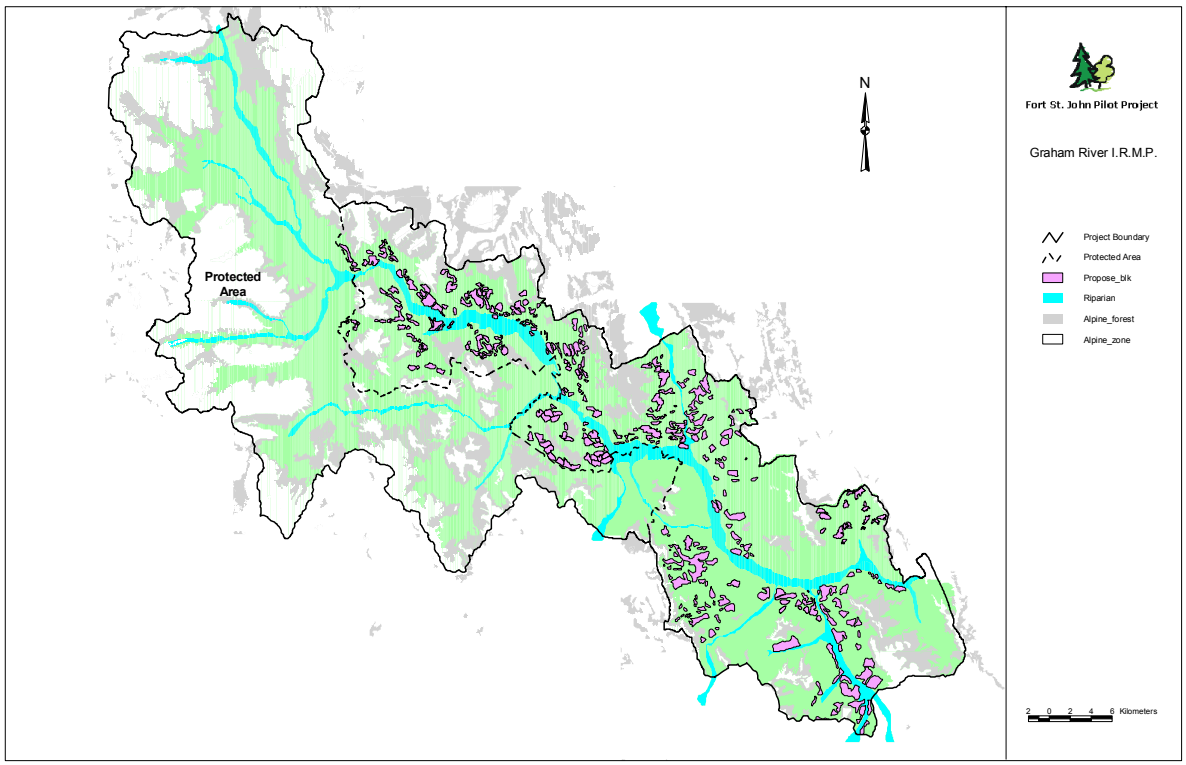


Figure 8: Corridors within the Graham River Area

The large area of inoperable timber within the Graham drainage provides additional extensive connectivity. These areas are generally of less habitat significance than the alpine and riparian areas (Lance 1997), and the location and extent may vary somewhat as inventory information is improved.

Providing for connectivity in the key habitat areas of the Graham supports ecosystem functions, and the habitat needs of a variety of local species.

Current Status:

No harvesting in cutblocks has occurred to date in these areas. Following consultation and agreement with WALP staff, some strip cuts are proposed within cluster 4 on one side of the connectivity corridor in Meadow Creek to increase forage potential while maintaining a component of forest cover.

Forecasting Assumptions and Analytical Methods:

- Does forecasting apply (y/n)? No

Strategy and Implementation Schedule:

During initial FDP or FOS planning the approximate location of these areas will be determined from maps. During field layout in blocks adjacent to these areas, the extent of the riparian alluvial corridor will be established, and harvesting will be excluded from this area, unless potential habitat benefits of some harvesting are agreed to with WALP representatives.

Monitoring Procedure:

Annual reports commencing in 2004 will update the status of this indicator.

Linkages to Operational Plans:

During preparation of FDP's and FOS's these areas will normally be excluded from consideration for blocks, other than noted above. In the event harvesting is agreed to for habitat reasons, SLP's will identify the measures to be implemented to accommodate habitat values.

Linkages to the LRMP:

The retention of significant areas for connectivity can also contribute to interior forest habitat, and protects areas which generally have the highest habitat values. Enhanced riparian protection within these corridors maintains water quality and fisheries values. This strategy therefore supports the following LRMP objectives:

- Maintain habitat for priority furbearing species
- Maintain high capability ungulate winter habitat
- Minimize wildlife habitat fragmentation and maintain existing large mammalian predator/prey system
- Maintain functioning and healthy ecosystems
- Promote water stewardship to manage for other resources

6.21. MKMA HARVEST

Indicator Statement	Target Statement
The number of drainages in the MKMA in which Clustered Harvest Plans are completed and submitted to government	A minimum of 1 drainage plan submitted no later than October 2007
SFM Objective: Provide opportunities for a feasible mix of timber, recreational activities and non-timber commercial activities Management strategies address important values in SMZ areas	
Linkage to FSJPPR: For the purposes of Section 42 of the FSJPPR this indictor statement, target statement and acceptable variance will be used to determine if forest practices are consistent with the landscape level strategies.	

Acceptable Variance:

Timing of submission may be delayed 1 year.

What is this indicator and why is it important?

This indicator measures progress towards planning long term harvesting using the clustered sequential harvesting pattern for new harvesting in the MKMA area, similar to as employed in the Graham River drainage.

Developing a long term plan provides a useful tool for optimizing the mix of timber, recreational activities, non timber commercial activities and protection of wildlife habitat.

Prior to proposing harvesting in a drainage in the MKMA a clustered Harvest Plan for that drainage will be completed and submitted for review and comment to the government. Harvesting in drainages within the MKMA will not commence until this plan is completed, other than in grandparented blocks. FDP's currently include harvesting activities up to 2007. The target date was set based on the earliest date activities are likely to be needed in these areas, but is subject to approval of the SFMP and at least one landscape level objective in the MKMA.

Current Status:

Currently grandparented blocks are approved in FDP's, and scheduled for harvest between 2004 and 2007.

A clustered harvesting schedule has been prepared for the Graham River drainage, including a portion of the Omineca NDU in the Graham LU. the portion of this schedule within the Graham LU has not been fully reviewed by the government yet.

Forecasting Assumptions and Analytical Methods:

- Does forecasting apply (y/n)? No

Strategy and Implementation Schedule:

Grandparented blocks are planned for harvest in 2003 - 2007 within the MKMA.

Clustered harvest plans will use sequential clustered harvesting, similar to that employed in the Graham River drainage, to concentrate effects of harvesting in relatively small areas at any one time in the MKMA. A long term harvesting plan for a specific drainage will be developed which include the approximate amount and timing of harvesting. The guiding

principles will be similar to Timber harvesting strategy #8, and the implementation strategy in sections 6.18, 6.19.

The drainage that will be selected for plan completion will be determined no later than December, 2006, and the plan will be prepared and submitted for comment no later than October 2007.

Monitoring Procedure

Progress on the implementation will be reported in annual reports in the year they occur.

Linkages to Operational Plans:

No new blocks may be proposed in FOS or FDP's until landscape unit objectives and a clustered harvesting plan are completed for a drainage. Subsequent FOS's or FDP's will be consistent with the LU objectives and clustered harvesting plan.

Linkages to the LRMP:

The sequential development strategy assists in access control, provides some flexibility to coordinate access with other industries, and restricts the amount of harvesting disturbance at any point in time. This provides for greater proportions of the drainage to be available for wilderness recreation, guide outfitting, and other non timber uses, by providing larger areas of forested wildlife habitat availability than provided by conventional harvesting patterns. The strategy also minimizes development costs, thereby enhancing the efficiency of timber harvesting operations.

This strategy therefore supports the following LRMP objectives:

- Maintain functioning and healthy ecosystems
- Manage access to protect significant wildlife and recreation values
- Maintain guide outfitting opportunities
- Maintain caribou habitat
- Maintain habitat for priority furbearing species
- Maintain high capability ungulate winter habitat
- Minimize wildlife habitat fragmentation and maintain existing large mammalian predator/prey system
- Provide a full range of wilderness recreation opportunities
- Maintain timber harvesting and forest management opportunities

6.22. RIVER CORRIDORS

Indicator Statement	Target Statement
Percentage of harvested areas that create openings greater than 1 hectare within 100 metres of RRZ's in identified major river corridors	No openings exceeding 1 hectare in blocks within the major river corridors harvested under the FSJPPR (i.e. after November 15th, 2001)
SFM Objective: Management strategies address important values in SMZ areas	
Linkage to FSJPPR: For the purposes of Section 42 of the FSJPPR this indictor statement, target statement and acceptable variance will be used to determine if forest practices are consistent with the landscape level strategies.	

Acceptable Variance:

10% of openings may exceed 1 hectare, but no openings greater than 2 hectares.

What is this indicator and why is it important?

This indicator measures significant, continuous interruptions in riparian connectivity caused by recent harvesting in identified major river corridors (section 1.3.1 of the SFMP).

In addition to providing high timber values, these areas are important sources of habitat elements such as CWD, snags for cavity sites, broadleaf trees, and shrubs. They also play a role as travel corridors for wildlife. This indicator will provide one measure of the implementation of the strategies designed to protect habitat elements and provide some connectivity within these corridors while allowing some timber harvesting.

The variance is provided to allow minor changes to boundaries required for unusual slope or timber type conditions.

Current Status:

Prior to the effective date of the FSJPR, some blocks were clearcut harvested within these areas. Current harvesting plans within 100 metres of the outer edge of the RRZ in identified major river corridors provides for either patch cuts less 1 hectare in size, or strip cuts of various widths (e.g. 12 to 40 metres), depending on site conditions. Small patch cuts retain nearly continuous cover over a portion of the area, other than roads which may connect them.

Forecasting Assumptions and Analytical Methods:

- Does forecasting apply (y/n)? No

Strategy and Implementation Schedule:

Where harvesting is proposed within 100 metres of the RRZ of areas identified in section 1.3 of the SFMP, silviculture and harvesting systems will be selected which provide for the retention of some forested habitat (i.e. capable of providing cover) through time outside of the RRZ, and minimize any impact on connectivity of forested stands by limiting the size of individual new openings.

Selection of the silviculture system will be based on relative habitat values, windfirmness, timber values, and site characteristics such as slope, topography and moisture conditions.

In the event harvesting is required to salvage damaged timber, or the MOF otherwise directs participants to harvest these areas, this indicator would not apply.

Monitoring Procedure:

Field inspections will ensure prescribed procedures in SLP's to achieve this target is met. Activities within these areas will be monitored annually and reported in annual reports.

Linkages to Operational Plans:

FDP's and FOS's will propose silviculture systems within these areas consistent with this indicator and strategy.

SLP's will include specific protection measures based on field assessments of site conditions.

Linkages to LRMP:

Maintaining significant amounts of forest cover within these areas provides for connectivity, ensures a high level of retention of forested habitat, and provides additional protection of riparian and aquatic values, while still permitting harvesting. This indicator therefore supports the following objectives within the major riparian corridors:

This strategy therefore supports the following LRMP objectives:

- Maintain high capability ungulate winter habitat
- Maintain site specific habitats
- Maintain functioning and healthy ecosystems
- Maintain timber harvesting and forest management opportunities

6.23. VISUAL SCREENING ON ROADS

Indicator Statement	Target Statement
% of new main summer road length developed adjacent to harvested areas within identified major river corridors where visual screening is present	100% of summer accessible road lengths within the designated area will have visual screening from adjacent cutblocks
SFM Objective: Management strategies address important values in SMZ areas	
Linkage to FSJPPR: N/A	

Acceptable Variance:

At least 75% of all new summer road length within the designated area will be visually screened.

What is this indicator and why is it important?

This indicator measures the extent of visual screening present in areas being harvested that are adjacent to summer roads which is visually screened sufficiently to provide additional security for wildlife. Summer road access presents a potentially significant disturbance to wildlife using the harvested areas for browse due to relatively high traffic loads from industry and the public. Visual screening can mitigate this impact.

Current Status:

Harvesting in major river corridors is normally done in the winter, on frozen ground conditions, and roads are generally impassable to truck traffic following the completion of logging. Summer roads are normally only constructed as mainlines which may pass through a river corridor and a cutblock at the same location. No new summer roads have been constructed since 2000 in these areas.

The variance allows for some instances when reduced screening may be needed due to site conditions (e.g. steep slopes, etc.).

Forecasting Assumptions and Analytical Methods:

- Does Forecasting apply (y/n)? No

Strategy and Implementation Schedule:

This indicator applies to activities subsequent to the FSJPPR in major river corridors, which are described in section 1.3. When summer road construction is proposed through existing blocks in these areas, or new blocks are located adjacent to existing summer roads, the locations will be modified as much as possible to provide screening to minimize the disruption to wildlife following harvesting. Field staff will be responsible for determining from maps whether this strategy applies to a particular road or block. Specific screening needs will be determined in the field by staff based on site conditions. Depending on a variety of site factors (e.g. slope, moisture conditions etc.) it may on occasion be prudent to skid directly to part of an existing main summer road, rather than leave a strip of timber that necessitates additional road construction behind the visual screen. WTP's may be used away from the road to address some of the screening concerns in this event.

Monitoring Procedure:

The area of summer roads within the riparian corridors will be assessed to determine how much of the road adjacent to cutblocks within the corridor is screened, and reported at the next SFMP.

Linkages to Operational Plans:

Location of screened areas will be identified in SLP's.

Linkages to LRMP:

This helps reduce disturbance of wildlife using riparian habitat areas, and is similar to a strategy included in major river corridors in the LRMP to support the following objective:

- Maintain site specific habitats

6.24. PERMANENT ACCESS STRUCTURES

Indicator Statement	Target Statement
Permanent access structures (%) within cutblocks	A maximum of 5% of the total aggregate area in cutblocks by managing participant to be occupied in permanent access structures in which harvesting was completed during that annual reporting period as determined on a 3 year rolling average. This only applies to permanent access structures utilized by the participants. See variance for phase-in period
SFM Objective: Sustain forest lands within our control within the Defined Forest Area A natural range of variability in ecosystem function, composition and structure which allows ecosystems to recover from disturbance and stress	
Linkage to FSJPPR: For the purposes of Section 35(5) of the FSJPPR, this indicator statement, target statement and acceptable variance will replace Section 30(1) of the FSJPPPR. For the purposes of Section 42 of the FSJPPR this indicator statement, target statement and acceptable variance will be used to determine if forest practices are consistent with the landscape level strategies.	

Acceptable Variance:

Phase-in target of 6% for the 3 year period ending March 31, 2004, 5.5% by March 31, 2005 and full implementation of the 5% target by March 31, 2006.

No variance necessary following phase in as the percentage is based on a 3 year rolling average.

What is this indicator and why is it important?

Permanent access structures (PAS) include roads, landings, trails, borrow pits, quarry or other similar structure in a cutblock that are developed for timber harvesting or other forest management activities, and whose use and/or construction material precludes the production of a commercial crop of trees. Roads are also used to provide access to other tenure holders and industrial users as well as providing access for public recreation and fire protection activities. This indicator measures the proportion of area that is removed for long periods of time from the productive forest landbase within harvested cutblocks. These permanent access structures do not contribute to maintaining forest ecosystem condition and productivity nor do they contribute to the health of global ecological cycles. As these structures are constructed they reduce from the productive forest landbase some of the essential elements deemed necessary for a healthy forest ecosystem.

Current Status:

The percentage of blocks productive area that is occupied by permanent access structures is dependent on the block size, shape, geography, logging method and season of logging. The current status over the past several years has identified that the average ratio of all harvest areas in the productive forest landbase lost to permanent access structures is less than the 7% target statement. However there exists significant variation between individual cutblocks due to the above mentioned cutblock factors which results in some individual blocks requiring in excess of 7% permanent access structures.

There are currently only two active participants, Canfor and BCTS which have an active harvesting record over the past several years. A review of the site level plans prepared for all harvested blocks for the last three years (2001/02/03) has shown that the average amount of area lost to permanent access structures on these blocks was 4.9%. The following Table 27 summarizes these site plans.

Table 27: Permanent Access Structures 2001-2003

Participant	Annual Reporting Period	Total ha. of PAS	Total productive ha. harvested	Total ha. of block	% PAS
Canfor	2001	85.1	1654.9	1740.0	4.9%
	2002	128.1	2702.9	2831	4.5%
	2003	145.7	2795.7	2941.4	5.0%
Canfor Total		358.9	7153.5	7512.4	4.8%
BCTS	2001	29.5	513.4	542.9	5.4%
	2002	34.6	556.3	590.9	5.9%
	2003	23.9	372.2	396.1	6.0%
BCTS Total		88.0	1441.9	1529.9	5.8%
Grand total		446.9	8595.4	9042.3	4.9%

Forecasting Assumptions and Analytical Methods:

- Does forecasting apply (y/n)? No

Strategy and Implementation Schedule:

The current performance requirement for the acceptable level of permanent access structures associated with harvesting as contained in the Fort St. John Pilot Project Regulation states that at the end of timber harvesting operations for a cutblock, the proportion of the cutblock area occupied by permanent access structures must not exceed 7% of the total cutblock area. If the proposed harvesting plan for a cutblock exceeds 7%, district manager approval for a variance must be requested.

It is proposed that upon approval of this SFMP a new performance requirement for the measurement of permanent access structures will be implemented. It is proposed that the new performance requirement be as follows: *A maximum amount of 5% of the total aggregate area in cutblocks by managing participant to be occupied in permanent access structures in which harvesting was completed during the annual reporting period as determined on a 3 year rolling average.*

It is proposed that this new performance requirement be implemented immediately with a phase in target of 6% for the first reporting period of, 2004 utilizing only two years worth of data; 2003 and 2004 and a target of 5.5% for the next reporting period utilizing 2003/04/05 data. The full target of 5% will be implemented for the reporting period of 2006 utilizing 2004/05/06 data.

As the forest sector is not the only developer within our defined forest area it may be advantageous to develop coordinated landscape level targets with other industries for permanent access structures and main roads. During the term of this SFMP efforts will be made to engage the Oil and Gas Commission and other industrial users on the land base to

review the feasibility of developing coordinated landscape level targets on access development to minimize forest land depletions.

Monitoring Procedure:

PAS areas will be determined from the SLP's for all blocks harvested over the previous 3 years. Harvesting inspections will verify that the PAS's are within the SLP limits and any non-conformances will be tracked. A status report will be produced annually.

Linkages to Operational Plans:

Operational plans as prepared by forest planners will continue to prescribe the most appropriate methods to reduce the losses to the forest landbase and will be responsible to ensure that over all planned road and landing development will not be disproportionate to the area to be harvested. In other words, the prescribing forester will only plan what is necessary to get the entire block harvested, typically larger blocks require less overall development percentage wise as opposed to smaller blocks.

Linkages to LRMP:

There is a strong correlation between the LRMP objective of minimizing losses to the timber harvesting landbase and our SFM objective to sustain forest lands within our control and our SFM target to reduce the permanent losses to this landbase attributable primarily to our activities. There is a longer term target in which we could in conjunction with other industries develop landscape level targets for amount of permanent access structures allowable on the forested landbase.

6.25. FOREST HEALTH

Indicator Statement	Target Statement
% of significant detected forest health damaging events which have treatment plans prepared and implemented	100% of significant detected forest health damaging agents will have treatment plans prepared and implemented within 1 year of initial detection
SFM Objective: A natural range of variability in ecosystem function, composition and structure which allows ecosystems to recover from disturbance and stress Ecosystem functions capable of supporting naturally occurring species exist within the DFA Maintain or enhance landscape level productivity	
Linkage to FSJPPR: For the purposes of Section 42 of the FSJPPR this indictor statement, target statement and acceptable variance will be used to determine if forest practices are consistent with the landscape level strategies.	

Acceptable Variance:

A variance of 1 year is permissible to provide for additional information collection and consultation with forest health specialists.

What is this indicator and why is it important?

This indicator describes the effectiveness of the forest health management strategy in addressing identified problems. The current process of detection has to date been

successful in identifying significant forest health issues, as broad based pest incidence surveys have not identified any substantial catastrophic losses to damaging agents. This indicator will identify that treatment plans are developed and implemented in a timely manner to address significant forest health issues.

Significant forest health damaging events are defined as those identified as:

- medium or high risk from the risk management classification system (see Strategy and Implementation Schedule, below), or
- forest health events identified as significant by the MOF, or
- damage which threatens the achievement of silviculture stocking standards within a plantation, or
- damage which threatens the survival of 10% or more of the trees in a merchantable stand greater than 50 hectares.

Current Status:

Participants have conducted detection programs across most of the DFA, focusing primarily on existing or proposed developed areas. Some overview flights in other parts of the DFA have been undertaken where forest health issues in adjacent TSA's posed a potential threat to stands within the DFA. Fire and windthrow damage has been routinely identified from field information and overview flights, and salvage programs developed as required. Other forest health issues in the DFA have been sporadic and localized since significant forest utilization commenced, as most of the forest stands are relatively young.

Forest Development Plans (FDP's) contain general to specific forest health objectives, and forest practices have been carried out in a manner consistent with those objectives (e.g. no non-compliances).

The District Manager has on one occasion requested a pest inventory assessment for a spruce beetle outbreak near Wonowon. Surveys showed the pest was limited in extent, and salvage logging was conducted to address the concern.

Free-growing damage (health) standards are used to assess stand health in plantations.

Harvesting is currently the most commonly applied treatment and control for protecting mature timber inventories for fire, wind damage, and spruce beetle. Fill-planting is the most commonly applied treatment for damage to plantations from frost and winter desiccation, which are the most prevalent abiotic factors.

Participants utilize the forest health management expertise in the Canadian Forestry Service and the BC Ministry of Forests as needed. The Canadian Forestry Service holds extensive historical information (old Forest Insect and Disease Survey), and it also houses expert diagnostic services, and conducts research relevant to forest health management. The Ministry of Forests also has leading experts in diagnostics, management and training. The participants contact the CFS and the Canadian Food Inspection Agency (CFIA) in the event of alien invasive pest found in forests managed by the participants.

Forecasting Assumptions and Analytical Methods:

Does forecasting apply? No

Strategy and Implementation Schedule:

1. The participants will establish, and maintain a summary of damaging agents and their estimated incidence, current status and their potential impacts. Table 28 is the initial estimate of incidence and severity of damaging agents in the DFA.

Table 28: Estimated Incidence, Severity, Current Conditions and Potential Impact of Damage Agents in the Fort St. John DFA

Pest Damage Agent	Estimated Incidence (area affected of DFA) by Severity Class (low, mid & high)			Severity Class Breakpoints (Low, Mid & High)	Current conditions	Potential Impact
	Low	Mid	High	e.g., prefixes denote classification is under development	Estimated extent of pest damage in the DFA, and type of damage	Type of damage, and seral stage affected
Spruce beetle	98.5%	1.5%	0	E.g., <2%, 2-10%, >10%	Uncommon, stem mortality; central, western and northern areas of DFA	Stand destroying (mature)
Eastern spruce budworm	99%	1%	0%	E.g.,<5%, 5-25%, >25%	Common, annual conditions dependant, northern areas of DFA	Stand destroying (mature & early seral understorey)
Foliar diseases of deciduous (*Venturia sp.*)	70%	25%	5%	E.g.,<10%, 10-30%, >30%	Ubiquitous/common, annual moist-weather condition dependant, often severe growth impact	Severe growth reduction, reduces stand density (early seral)
Pine stem rusts	70%	25%	5%	<10%, 10-20%, >20% (Pers comm., R.W. Reich)	Ubiquitous/common, localized mid-high severity	Stem mortality, reduces stand density (early seral)
Insect defoliators of deciduous	80%	10%	10%	E.g.,<10%, 10-30%, >30%	Periodical, wide range of severity; growth reduction	Limited stem mortality, growth reduction (early to mature seral)
Wood decay fungi	30%	40%	30%	E.g.,<10%, 10-30%, >30%	Ubiquitous, variable by stand	None to severe wood quality effects (mature)
Wildlife browse (hares, elk etc) Livestock	90%	10%	0%	E.g.,<10%, 10-30%, >30%	Ubiquitous but localized both conifer & deciduous	Low to severe growth reduction (early seral)
Livestock	90%	10%	0%	E.g.,<10%, 10-30%, >30%	Localized to range tenures on both conifer & deciduous	Low to severe growth reduction & mortality (early seral)
Mountain pine beetle	99.5%	0.5%	0	E.g., <2%, 2-10%, >10%	Uncommon	Stand destroying (mid-to-late-mature)
Warren's root collar weevil	99%	1%	0	E.g., <2%, 2-10%, >10%	Ubiquitous but localized stem mortality	Scattered stem mortality (early seral, <10yrs)
Tomentosus root rot	95%	4%	1%	<6, 6-15, 15+ (Pers omm.., R.W. Reich)	Common below 700m a.s.l. (I.e., ~ 5000 ha in DFA)	Low to severe growth reduction, limited mortality & windthrow (early to mature)
Spruce weevil	97%	2%	1%	E.g., <2%, 2-10%, >10%	Uncommon, localized attack; stem deformity and growth reduction	Stem deformity and growth reduction (early seral)
Western balsam bark beetle	95%	5%	0%	E.g., <2%, 2-10%, >10%	Common but variable attack intensity	Stand destroying (mature)
Conifer foliar diseases	80%	10%	10%	E.g.,<10% ,10-20%, >10%	Uncommon, localized attack; growth reduction	Growth reduction (early to mature seral)
Eriophyid mites	99%	0%	1%	E.g.,<1% 1-10%, >10%	Very uncommon, localized attack; little growth reduction	Growth reduction (early seral, predominantly on deciduous)
Abiotic: Frost	85%	10%	5%	E.g.,<1% 1-10%, >10%	Common, localized to widespread damage	Growth reduction, sometimes stem deformity or stem mortality (early seral is most severely affected)
Abiotic: Snow-press	97%	3%	0%	E.g.,<1% 1-10%, >10%	Common, localized to widespread damage	Stem deformity to breakage (early to mid seral)
Abiotic: Hail	99%	0%	1%	E.g.,<1% 1-10%, >10%	Common, localized damage; most affects deciduous species	Stem damage or forking (early)
Abiotic: Winter Desiccation (Red belt)	97%	1%	2%	E.g.,<1% 1-10%, >10%	Common, localized mid – high elevation bands or plantations at any elevation; on conifer species	Foliage mortality on mature, or seedling mortality in plantations
Abiotic: Sunscald	99%	1%	0%	E.g.,<1% 1-10%, >10%	Uncommon, localized to widespread damage	Stem mortality (early to mid seral)
Abiotic: Windthrow	85%	10%	5%	E.g.,<1% 1-10%, >10%	Uncommon, localized to widespread damage	Stem breakage (mature)
Abiotic: Fire	99%	<1%	<1%	<5% mortality-5-30% mortality; >30% mortality	Uncommon to common, localized to widespread damage, highly variable occurrence annually	Stem quality to stem and stand mortality
Abiotic: Flooding	95%	4%	1%	E.g.,<1% 1-10%, >10%	Uncommon, localized to widespread damage	Stem mortality (early to mature)
Abiotic: H2S etc gas	99%	<1%	<1%	E.g.,<1% 1-10%, >10%	Uncommon, localized near energy operations	Growth reduction to mortality (early to mature)

This table will be updated as new information becomes available.

2. The participants will establish and maintain a risk management classification system, to be complete by April 1, 2005.
3. The participants will maintain and refine a detection and monitoring program for damaging agents over the landbase by:
   a) continuing to conduct aerial and ground surveys in management zones in which forest operations will be proposed during the term of this plan if there is an identified forest health issue .
   b) continuing to conduct aerial surveys in other parts of the DFA if there is reason to suspect potential forest health issues may exist in these areas.
   c) ensuring appropriate forest workers, consultants and industry staff, are competent at identifying specific forest health concerns within the pilot project area.
   d) maintaining a record of agent incidence and intensity.
4. Active participants will address fire management issues in fire preparedness plans that outline objectives, duties and responsibilities related to minimizing fire risk, and responding to fire occurrence.
5. The participants will develop treatment plans for significant forest health issues. Treatment plans will identify the location of the significant concern, and an implementation schedule for the proposed treatments. Treatment plans will be developed using forest health specialists as needed. Plans will consider the risk presented by the damaging agent, and the cost: benefits of a range of available options. Some of the more common options which may be employed are:
   - relocating harvesting activities to meet forest health management requirements,
   - pheromone baiting and lethal trap programs (trap trees in forested conditions, and lethal traps in mill yard conditions),
   - incorporating forest health requirements into cutblock designs where necessary to prevent the development of forest health problems (e.g., cold air drainage for frost potential, or understorey management for eastern spruce budworm),
   - fill-planting or species conversion for plantation related problems
   - doing nothing, if so warranted by the level of risk and cost : benefit analysis (the latter to be developed).
6. General measures to be implemented for potential significant problems, depending on site conditions, are summarized in Table 29.

Table 29: Detection & Monitoring, and Treatment Groupings for Damage Agents

	Damage Agents			
Forest Health Management Groupings	Spruce beetle Eastern spruce budworm Mountain pine beetle Fire	Defoliators of deciduous species Western balsam bark beetle **Red-belt desiccation	Tomentosus root rot Wildlife browse Pine stem rusts Wood decay fungi Windthrow	Foliar diseases of deciduous & coniferous species Spruce weevil Warren's root collar weevil Eriophyid mites **Frost, snow-press, hail, sunscald, flooding
Detection and Monitoring	*Detect and Monitor via aerial surveys, and pre-harvest operations surveys and assessments*	*Detect and Monitor via aerial surveys (for areas classified as high risk, or anecdotal observations)*	*Detect and Monitor during pre-harvest, and reforestation success survey operations.*	*Detect and Monitor during silviculture surveys*
Treatment or Control	*Implement containment sanitation and salvage harvesting strategies*	*Fill planting ** *	*Prescribe pest control or salvage strategies at pre-harvest phase; for pine stem rusts; genetically resistant stock types and/or fill-planting*	*Fill-planting** *

Monitoring Procedure:

The participants retain records of all significant forest health damaging agents detected. Forest health information on areas or damage agents of broad concern affecting or potentially affecting more than one participant (e.g., mountain pine beetle, spruce bark beetle) will be forwarded to the MOF. Participants will notify the MOF following treatment action on high-risk damage agents. A summary of significant pest conditions and treatment plans will be presented in each annual report.

Linkages to Operational Plans:

Site Level Plans will identify significant forest health concerns and proposed treatment options. Forest Operations Schedule's (FOS's) will be modified as needed to relocate harvesting to address forest health issues.

Linkages to LRMP:

The forest health management strategy links to the LRMP indirectly and supports the biodiversity strategy through its direction to manage for seral stages, and, it links directly to the General Management Direction (Forest Management) by "encouraging forest harvesting patterns and block sizes which emulate natural disturbance patterns found within the planning area." The forest health management strategy further links to other specific LRMP objectives:

- Maintain functioning and healthy ecosystems
- Manage for forest health
- Minimize losses to the timber harvesting land base
- Enhance timber harvesting and a sustainable long-term supply

6.26. SALVAGE

Indicator Statement	Target Statement
The relative proportion of salvaged hectares versus total hectares damaged in merchantable stands (as defined in the current TSR) within a management intensity class	The relative proportions of salvage hectares will be highest in the high intensity zones, and lowest in the low intensity zones over an SFMP period (December 1, 2003- March 31, 2008)
SFM Objective: A natural range of variability in ecosystem function, composition and structure which allows ecosystems to recover from disturbance and stress	
Linkage to FSJPPR: N/A	

Acceptable Variance:

None.

What is this indicator and why is it important?

This indicator measures the success of a timber salvage strategy designed to promote lower relative salvage rates in merchantable damaged stands as forest management intensity emphasis decreases. Merchantability will be defined based on forest cover and TSR assumptions on what constitutes a merchantable stand. Damaged stands are defined as

either burnt stands , or catastrophic insect infestations where 30% or more of the trees are expected to die as a result of the disturbance.

Studies have suggested that some species may be heavily dependent on fire killed forests, and occur at much reduced numbers after forest salvage operations (Delong, 2002). Black-backed and three toed woodpeckers may decrease in abundance due to a lack of fire killed stands (Huuto 1995), and some fungi and insects are fire obligates, or heavily reliant on fire (Stepnisky, unpublished data). In order to provide unique habitats not available in young managed stands (e.g. burnt snags), and maintain a proportion of forests that follow natural successional pathways, it is ecologically desirable to have some proportion of natural disturbances, including those in otherwise merchantable stands, left unsalvaged on the landscape. Providing for some unsalvaged damaged areas contributes to maintaining a natural range of variability in ecosystem function, composition and structure.

It is still necessary, however, to protect timber resources from various abiotic (e.g. fire, wind and flooding) and biotic (e.g. pests and diseases) damaging agents. Salvaging some timber values following damaging events, including fire, and catastrophic insect infestations supports the basic assumptions of the TSR, and addresses forest health concerns. Implementing a strategy that places a low emphasis on salvaging damaged merchantable stands in low forest management intensity areas, and greater emphasis in high forest management intensity areas, will help balance the ecological values with economic and social values.

The DFA's forest composition includes large areas of non-merchantable stands, either due to age or low productivity. Natural disturbances, particularly fires, are largely random events which may or may not occur in merchantable stands, so the degree to which areas follow natural disturbance pathways will be influenced significantly by the types of stands that burn, therefore absolute measures of salvage levels is not a reliable indicator.

Current Status:

Analysis of forest cover data indicates that since 1980, 47,182 hectares burnt, and approximately 2711 hectares, or 5.8% was salvage logged. It is assumed that the other 94.2% of unsalvaged area is following natural successional pathways. Much of the burnt area, however, would fall in stands not targeted for harvesting during that period of time (e.g. non timber harvesting landbase, deciduous stands, and immature conifer in the timber harvesting landbase (THLB). Assuming merchantable coniferous stands were equally likely to be burnt as other stands, it is estimated that approximately 36.6% of the burnt area in merchantable stands was salvage logged. Insect damage resulting in extensive mortality of the stand has to date been very rare.

Forecasting Assumptions and Analytical Methods:

- Does forecasting apply (y/n)? No

Strategy and Implementation Schedule:

Strategy: Enhance the component of young natural forests by implementing variable levels of salvage effort based primarily on management intensity level, with the greatest salvage efforts in the high forest management intensity zones, and the least effort in the low intensity zones.

The participants general objective for naturally disturbed areas, therefore, will be to salvage some of the higher value damaged timber, while permitting a proportion of otherwise merchantable damaged stands to go unsalvaged.

Specific zonal guidelines to support this strategy are outlined below:

High Intensity LU's:

In stands damaged by fire or insects, all reasonable efforts will be made to salvage merchantable stands of timber where it can be done economically, except in Protected Areas. Economic viability of harvesting will vary depending on factors such as the degree of damage, age, and size of timber when damaged, extent of new access required, the extent of the damaged area and the value of the fibre to the manufacturing plants. A proportion of the damaged area may be retained as wildlife tree patches consistent with the LU target retention levels, provided safety and forest health concerns can be addressed satisfactorily. As well, if any damaged timber presents a potential threat to other timber resources if not salvaged (e.g. insect infestation), the participants will consult with the government to determine if sanitation logging or other control measures are desirable to minimize risks.

Moderate Intensity LU's:

Some merchantable stands within 5 kilometres of existing winter access and outside protected areas or riparian buffers may be harvested, provided harvesting is economically viable. A proportion of the damaged area may be retained as wildlife tree patches provided safety and forest health concerns can be addressed satisfactorily. To provide for small natural disturbance events, patches less than 1 hectare will be left unsalvaged unless they are within 1 km of existing access, or present a potential health risk to adjacent forests. As well, if any damaged timber presents a potential threat to other timber resources if not salvaged (e.g. insect infestation), the participants will consult with the government to determine if sanitation logging or other control measures are desirable to minimize risks.

Low Intensity LU's:

Salvage operations will be limited to merchantable stands identified in proposed blocks or clusters in any plan, or other merchantable areas within 2 kilometres of existing winter access, provided the harvesting is economically viable. A proportion of the damaged area may be retained as wildlife tree patches provided safety and forest health concerns can be addressed satisfactorily. If the damaged timber presents a clear health threat to other timber resources, such as an insect infestation, which, if it went unchecked may damage other timber, the participants will consult with the government to determine an appropriate course of action.

This strategy will be implemented with some flexibility, as the intent is to find a balance between maintaining habitat niches created by fires and salvaging some valuable timber resources to maintain forest health and meet economic and social objectives. In the event that fires are rare for extended periods of time (e.g. less than 100 ha/SFM period), it may be desirable to leave some burnt areas unsalvaged that would normally be salvaged. Conversely, in the event of exceptionally large areas being impacted by fire over a short period of time, additional salvage efforts may be necessary to support timber management and social objectives.

Monitoring Procedure:

The total area burnt, the burnt area of merchantable stands (based on the TSR definition), and the area salvage logged by management intensity level, will be determined from MOF information, forest cover data, and participants records. The five year relative rate of salvage of merchantable stands by management intensity will be reported in subsequent SFMP's. This time frame provides the opportunity for winter salvage operations of a

previous years fire in order to allow accurate comparisons of relative salvage rates compared to burn rates, and provide sufficient time to report in subsequent SFMP's.

Linkages to Operational Plans:

Guidelines will be used as a tool to assist foresters in determining if FDP's or FOS's will be amended to propose salvage of merchantable burnt areas.

Linkages to LRMP:

This strategy provides for some areas with merchantable sized timber to follow natural successional pathways by remaining unsalvaged, while allowing for the salvage of some timber values. This supports specific species which rely heavily on such features as burnt snags, and provides significant sources for snag and CWD habitat elements important to ecosystem function. Provisions for salvage where there are risk to adjacent forests provides allowances to address forest health concerns.

This strategy supports the following LRMP objectives:

- Maintain functioning and healthy ecosystems
- Maintain site-specific habitats
- Maintain timber harvesting opportunities
- Maintain forest health

6.27. SILVICULTURE SYSTEMS

Indicator Statement	Target Statement
Percentage of area harvested annually using even aged silvicultural systems	Even aged silvicultural systems will be employed on at least 80% of the total area harvested annually in the DFA
SFM Objective: A natural range of variability in ecosystem function, composition and structure which allows ecosystems to recover from disturbance and stress	
Linkage to FSJPPR: N/A	

Acceptable Variance:

No acceptable variance.

What is this indicator and why is it important?

Evenaged silvicultural systems are any silviculture system that results in new forests with one or two treed layers of relatively uniform ages (+/-20 years). The most common evenaged silviculture system is clearcutting, with or without reserves, where most trees are harvested, and new forests are established in which trees are approximately the same age. DeLong (2002) notes that large fires are the dominant type in the Boreal and Boreal Foothills NDU's (i.e. the NDU's where harvesting will occur during the term of this plan), which has resulted in large patches of relatively even aged forests. Initial estimates for the proportion of stand replacement natural disturbances (e.g. that result in significant sized even aged natural stands) in these NDU's range from 80-98%, while small gap replacement events varies from 2-20% (Delong 2002).

Even aged silviculture systems are most similar to stand replacement events, and are therefore consistent with the natural disturbance pattern. The target minimum for even aged silvicultural systems is at least 80% of the area harvested annually, which is consistent with the low range of stand replacement events in these NDU's.

Current Status:

From March 1 2002 to March 31, 2003, 97% (BCTS 94%, Canfor 98%) of the harvested area in the DFA by participants was completed using even aged silvicultural systems.

Forecasting Assumptions and Analytical Methods:

- Does forecasting apply (y/n)? No

Strategy and Implementation Schedule:

Evenaged silvicultural systems, primarily clearcutting with reserves, will be implemented on most sites to reproduce even aged forests consistent with natural stand replacement events. In stands where understorey exists, shelterwood systems may be employed to protect some of the understorey. In unevenaged stands, foresters will assess site factors and the quality of the immature timber in determining the most appropriate system to employ.

In some identified areas where other non-timber resources have high value, other alternative or modified silvicultural systems (e.g. group or individual tree selection, small patch or strip cuts etc) that can be implemented successfully and cost effectively may be employed.

Monitoring Procedure:

The area harvested by evenaged silviculture systems will be determined from participant's records, and reported in annual reports.

Linkages to Operational Plans:

Prior to preparing SLP's, foresters will consider the site factors and stand structures of proposed blocks, and any objectives or strategies in the SFMP which may impact selection of a silviculture system. SLP's will identify if blocks are planned for unevenaged silviculture systems based on these factors.

Linkages to the LRMP:

Evenaged silvicultural systems are consistent with the predominant natural stand replacement events. They also permit efficient harvesting methods, and effective silviculture treatments which allow for the replacement of forests stands to maintain or enhance sustainable long term timber supplies. This indicator therefore supports the following LRMP objectives:

- Maintain functioning and healthy ecosystems
- Maintain timber harvesting and forest management opportunities
- Enhance timber harvesting and a sustainable long term timber supply

6.28. SPECIES COMPOSITION

Indicator Statement	Target Statement
Relative Change in Plantation Composition versus Harvest Composition for Spruce and Pine	The relative proportion of spruce and pine planted annually will equal the proportions harvested annually (excluding fill planting)
SFM Objectives: The diversity and pattern of communities and ecosystems within a natural range A natural range of variability in ecosystem function, composition and structure which allows ecosystems to recover from disturbance and stress	
Linkage to FSJPPR: For the purposes of Section 42 of the FSJPPR this indictor statement, target statement and acceptable variance will be used to determine if forest practices are consistent with the landscape level strategies.	

Acceptable Variance:

An annual variance of plus or minus 20% absolute difference between the planted and scaled percentages is allowed to reflect potential annual harvest composition fluctuations.

What is this indicator and why is it important?

This indicator illustrates the relative proportion of spruce and pine being planted compared to the relative proportions harvested. It provides an indication of the extent of change of species composition as a result of forest management activities on coniferous licences. Spruce and Pine make up in excess of 95% of the coniferous species harvested in the DFA, and 99% of the species planted.

Maintaining relatively consistent proportions of spruce and pine between pre-harvest and post-harvest stands helps to maintain a natural range of diversity and pattern of communities and ecosystems. The timber harvesting profile of spruce and pine is expected to be relatively consistent from year to year, in order to meet mill requirements. The percentage of species planted compared to harvested would be expected to vary somewhat from one year to another however, as planting is normally 1 to 2 years behind logging activity. In the rare event of extensive salvage programs due a large natural disturbance event, the harvesting and planting species proportions could potentially be substantially different for short periods of time, in which case the target range may need to be temporarily revised.

This indicator applies to coniferous licensees and the BCTS only, and does not apply to replanting of areas previously planted.

Current Status:

Table 30 illustrates the proportions of Pine and Spruce planted compared to the proportions scaled. Over the last 2 years, the largest difference was 5%, with slightly more spruce being planted than harvested. The projection for 2003-2004 is for approximately a 7% difference, due to a slight increase in the proportion of spruce expected to be harvested from the previous year.

Table 30: Species Composition

Total Seedlings Planted (BCTS and Canfor)					Total Pine and Spruce Scaled Volumes			
Year	Pli	Sx	Relative % Planted Pl Year ratio	Sx Year ratio	Relative % Scaled Pl	Sx	Variance	Comments
2000	1368376	3080391	30.8%	69.2%	no data	no data		
2001	1491049	3313459	31.0%	69.0%	35.7%	64.3%	4.7%	Scale volume
May 2002-Mar 2003	1678534	3515058	32.3%	67.7%	32.5%	67.5%	0.2%	Scale volume
May 2003-Mar 2004	1664293	2536113	39.6%	60.4%	33%	67%	-6.6%	Plan volume
Spring 2004 – future	849833	1581667	35.0%	65.0%				

Forecasting Assumptions and Analytical Methods:

- Does Forecasting apply (y/n)? Yes

2003-2004 estimate is based on seedlings ordered to date, and preliminary timber harvesting plans.

Strategy and Implementation Schedule:

SLP's identify proposed silvicultural treatment regimes prior to harvesting, based on stand and site characteristics, including species selection options, and silviculture supervisors order seedlings based on the SLP information, and harvest plans.

More than 95% of the coniferous volume harvested in the DFA was processed at Canfor's sawmills in Fort St. John and Taylor in 2002. Currently participants plant nearly 100% of coniferous blocks in the DFA with spruce or pine seedlings, with planting occurring as soon as practical following harvesting.

Records of planting activity, including species composition, are completed following each summer field season. Information on harvested volumes by species is obtained from scale data as wood is delivered. Records will be reviewed and results summarized for the April 1-March 31 fiscal year.

Monitoring Procedure:

Planting activity is tracked in silviculture information systems (e.g. Genus) while harvested volumes are recorded at the weigh scales. Results will be analyzed annually and presented in annual reports.

Linkages to Operational Plans:

The Landscape Level Reforestation Strategy (LLRS) and Site Level Plans detail stocking requirements.

Linkages to the LRMP:

This indicator provides information on whether silviculture practices are resulting in substantial species conversions, which may negatively impact vegetative patterns across the landscape over time. It therefore supports the following indicator:

- Maintain functioning and healthy ecosystems.

6.29. REFORESTATION ASSESSMENT

Indicator Statement	Target Statement
Merchantable Volume (m^3) for coniferous areas	For coniferous areas, Merchantable Volume will meet or exceed Target Volume (95% of Predicted Maximum Volume) within the reforestation period
SFM Objectives: A natural range of variability in ecosystem function, composition and structure which allows ecosystems to recover from disturbance and stress Maintenance of the processes for carbon uptake and storage	
Linkage to FSJPPR: For the purposes of Section 35(5) of the FSJPPR this indicator statement, target statement and acceptable variance will be used in replacement of the portions of affected Section 32 of the FSJPPR through the application of the landscape level strategy for coniferous areas logged after November 15, 2001. This will also apply to coniferous area in cutblocks with commencement dates before November 15, 2001 if the participant currently carries reforestation liability and has submitted a statement to the district manager that the cutblock(s) will be subject to the SFMP under Section 42 of the FSJPPR. Please refer to sec 8.1.3 of this SFMP. For the purposes of Section 42 of the FSJPPR this indicator statement, target statement and acceptable variance will be used to determine if forest practices are consistent with the landscape level strategies for coniferous areas.	

Acceptable Variance:

A variance of 5% from the Target Volume will be acceptable. The variance accounts for the complexity of ecosystems and silviculture regimes combined with the long time frames and variety of influences on reforestation outcomes. If the Merchantable Volume falls below the Target Volume and within the variance the results will be reviewed to determine if a specific change in management practice is indicated. This review will consider all Values, Objectives, Indicators and Targets in the SFMP, previous trends and precision of outcomes in silviculture regimes. This review will provide information which will be considered in developing future regimes and practices, ensuring a model of continuous improvement.

Damage event beyond the control or influence of the participants will also be considered an acceptable variance.

Individual cutblocks will meet a minimum cutblock Mean Stocked Quadrant (MSQ) value of 2.0 Well Growing crop trees for a target stocking of 1200st/ha. For a target stocking of 1000st/ha and 800st/ha the minimum cutblock MSQ values will be 1.7 and 1.3 respectively. If the cutblock has areas of different target stocking the MSQ will be prorated by area.

What is this indicator and why is it important?

This indicator measures the success of reforestation regimes in establishing well growing plantations within fifteen years of harvest.

Ensuring that harvested stands are replaced with a well growing plantation is an indication that the harvested area has recovered from a disturbance and maintained its resiliency and productive capacity. Delays in the replacement of harvested species negatively impact future harvest levels. The assessment on a landscape level allows reforestation regimes to be varied at the cutblock level to ensure cost effective programs and the recognition of other values. Achieving the merchantable volume target contributes to carbon uptake and storage objectives.

Current Status:

Field data collection and analysis to begin in 2003.

In the interim, individual coniferous areas must meet the Well Growing standards within the reforestation period as outlined in the FSJPPR.

Forecasting Assumptions and Analytical Methods:

- Does Forecasting apply (y/n)? No

Future yields are calculated based on a TASS model. Inputs of stocking, species group, effective age, harvest age and site index are used to calculate a theoretical yield. The target (TV) is set at 95% of the theoretical predicted maximum volume (PMV) and an actual merchantable volume (MV) is calculated using field data.

Strategy and Implementation Schedule:

A Landscape Level Reforestation Strategy sets out the process and detail for this indicator. A field sample will be collected in the fall of 2003 and used to examine the appropriateness of the selected target and build a compilation tool.

Implementation of this indicator for deciduous and mixedwood stands will depend on the review and development of a suitable growth and yield model.

Monitoring Procedure:

A Landscape Level Reforestation Strategy sets out the overall process to establish and assess plantations. Separate indicators monitor progress to the assessment stage as well as an internal progress review.

Progress Review

Planting will be carried out over the entire area to be reforested under the SLP. Following this activity the block will be reviewed for potential achievement of the SLP including LLRS targets.

The progress review will be carried out in all blocks within eight growing seasons following harvest commencement. The forester managing each block will summarize the progress to date; its success and the likelihood of maintained success. Assessment methods are at the discretion of the forester and may vary from an aerial assessment to a detailed plotted survey. Field information must have been obtained within the last two growing seasons. The results will be summarized over the entire landscape being managed. For reviewing progress to the future target volume (TV) the forester will provide the following:

1. An area estimate by block of areas not expected to contribute to future volume.
2. An area estimate by block of areas that are less than minimum stocking as set out in the SLP.

The method for calculating area is at the discretion of the forester and may vary from a field inspection estimate to a GPS survey. Areas containing less than minimum stocking will be prorated based on the comparison to minimum stocking.

Total area unstocked plus prorated area below minimum stocking will be summarized as a percentage of total area surveyed and compared to the 95% ratio between Target Volume (TV) and Predicted Maximum Volume (PMV). The forester will then decide if all blocks can carry forward without further treatment or, if not, ensure further treatments are scheduled to ensure future targets are met.

This review is intended to be an internal review to provide the pilot project participants with an approximate measure of success. At this time the forester can also decide that areas below the minimum standards in the SFMP/SLP can be carried forward in their existing condition if he/she considers that the areas will not impact the success of targets under the SFMP/SLP.

Linkages to Operational Plans:

The Landscape Level Reforestation Strategy and Site Level Plans detail stocking requirements.

Linkages to LRMP:

- Maintain functioning and healthy ecosystems.

6.30. ESTABLISHMENT DELAY

Indicator Statement	Target Statement
Establishment Delay (years)	The area weighted average establishment delay for coniferous regeneration will not exceed two years The area weighted average establishment delay for deciduous regeneration will not exceed three years
SFM Objectives: The diversity and pattern of communities and ecosystems within a natural range A natural range of variability in ecosystem function, composition and structure which allows ecosystems to recover from disturbance and stress Maintenance of the processes for carbon uptake and storage	
Linkage to FSJPPR: For the purposes of Section 42 of the FSJPPR this indicator statement, target statement and acceptable variance will be used to determine if forest practices are consistent with the landscape level strategies for coniferous and deciduous areas logged after November 15, 2001.	

Acceptable Variance:

To allow for variations in site preparation requirements, access and delays in harvest the acceptable variance for establishment delay is one half year.

What is this indicator and why is it important?

Establishment delay is the period from the start of harvest on the area to be reforested to the completion of initial establishment of future tree species as required in the SLP.

The establishment delay is usually within two years where planting is prescribed and four years where the stand is expected to reforest naturally. Ensuring that harvested stands meet the prescribed establishment delay is an indication that the harvested area has maintained the ability to recover from a disturbance and thereby maintaining its resiliency and productive capacity. Delays in the replacement of harvested species negatively impact future growth and harvest levels.

Current Status:

2.1 years for conifer (Canfor; calculated to Dec 2002)

1.75 years for conifer (TSP)

Forecasting Assumptions and Analytical Methods:

- Does forecasting apply (y/n)? No

Records of harvesting activity and silviculture treatment are made in Genus. On an annual basis these records are reviewed and all harvested area that is not completely re-established is identified. The area weighted average age from harvesting start date of all blocks is calculated.

Strategy and Implementation Schedule:

A Landscape Level Reforestation Strategy identifies target and timelines for reforestation success. Site level plans (SLP) identify silviculture regimes and timelines on a cutblock level. Genus system records harvesting activity and future treatments based on SLP's and post harvest block reviews. Blocks are planted within the first or second growing season depending on the implementation of site preparation treatments.

Monitoring Procedure:

All reforestation activities are documented and tracked in Genus. Establishment delay is reviewed annually by summarizing data from Genus on all unstocked cutblocks and calculating the area weighted average age of unstocked area. Calculations will be based on the month of completion of surveys and entire cutblock net reforestable area will be used in the calculations if any or all of the cutblock NAR is unstocked.

Survey Requirements

For artificial regeneration a survey of well spaced will be carried out during the same growing season as establishment to confirm stocking levels meet the requirements of the appropriate SLP. A further survey of well spaced will be carried out within three growing seasons to confirm stocking is maintained above minimum levels. The surveys will meet current standards at the time of writing for measuring well spaced and total trees but inclusion of any other parameters, such as, brush, health, inventory labeling, etc. will be at the discretion of the implementing forester. Surveys will be at an intensity of one plot per hectare using the appropriate minimum inter-tree spacing. The minimum strata size is 2 hectares.

For natural regeneration a survey of well spaced will be carried out during the three growing seasons post harvest to confirm stocking levels meet the requirements of the appropriate SLP. The surveys will follow current "Stocking and Free Growing Procedures Manual - May 2002" guidelines. A minimum of five plots will be placed in each stratum on 100meter UTM coordinates in a random fashion and meet required confidence limits. A minimum stratum size of 2 ha will be applied.

For mixedwood, discrete stratas of deciduous or conifer the respective survey requirements will apply. Survey requirements for intimate mixtures of conifer and deciduous will need to be developed.

Linkages to Operational Plans:

The Landscape Level Reforestation Strategy (LLRS) and Site Level Plans detail timing and stocking requirements.

Linkages to LRMP:

Maintain functioning and healthy ecosystems.

6.31. LONG TERM HARVEST LEVEL

Indicator Statement	Target Statement
Long-term harvest level (LTHL) as measured in cubic metres per year (m^3/yr)	We will propose an Allowable Annual Cut (AAC) that sustains the LTHL of the Defined Forest Area (DFA)
SFM Objective: Maintain or enhance landscape level productivity No decrease in the LTHL in the DFA	
Linkage to FSJPPR: N/A	

Acceptable Variance:

No acceptable variance.

The participants propose an AAC however, the Chief Forester (Minister of Forests) determines the AAC for the management unit.

What is this indicator and why is it important?

The LTHL is the harvest level that can be maintained indefinitely given a specified timber harvesting land base and associated management regime within the DFA. The analysis that accompanies the TSR is based on the best available information and provides a timber supply forecast for the next 250 years. Timber Supply Reviews are generally conducted every five years during which the assessment of the long term sustainable harvest level can be reviewed in the context of current socio-economic condition, ecological consideration and also with updated inventory and forest management information. AAC's are determined by the Chief Forester of BC and are generally within the long-term harvest level forecasts in order to ensure sustainable forest productivity.

Since the impacts of forest utilization that occur today will affect future generations, it is necessary to be able to plan for sustainable forest management over centuries. The short and medium term harvest projections are directly linked to the long-term sustainable harvest levels. Incorporating new (best available) information and changing social values into the periodic timber supply analysis, provides an opportunity to fine tune short-term and long-term harvest levels throughout time and be responsive to changing conditions while still considering the long term sustainability of the forest ecosystem.

Current Status:

The latest TSR Base Case Analysis Report was completed in June 2002, and the AAC Rationale was effective March 1st, 2003.

The AAC established for Ft St John was established at 2,115,000 m^3/year.

The harvest level includes as partition of 1,200,000 m^3/year for coniferous leading stands and 915,000 m^3/year for deciduous leading stands.

The TSR base case indicates that the conifer harvest level is below the long-term harvest level. The deciduous harvest level while currently above the long-term harvest level can be maintained for the first 3 decades before declining at 10% per decade to the long-term harvest level of 632,000 m^3/year. Subsequent sensitivity analysis indicates that the initial harvest rate may be able to be maintained for more than 10 decades before declining at 10% per decade to a long-term harvest rate of 741,000 m^3/year. Both of these harvest flows indicate that the initial harvest level will not adversely impact the long-term harvest level.

Forecasting Assumptions and Analytical Methods:

Forecasting of this indicator is completed as part of the TSR process and completed every 5 years. Participants update the status of their individual AAC's annually and information that goes into the TSR is updated as it becomes available. The next timber supply analysis is scheduled for 2009.

Timber supply is usually considered within the context of three relative timeframes — short term, medium term and long term. The short term is typically represented by the first two decades of the harvest forecast and reflects the period in which the scheduled harvest level is defined by immediate concerns of achieving socio-economic objectives and maintaining non-timber values. The medium term corresponds to the transition from harvesting mostly old growth to harvesting managed stands. The long term is the period that begins approximately when the harvest reaches the LTHL.

Strategy and Implementation Schedule:

Guidance in developing harvest flow objectives is taken from the current economic and social objectives of the Crown expressed by the Minister of Forests in a letter to the chief forester in 1994. In the letter, the Minister emphasized the importance of the continued availability of good forest jobs and the long-term stability of communities that rely on forests. The letter also states that any decreases in allowable cut at that time should be no larger than necessary to avoid compromising long-run sustainability.

In general, a reasonable flow pattern provides for a managed and gradual transition from short-term to medium- and long-term harvest levels, and avoids large and abrupt disruptions in timber supply. A reasonable flow has a medium-term level that drops below the long-term level to the minimum extent and only if justified. The long-term level should provide an even level of growing stock over the long term.

Monitoring Procedure:

The data needed to monitor and forecast this indicator includes but is not limited to:

- VRI (Vegetation Resources Inventory) forest cover
- Timber supply information package; current management assumptions
- Growth and yield curves/tables
- Social-economic parameters (employment, taxes, government revenues etc.)

Long-term monitoring of managed stands will occur through Change Monitoring Inventory (CMI) plots established over the DFA. These plots are systematically established across the DFA based on a 3-km grid in stands 15 years after harvesting. These plots will provide a representative sample of all managed stands over time. The first set of 30 plots is being

established in 2003. Once the initial backlog of approximately 70 samples is established for stands that have been harvested greater than 15 years ago there will be an additional 3 to 4 samples established each year in conifer stands and eventually 4 to 5 in deciduous stands.

The CMI plots will be re-measured on an approximately 10-year cycle providing growth and yield data for managed stands that can be used to check the accuracy of yield curves used to project growing stock in managed stands within the THLB.

Linkages to Operational Plans:

The TSR forecasts short, medium and long-term harvest levels for the DFA. The Chief Forester determines an AAC for both deciduous and coniferous timber harvesting land bases, and the Minister of Forests sets and apportionment to each forest tenure. Forest tenure holders (licensees) develop operational harvest plans (Forest Development Plans, or Forest Operations Schedules) using AAC as a key driver for development.

Linkages to LRMP:

The indicator statement and target help to support the following LRMP objectives:

- Maintain timber harvesting and a long-term timber supply
- Maintain timber harvesting and forest management opportunities

6.32. SITE INDEX

Indicator Statement	Target Statement
Site index	Average post harvest site index will not be less than average pre-harvest site index on blocks harvested under the pilot project regulation
SFM Objective: Maintain or enhance landscape level productivity Protect soil resources to sustain productive forests	
Linkage to FSJPPR: N/A	

Acceptable Variance:

A maximum negative variance of 15% post harvest site index versus pre harvest site index, for statistical variability.

What is this indicator and why is it important?

Site index is a relative measure of forest site quality. It is a measure of the height growth that can be expected 50 years after trees reach 1.3 metres in height for a tree species on a given site. Site index is highly sensitive to changes in ecological site conditions including soil nutrients, moisture and other variables, and is generally considered one of the most reliable indicators of site quality. Conducting activities in a manner that decreases a sites potential capability to produce timber will be reflected in reduced post harvest site index.

Soil productivity is one of the main factors impacting site productivity. Site index will be negatively affected if soil productivity were significantly reduced due to harvesting activities. A relative comparison of a plantations average site index when well growing compared to

the pre-harvest site index is therefore an appropriate method for evaluating if the resiliency and productive capacity of forest stands and forest soils has been maintained.

Current Status:

Testing the practicality of using cruise information for assessing site index (SI) was done in 2002. Cruise information for 25 blocks was analyzed and compared to forest cover map site index. Due to the age of the inventory in some parts of the TSA, six of the blocks had site classes rather than site indices identified, so they were assigned SI based on averages for the site class. Three (12%) of the average site indices determined by cruise information were lower than the forest cover SI, the rest were the same or higher. In one sample, forest cover site index overestimated the SI by 11.1% compared to the cruise. These minor discrepancies appear to be related to the accuracy of the inventory, and statistical variability. Accounting for natural variability within blocks, and normal statistical sampling error of the measurements, a maximum variance of 15% to the target minimum should be permissible.

Silviculture surveys to date generally have not calculated site index by the growth intercept method. Site index for previous silviculture surveys was estimated from either preexisting forest cover information, or from ecotype averages.

Forecasting Assumptions and Analytical Methods:

- Does forecasting apply (y/n)? No

Strategy and Implementation Schedule:

The vast majority of the forests in the DFA are even aged, thrifty to mature stands, which make them amenable to collecting accurate pre-harvest site indices during operational cruising activities, utilizing existing site index compilation programs. In some instances where cruising information is not available pre-harvest site index estimates will be derived from forest inventory maps, or alternatively from SIBEC information, although this source is considered less reliable at present.

This indicator will initially only apply to blocks harvested under the pilot regulation (i.e. harvesting commenced Nov. 15, 2001 or later). Silviculture blocks harvested prior to this date are currently subject to existing SLP provisions for site degradation. Additional testing of post harvest versus pre harvest SI will continue in 2003, in order to further refine the process and validate the assumptions.

August 2003: Silviculture Supervisors will ensure that post harvest site index will be collected using the growth intercept method during well growing silviculture surveys. These will be compared to existing cruise SI, inventory, or average SIBEC information to provide a baseline.

April 2004: The Cruising Supervisor for all participants will ensure that pre-harvest site index information from cruise plots will be collected during all cruising operations following standard procedures (see Appendix 11: Procedure for Selecting Sample Trees in Operational Cruising for Use in Site Index Calculations). For all new cruises average site index information will be compiled by the Cruising Supervisor, and data stored digitally by SU (e.g. in GENUS, or similar information system). For blocks cruised prior to April 2004, if cruise SI information is not available, the site index from forest cover inventories will be applied to the block.

December 2004: Participants will be responsible for reviewing blocks already harvested under the pilot regulation, and depending on the information available, use (in descending order of selection) existing cruise information, forest cover data, or preliminary SIBEC

estimates, to assign a pre-harvest site index to each SU. SI from forest cover data will be derived from the most prevalent forest cover type within an SU.

Monitoring Procedure:

The site index information will be compiled for each SU in each well growing block surveyed. The Silviculture supervisor will compare the prorated averages of pre-harvest SI in each block to the recorded post harvest SI, and report this information in the annual report.

Linkages to Operational Plans:

The cruising supervisor will ensure that cruising project tenders will include SI requirements within the contract documents. Site level plans (SLP's) will identify the pre-harvest site index for each SU from the cruising information, or where not available, from the forest cover inventory information. Well growing surveys will collect and report site index by SU.

Linkages to LRMP:

Site index provides a measure of the capability of the sites future productivity, and an indication of the impact of forest operations on this capability. This indicator therefore supports the following LRMP objectives:

- Maintain functioning and healthy ecosystems
- Enhance timber harvesting and a sustainable long term timber supply
- Maintain timber harvesting and forest management opportunities

6.33. LANDSLIDES

Indicator Statement	Target Statement
Number of hectares of landslides resulting from forestry practices	0 hectares of landslides due to forestry activities on blocks harvested and roads constructed commencing December 1, 2001
SFM Objective: Protect soil resources to sustain productive forests	
Linkage to FSJPPR: N/A	

Acceptable Variance:

A one hectare per year total accumulative variance from the target is considered a manageable variance which should have no significant measurable impact on the overall productivity of the forestland base.

What is this indicator and why is it important?

For the purposes of this indicator, landslides are defined as the mass movement of soil or debris covering an area at least 0.10 hectares in size.

Naturally occurring landslides are an ongoing feature of the geology in the Fort St. John TSA, and as such contribute to the natural landscape pattern. In many parts of the TSA landslides are and will continue to occur whether or not timber harvesting or other industrial activity takes place.

Maintaining sustainable, productive forests, however, requires that the impacts of timber harvesting do not create conditions that may initiate slides, where they may not have naturally occurred otherwise. The primary areas of concern, in most instances, is maintaining natural water dispersal patterns, avoiding road cuts in potentially unstable areas, and minimizing the impacts of soil disturbance on water infiltration rates.

Current Status:

A review of Canfor's Incident Tracking Records from 1995 to 2002 shows 7 recorded slide events.

- CP 628-5 – Three slides are described as no more than 10-15 metres long by 5 metres wide.
- CP 802-9 – small slide estimated as 20 metres by 20 metres.
- CP 142-4 – slide is noted as 20 m x 30 metres.
- CP 314-4 – slide is only described as a "small slide" below a landing.
- CP 311-1 – does not have a size noted in the records, but is estimated at 25m wide by 170 m in length, or approximately .43 ha in size.

No landslides have been recorded on blocks harvested or roads constructed since December 1, 2001 on coniferous licencees or BCTS operations.

Forecasting Assumptions and Analytical Methods:

- Does forecasting apply (y/n)? No

Strategy and Implementation Schedule:

During the initial planning stages staff will review existing terrain stability mapping. Areas with obvious serious terrain stability concerns will be avoided, and areas with mapped potential stability issues will be identified and reviewed in the field to determine the potential for concern given the proposed activity.

Trained field staff will be responsible for identifying additional unstable or potentially unstable areas during initial layout or cruising, which may not be apparent from mapping information. Appropriately qualified personnel then assess the level of risk and potential impacts presented by a proposed project, and whether or not changes in the design or location of the project can reduce or eliminate the risk. Activities are modified or dropped according to the recommendations received.

December 2003: Tracking methodology will be communicated to operational staff. Formal tracking will commence January 1, 2004.

Monitoring Procedure:

Areas with identified potential stability concerns will be assigned higher risk rankings, and monitoring frequency will be correspondingly increased.

Woodlands staff will identify landslides during inspections, and maintain incident records, including the size of each slide occurring in or adjacent to cutblocks or roads. An investigation of the cause will be completed to determine if forestry activities contributed significantly to the incident.

If the internal assessment indicates forestry activities did not contribute, an independent assessment will be required to confirm these findings. Action plans will be developed to

address any significant damage where the determination concludes it is related to forest activities.

Annually the incident tracking systems will be reviewed for the number, size and cause of landslides, and the designated forester for inclusion in an annual report will complete a summary.

Linkages to Operational Plans:

During the preparation of FDP's and FOS's, existing terrain stability information will be reviewed and considered in the preparation of the plans.

SLP's will identify areas determined from fieldwork to present a risk of landslides, and the proposed measures to minimize this risk. Where the stability concerns outside of the expertise of the person preparing the SLP, other adequately qualified personnel will be enlisted to provide recommendations.

Linkages to the LRMP:

Managing to reduce the risk of landslides, and minimize damage that may occur protects the forest landbase, maintains site productivity, and generally minimizes disturbances or damage to naturally functioning ecosystems.

This indicator therefore supports the following LRMP objectives:

- Minimize losses to the timber harvesting land base.
- Maintain functioning and healthy ecosystems.
- Maintain timber harvesting and forest management opportunities.

6.34. PEAK FLOW INDEX

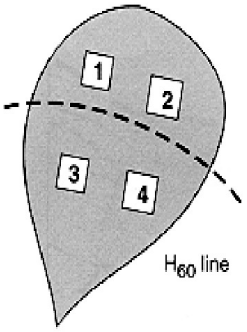
Indicator Statement	Target Statement
The percent of watersheds achieving baseline targets for the peak flow index and the percent of watershed reviews completed where the baseline target is exceeded	A minimum of 95% of the watersheds will be below the baseline target All watersheds that exceed the baseline target will have a watershed review completed wherever new harvesting is planned
SFM Objective: Maintenance of water quantity	
Linkage to FSJPPR: For the purposes of Section 42 of the FSJPPR this indictor statement, target statement and acceptable variance will be used to determine if forest practices are consistent with the landscape level strategies.	

Acceptable Variance:

A variance to a minimum of 90% of the watersheds will be below the baseline targets will be acceptable.

A zero variance for conducting a watershed review wherever new harvesting is planned in a watershed where the baseline target is exceeded.

What is this indicator and why is it important?



Block no.	Area (ha)	Stand height (m)	ECA (ha)	Weight factor	Weighted ECA
1	20	4	15.0	1.5	22.5
2	30	6	15.0	1.5	22.5
3	20	1	20.0	1.0	20.0
4	30	8	7.5	1.0	7.5

Weighted Total ECA = **72.5**

Peak Flow Index = $\frac{72.5}{1000}$ = **0.0725**

Figure 9: Peak Flow Index - Example Calculation

Most changes to stream channel stability and fish habitat occur during large runoff events, or peak flows (Beaudry and Gottesfeld 2001). In the interior of British Columbia most peak flows occur during spring snowmelt. Large disturbances in a forested watershed, such as extensive forest harvesting or wildfires, can have a negative impact on peak flows by increasing the flows above stability thresholds. This can accelerate streambed and stream bank erosion, damage fish habitat and result in an unstable fluvial system. After forest harvesting or wildfires have disturbed an area, both winter snow accumulation and spring snow melt rates increase (Winkler 2001). However, the impact of disturbances on peak flows is not equal throughout a watershed. Disturbances that are located at higher elevations in a watershed have a greater impact on peak flows than do those located at lower elevations (Gluns 2001). Consequently, it is important that a good water quantity index take this fact into consideration. The Peak Flow Index (PFI) considers this by providing a greater weight factor to the disturbances that occur at higher elevations. The "higher elevation" is defined as the upper 60% of the watershed. This "upper watershed area" is defined individually for each watershed or sub-basin by using the concept of the "H60 line".

The Peak Flow Index also considers that the forest will re-grow over time within a disturbed area. As re-growth occurs, the negative impact of accelerated snow accumulation and melt is reduced and consequently so are the impacts to increased peak flows. The PFI considers stand height as the indicator of re-growth. The PFI value decreases as the stand height increases. The PFI provides an objective method to forecast and evaluate the potential effects of past disturbances and future plans. By providing conservative target values, it ensures that rates of forest harvesting do not contribute to the degradation of the water resource. Figure 9 provides an example of how PFI is calculated for a 1000 ha watershed.

Although the PFI is a good index, it is only that “an index”. It is not intended to be a detailed quantitative modeling of increased volumes of flows. The Peak Flow Index will be used as a "coarse-filter" to identify where a more detailed review of the watershed is required when new harvesting is planned i.e. if the PFI for the watershed is below the baseline target when new harvesting is planned then no further review is required, however, if the current PFI is above the baseline target when new harvesting is planned then a more detailed review of the watershed is required.

Current Status:

There are 106 watersheds delineated for monitoring PFI. Table 31 identifies the current status, the status once the FDP is applied and baseline targets for all 106 watersheds. There are 103 watersheds (97%), that are currently meeting the baseline target PFI and 102 watersheds (96%) that are meeting baseline targets after the FDP is applied. Watersheds not meeting baseline targets after the FDP are highlighted in the table.

Table 31: PFI Current Status

Watershed Group	Watershed Name	Size (km2)	Elevation range (m)	H60 Elevation (m)	Current PFI	FDP Status PFI	Baseline Target PFI
Upper Prophet	Besa River	515.61	1136 – 2993	1568	0.01	0.01	43
Upper Prophet	Nevis Creek	182.43	1019 – 2102	1422	0.01	0.01	37
Upper Prophet	Pocketknife Creek	235.85	860 – 1884	1110	0.26	0.26	43
Upper Prophet	Minaker River	170.31	859 – 1742	1060	0.10	0.10	43
Upper Prophet	Keily Creek	269.62	1137 – 2920	1683	-	-	37
Upper Prophet	Minaker River - Residual	555.08	819 – 1820	1070	0.15	0.15	43
Upper Prophet	Upper Prophet	1,177.85	1020 - 2993	1569	0.01	0.01	37
Upper Sikanni	Sikanni Chief	470.52	1119 – 2739	1488	0.52	0.52	43
Upper Sikanni	Trimble Creek	160.27	1082 – 2122	1439	-	-	43
Upper Sikanni	Sidenius Creek	460.87	1119 – 2619	1489	0.11	0.11	43
Upper Sikanni	Loranger Creek	132.18	1025 – 2018	1390	1.84	1.84	43
Upper Sikanni	Buckinghorse River	389.18	840 – 1936	1119	4.75	4.75	43
Upper Sikanni	Middle Fork Creek	207.97	857 – 1269	1060	1.19	1.19	43
Upper Sikanni	Daniels Creek	223.39	758 – 1263	1041	2.32	2.32	43
Upper Sikanni	Medana Creek	138.68	702 – 1183	1000	8.63	8.63	43
Upper Sikanni	Coal Creek	214.49	637 – 1079	900	5.21	5.22	43
Upper Sikanni	Donnie Creek	122.16	520 – 1043	822	5.75	5.75	50
Upper Sikanni	Temple Creek	216.19	458 – 901	760	2.30	4.45	43
Upper Sikanni	Trutch Creek	858.44	491 – 1262	781	0.73	3.11	43
Upper Sikanni	Boat Creek	391.83	455 – 1081	719	1.03	1.03	50
Upper Sikanni	Sikanni Chief - Residual	2,902.00	618 – 2739	1143	5.52	5.52	43
Upper Sikanni	Buckinghorse River - Residual	1,239.18	618 - 1936	1029	3.62	3.62	43
Lower Sikanni	West Conroy	248.28	638 – 1020	782	0.82	1.04	50
Lower Sikanni	LSIK Unnamed 2	162.43	536 – 858	720	14.72	15.25	43
Lower Sikanni	Katah Creek	594.82	419 – 915	660	0.41	0.41	50
Lower Sikanni	LSIK Unnamed 4	59.29	519 – 721	641	2.29	2.29	50
Lower Sikanni	Bull Creek	351.34	639 – 981	752	0.21	0.21	50
Lower Sikanni	Upper Gutah Creek	806.45	559 – 901	728	1.23	1.23	62
Lower Sikanni	Dechacho Creek	172.51	378 – 762	516	4.42	4.42	50
Lower Sikanni	Kenai Creek	78.86	400 – 621	1000	4.63	4.63	50
Lower Sikanni	Niteal Creek	516.60	359 – 520	475	6.75	6.75	50
Lower Sikanni	Conroy Creek	1,096.67	417 – 1020	720	3.01	3.44	50
Lower Sikanni	Katah Creek	594.86	419 – 915	660	0.41	0.41	50
Lower Sikanni	Gutah Creek	1,450.99	380 – 901	645	2.22	2.22	50
Fontas	FONT Unnamed 1	117.73	361 – 481	461	3.08	3.08	50
Fontas	Dazo Creek	260.27	360 – 494	460	4.04	4.04	50
Fontas	Teklo Creek	212.81	380 – 474	426	1.47	1.47	50
Fontas	Kataleen Creek	162.95	380 – 451	413	2.90	2.90	50
Fontas	Chasam Creek	168.21	539 – 680	599	5.72	5.72	50
Fontas	Fontas River	320.35	536 - 800	660	2.96	2.96	50
Fontas	Bedji Creek	230.42	460 – 600	508	0.37	3.39	50
Fontas	Upper Etthithun River	404.45	620 – 842	680	11.89	11.89	50
Fontas	Ekwan Creek	850.50	360 – 481	420	3.96	4.41	50
Fontas	Fontas River	714.32	440 – 800	580	3.26	3.26	50
Fontas	Etthithun River	1,161.60	440 – 842	535	5.07	6.77	50
Kahntah	Helicopter Creek	147.32	505 - 742	613	3.86	3.86	62
Kahntah	Dahl Creek	412.84	535 – 943	700	0.61	0.61	50
Kahntah	Upper Cautley Creek	478.27	660 – 1022	740	19.14	19.14	62
Kahntah	KAHN Unnamed 4	226.87	640 – 944	720	30.02	30.02	50
Kahntah	KAHN Unnamed 5	126.05	538 – 721	624	6.44	6.60	62
Kahntah	Cautley Creek	865.02	518 – 1022	680	13.83	13.85	62
Kahntah	Kahntah Creek	1,096.59	518 - 944	700	9.08	9.08	50

Watershed Group	Watershed Name	Size (km2)	Elevation range (m)	H60 Elevation (m)	Current PFI	FDP Status PFI	Baseline Target PFI
Upper Halfway	Blue Grave Creek	158.63	720 – 1722	960	12.28	13.02	37
Upper Halfway	Horseshoe Creek	197.41	739 - 1762	1060	4.35	4.35	37
Upper Halfway	UHAF Unnamed 3	127.86	922 – 1862	1221	0.47	0.47	37
Upper Halfway	Upper Chowade Creek	426.75	925 – 2336	1395	2.68	2.68	37
Upper Halfway	Upper Cypress Creek	334.89	1099 – 2316	1493	-	-	37
Upper Halfway	UHAF Unnamed 6	211.34	778 – 1981	976	21.11	23.12	37
Upper Halfway	Upper Halfway River	629.22	1103 – 2590	1235	1.54	1.54	37
Upper Halfway	Two Bit Creek	160.23	980 – 1888	1235	3.85	3.85	37
Upper Halfway	Upper Halfway River	1,096.06	914 – 3057	1241	1.86	1.86	37
Upper Halfway	Cypress Creek	620.07	840 – 2229	1200	2.42	5.36	37
Upper Halfway	Chowade River	988.88	779 - 2331	1475	4.98	5.37	43
Lower Halfway	LHAF Unnamed 1	216.47	699 – 1022	860	28.31	34.11	43
Lower Halfway	Townsend Creek	295.80	698 – 1081	880	28.16	34.96	43
Lower Halfway	Blair Creek	230.44	698 – 1142	902	39.39	45.23	43
Lower Halfway	Cameron River	495.18	699 – 1203	944	14.84	19.94	43
Lower Halfway	Poutang Creek	179.97	1098 – 2393	1453	-	-	43
Lower Halfway	Needham Creek	328.94	938 – 2269	1430	0.03	0.03	43
Lower Halfway	Horn Creek	426.61	1079 – 2347	1474	0.01	0.01	37
Lower Halfway	Kobes Creek	299.88	620 – 1648	828	15.09	16.37	50
Lower Halfway	Colt Creek	158.53	719 – 1701	913	15.05	15.36	43
Lower Halfway	Ground Birch Creek	338.39	558 – 1062	735	16.33	23.09	43
Lower Halfway	Aikman Creek	118.74	640 - 1120	815	31.64	31.64	43
Lower Halfway	Deadhorse Creek	208.99	560 – 959	820	23.32	28.09	43
Lower Halfway	Graham River	2,309.94	530 – 2404	1279	4.05	4.98	43
Lower Halfway	Cameron River - Large	2,029.32	538 - 1205	837	23.40	29.05	37
Upper Beatton	Jedney Creek	128.76	779 – 1101	952	3.79	8.65	43
Upper Beatton	Grewatsch Creek	269.73	736 – 1103	927	7.26	10.85	50
Upper Beatton	Beatton River	1,071.09	777 – 1780	984	6.46	11.83	43
Upper Beatton	La Prise Creek	338.99	717 – 1021	860	5.36	5.36	50
Upper Beatton	Holman Creek	150.18	719 – 1080	896	13.22	13.47	50
Upper Beatton	Black Creek	666.11	700 – 1022	807	12.76	12.76	50
Upper Beatton	Martin Creek	120.24	700 – 980	830	57.56	57.56	50
Upper Beatton	Nig Creek	476.81	680 – 920	782	43.68	45.21	50
Upper Beatton	UBTN Unnamed 9	156.26	677 – 880	757	10.27	10.42	50
Upper Beatton	McMillan Creek	103.34	659 – 770	736	4.17	4.17	43
Upper Beatton	Arrow Creek	507.02	661 – 902	783	25.15	25.15	50
Upper Beatton	Upper Beatton Lrg	2,345.63	719 - 1782	924	7.49	11.83	50
Milligan	Dede Creek	128.35	680 – 740	720	68.73	68.73	62
Milligan	Upper Milligan Creek	382.20	719 – 941	832	5.02	5.02	50
Milligan	MILL Unnamed 3	325.52	780 – 962	880	10.99	10.99	62
Milligan	Milligan Creek	432.38	680 – 941	780	5.27	5.27	50
Milligan	Flick Creek	203.24	700 – 859	780	3.71	3.71	62
Milligan	Little Beaverdam Creek	334.14	690 – 854	732	4.19	4.19	62
Milligan	Milligan Creek Lrg	1,836.56	619 – 941	758	15.38	15.38	50
Upper Peace	Farrell Creek	646.01	447-1686	713	5.79	10.66	43
Upper Peace	Coplin Creek	350.04	582-942	773	8.66	13.21	43
Upper Peace	Red Creek	239.85	446-919	753	7.36	7.56	43
Upper Peace	North Cache Creek	187.89	548-909	759	6.88	8.96	43
Lower Beatton	Upper Blueberry	857.77	655-1048	820	21.87	27.50	50
Lower Beatton	Aitken Creek	828.45	654-985	815	13.01	17.54	43
Lower Beatton	Umbach Creek	430.91	611-866	741	18.52	23.38	43
Lower Beatton	Charlie Lake	292.66	690-889	773	78.09	81.64	62
Lower Beatton	Osborn River	735.95	623-987	745	4.29	10.40	43
Lower Beatton	Doig River	983.34	623-852	731	5.40	5.40	43

Forecasting Assumptions and Analytical Methods:

The watersheds and baseline target PFI's were developed by Pierre Beaudry, MSc, RPF, Professional Hydrologist (P. Beaudry & Associates Ltd. Watershed Management Services). The watersheds are based on the BC Provincial Watershed Atlas. The following principles were applied when delineating watersheds:

- The watershed boundaries are based on the concept of hydrologic watersheds (water draining through a single point) as opposed to political watersheds. Modifying the true hydrological watershed to fit within the political landscape was avoided wherever possible. Also, small watersheds, known as "residual areas" were not "lumped" or aggregated into a single unit. The PFI concept is most relevant if it monitors a single hydrologic watershed.
- The size of sub basins in this plan range from approximately 60 to 2,900 square kilometres. Very small watersheds and very large watersheds are not included because the PFI concept is most applicable at the sub basin level.
- Watersheds were delineated where the DFA covered at least 50% of the watershed area. Therefore one watershed extends beyond the DFA. Alternatively, the DFA is not completely covered by watersheds. Despite these physical limitations the majority of the planning area is covered by watersheds.

Watersheds were named according to the local name of the water body, where applicable. A basin name was also added to provide a geographic reference.

Once all watersheds were delineated, a baseline target was determined for each of the watersheds. The setting of an absolute PFI target is very difficult and can lead to significant controversy. Although there is no single widely accepted threshold value, conservative targets are suggested. Although we don't know what the physical and biological impacts from increased peak flows will be, we do know that there will be increased flows caused by the removal of a large percentage of the forest canopy. Consequently, a maximum target is set with the overall goal of maintaining the sustainability of the aquatic resource without being overly conservative. The targets must consider the type of watershed and type and stability of the fluvial system. The idea behind setting a baseline target is not to prevent changes in peak flows to occur, but to maintain flows within levels that will not unduly accelerated rates of streambed and stream bank erosion and degrade fish habitat. The suggested target PFI values are partly subjective and are based on a combination of professional opinion, scientific literature and 20 years of personal involvement in research projects investigating peak flows by Pierre Beaudry. Further details on the development of peak flow indices can be found in the report provided to Canfor by Pierre Beaudry, "Peak Flow Index Calculations for 96 Watersheds in the Ft St John Defined Forest Area, March 2003".

Long term forecasting was completed over the full 250 year planning horizon for this indicator. Due to complexities in modeling the direct PFI index because of difficulties in tracking the area above and below the H60 line and applying the constraints a simplified forecasting was done using Equivalent Clearcut Area (ECA) targets. ECA targets were developed by Pierre Beaudry as well as PFI targets. The ECA targets are set lower to reflect the lack of consideration for increased flows coming from above the H60 line within a watershed. All targets were met over the 250-year planning horizon.

Strategy and Implementation Schedule:

As stated above, the PFI is intended to be a coarse filter so that if we are planning to exceed the baseline target we take a closer look at the specific watershed to ensure that water values are maintained. The first indicator target is established to provide the number of watersheds with PFI's that may exist above the baseline PFI at any point in time. The target was determined from a review of the number of watersheds currently above the baseline target and the number that are expected to be above the baseline target after the Forest Development Plans or Field Operations Schedules (FOS) are implemented. The second indicator target is established to ensure that where new harvesting is planned within watersheds that exceed the baseline PFI a watershed review is completed. The watershed review will be preformed by a professional hydrologist and will make specific recommendations for further development in the watershed. These recommendations will then be implemented with our operational plans. This currently applies to the Charlie Lake and Blair Creek watersheds.

Monitoring Procedure:

Data sources include forest cover inventory, watershed boundaries, adjacent licensee planning and harvest history information, and GENUS data. All participants are using GENUS to track planning and harvest history information.

Forest cover information and biogeoclimatic maps are updated either by the Provincial Government or by Forest Licensees under contract with the Government. These data sources are usually only updated / replaced in five to 10 year intervals. Adjacent licensee information is obtained from other licensees that share the same biological land base. This information is obtained approximately every two years as Forest Development Plans are replaced. The Ft St John Pilot Project GENUS system is a "real-time or live" database that is maintained and updated by participant staff as they carry out their daily activities.

There are 106 watersheds, each with its own PFI baseline target. Three reports will be generated. The first report is a tabular report of the PFI within each of the 106 watersheds. The second report is a single number that identifies the percent of watersheds that are below the PFI for any given year. The third report shows the number of watersheds exceeding the baseline target PFI that have had a watershed review completed if new harvesting is planned.

- **Report 1 calculation:** Forest cover is projected to the current date by overlaying GENUS and adjacent licensee information. Each harvest area is weighted based on its elevation and stand height to determine the actual PFI.
- **Report 2 calculation:** The number of watersheds below the baseline target PFI / the total number of watersheds (106), expressed as a percent.
- **Report 3 calculation:** The number of watersheds exceeding the baseline target PFI where new harvesting is planned and a watershed review is complete / the total number of watersheds reviews, expressed as a percent.

To monitor this indicator, the reports will be run when new harvesting is reported in FOS's and compared to the overall target.

The results of watershed reviews will be compared to the initial targets to determine the effectiveness of the target. Should the reviews indicate that the targets were not appropriate this will effect a review of all assumptions used to determine the targets and may result in the targets being adjusted.

Linkages to Operational Plans:

The data will be used at the FOS level to guide future harvest planning and to adjust practices where necessary.

Stream bank erosion, unstable slopes with a potential to deliver sediment to streams etc will be identified during fieldwork phases of block layout and road location and may initiate a watershed review even though the PFI is below the threshold. ,

Linkages to LRMP:

The PFI indicator is directly related to and supports the following LRMP objective:

- Sustain natural stream flow regime.

This indicator while not fully achieving helps to support and does not preclude the outcome of the following LRMP objectives:

- Maintain fish habitat and water quality for priority fish species
- Maintain the headwaters of major rivers and streams as a source of water for current and future generations
- Promote water stewardship to manage for other resources
- Protect water quality and quantity in Charlie Lake watershed

6.35. WATER QUALITY CONCERN RATING

Indicator Statement	Target Statement
The percentage of surveyed stream crossings identified with a high WQCR rating on forestry roads within the DFA for which participants are responsible *WQCR – water quality concern rating	Less than 25% of surveyed stream crossings on active roads (i.e. not deactivated) will have "High" WQCR of the total, based on a three year rolling average Less than 30% of surveyed stream crossings on non-active roads (i.e. deactivated) will have "High" WQCR of the total, based on a three year rolling average
SFM Objective: Maintenance of water quality	
Linkage to FSJPPR: N/A	

Acceptable Variance:

Maximum High WQCR allowable will be 30% for active roads, and 35% for non-active roads.

What is this indicator and why is it important?

Sediment from forestry practices is generated mainly from the following three sources: roads, landslides and stream bank instability. Significant increases in sediment concentration in streams over natural levels can have a negative effect on fish and fish habitat (Slaney et al. 1977; Government of BC 1995; Hall et al. 1987; Hartman and Scrivener1990; Phillips 1971; Scrivener and Tripp 1998.). Sediment can also reduce the value of water for domestic and agricultural use (Government of BC 1995). In areas where

rainfall precipitation is dominant and harvesting occurs on steep slopes, landslide processes can be a major contributor of sediment to streams. In areas such as the Ft. St. John DFA, where the landscape is dominated primarily by rolling hills and low precipitation, landslides are a less significant landscape process than in many other areas of the province.

Sediment yields from logging roads can show a 2 to 50 fold increase over historical levels (Reid 1993). The main point of road sediment delivery to streams is at crossings such as culverts and bridges (Brownlee et al. 1988; Government of BC 1995). While it is recognized that roads are not the only source of sediment related to forestry practices, they are considered to be the most significant causes of increased sedimentation (Beschta 1978; Brownlee et al. 1988; Government of BC 1995; Reid and Dunne 1984). Through the proper layout, construction, deactivation and use of erosion and sediment control (ESC) measures, the impact that roads have on water quality can be significantly reduced (Beaudry 1998; Government of BC 1995). In an effort to assess the impact that stream crossings are having on the water quality within the Ft. St. John TSA, a field based assessment, known as the Stream Crossing Quality Assessment (SCQA) was developed.

The SCQA method is a subjective type of assessment, yet it is systematic in its approach. There are no detailed quantitative measures that must be made (e.g. length and depth of erosion rills). The SCQA method was designed with the assumption that it is better to assess a much larger number of crossings in a qualitative way (i.e. a significant proportion of the crossings within a watershed), than it is to assess only a few crossings in a very detailed, quantitative way. A balance between effectiveness and efficiency has been developed when performing the SCQA field assessments. The SCQA method was designed to be conducted relatively quickly (10 to 15 minutes per crossing) so that a maximum number of crossings can be assessed within an area of interest.

The result of conducting the SCQA field surveys is an individual crossing score for each crossing surveyed. This is calculated based on the erosion and sediment delivery potential of the crossing and results in a score between 0.0 and 1.0. The individual crossing score is used to assign a Water Quality Concern Rating (WQCR) of none, low, medium, or high to each individual crossing. The WQCR can then be used to identify individual or groups of crossings that may be having a negative impact on local water quality.

Current Status:

In 2002 and 2003, areas were selected for the stream crossing quality assessment process as follows:

- August 2002 – Areas within the Jedney, Laprise, and Bluegrave operating areas were selected to be surveyed on a broad scope based on watersheds with a focus based on recent areas of road construction and deactivation.
- June 2003 – Areas within the Graham River, Bluegrave, and Chowade operating areas were selected based on recent (<5 years) road construction and deactivation within DFA roads under the participant's control.

The first survey on selected tenured crossings was performed in October 2002 with the following results:

- Total stream crossings surveyed - 82
- Active Roads (12 crossings)
  - High rating - 3 (25%)
  - Medium rating – 7 (58%)

  - Low rating – 2 (17%)
  - None (no concern) – 0
- Non-Active Roads (70 crossings)
  - High – 19 (27%)
  - Medium – 15 (21%)
  - Low – 29 (42%)
  - None (no concern) – 7 (10%)

Results from the 2002 survey are currently being evaluated and analyzed, with some site-specific remediation already performed.

Surveys are currently under way in the current year, commencing in July 2003. Data results are forthcoming.

Forecasting Assumptions and Analytical Methods:

- Does forecasting apply (y/n)? No

Strategy and Implementation Schedule:

Strategies

Management practices for stream crossings and seasonal bridge installation and removal will be consistent with the procedures in Appendix 12.

Assessment strategies are as follows:

Historical activities vs. recent activities

SCQA surveys are initiated based on consideration of levels of risk including:

1. Active or inactive areas greater than 5 years of age are less apt to pose substantial risk due to stabilization and re-vegetation over time.
2. Implementation of environmental management systems have produced:
   a. Higher levels of monitoring and inspections
   b. Improvement of practices and procedures
3. Recent disturbances such as construction and deactivation generally increases the potential sedimentation into streams.

Selection of Locations

Due to the overall size of the defined forest area and the involvement of other interest groups, survey areas are restricted to those specific roads under the control of the participants.

Road selections are determined by consideration of four aspects:

1. Areas where participants have been jointly active within the DFA,
2. Where recent road construction and deactivation projects (< 5 years) have occurred,
3. Areas of previous surveys requiring follow up analysis and,
4. Areas where terrain features and soil type pose an increased potential for sediment delivery into streams.

Sampling

Once specific roads have been selected based on the above criteria, a minimum of ten percent (10%) will be scheduled for WCQI surveys.

Corrective Action

There are two primary targets for corrective action:

1. Site specific deficiencies
   a. Active roads
      Crossings receiving a "High" WQCR will be assessed for remediation work, and prescribed works will be completed within 1 year.
   b. Inactive road
      Crossings receiving a "High" WQCR will be assessed for corrective action based on several criteria:
      - Accessibility issues
        1. Areas subject to damage during re-opening process
        2. Other fish bearing crossings requiring structures for passage
        3. Isolated areas restricted to air or winter access only
      - Resources required
        1. Type of equipment suitable for remediation work
        2. Financial
2. Inadequate road construction or deactivation practices and procedures

   If assessment and evaluation of survey data identifies levels of "High" WQCR in excess of targets, recommendations will be developed for changes to best management practices surrounding road construction, maintenance, and deactivation.

   Prior to implementation, the participant will review the recommendations and provide direction for development of acceptable Action Plans.

Implementation

The SCQA system was implemented on the DFA in 2002. Continuation of the SCQA system is slated as follows:

- Annually, the participants will select areas for survey as per the Selection of Locations and Sampling strategies.
- Annually, stream crossing surveys will be conducted and the resulting data analyzed.
- Results from the annual evaluation process of WQCR survey data will determine the need for development of recommendations and subsequent Action Plans. If required, plans will be formulated to meet target goals and promote continuous improvement over time in the areas of road construction, maintenance, and deactivation practices.

Monitoring Procedure:

Measurement Process

- Results from the indexing process are tabulated into spreadsheet reports
- Reports are evaluated by participant working group

Tracking Process (entry of information into the FRMS)

- Stewardship of crossings are identified at the time of data entry

- Reports are generated and distributed to the applicable participant for review and appropriate action

Reporting

- Annually, statistics and data collected will be reported to the participant working group for inclusion in the overall SFM report

Linkages to Operational Plans:

Once data is compiled and evaluated for the surveyed area within the DFA, corrective action will be taken as necessary to meet or exceed target goals. Achieving targets will support the overall objective by completing site-specific remediation as required and, improvements to construction, maintenance and deactivation practices as required.

Linkages to the LRMP:

This indicator proactively addresses the potential impacts of stream crossings, which will protect water quality in areas downstream of crossings. It therefore supports the following LRMP objectives:

- Manage access to protect significant fish and wildlife habitats, alpine areas and recreation values.
- Promote water stewardship to manage for other resources.
- Maintain water quality in the Peace River.
- Protect water quality and quantity in the Charlie Lake watershed.

6.36. PROTECTION OF STREAMBANKS AND RIPARIAN VALUES ON SMALL STREAMS

Indicator Statement	Target Statement
The number of non-conformances to SLP measures to protect stream bank, stream channel stability and riparian vegetation from harvesting and silviculture activities	No non-conformances related to protecting stream bank, stream channel stability and riparian vegetation due to harvesting or silviculture activities
SFM Objective: Maintenance of water quality	
Linkage to FSJPPR: For the purposes of Section 42 of the FSJPPR this indictor statement, target statement and acceptable variance will be used to determine if forest practices are consistent with the landscape level strategies.	

Acceptable Variance:

The maximum allowable variance is one non-conformance per participant annually.

What is this indicator and why is it important?

This indicator measures if participants harvesting or silviculture activities are being conducted in accordance with measures outlined in SLP's to protect streambanks, channel stability and riparian values on waterbodies which do not have a mandatory riparian reserve zone (e.g. S4, S5, and S6 classifications). SLP's contain site specific measures designed to protect streambanks, stream channel stability, and in many cases adjacent riparian vegetation. This will provide an indication of the effectiveness of SLP measures, and the implementation of these measures during forestry operations to protect riparian vegetation

and water resources. Protecting the streambanks and stream channels reduces the risk of sedimentation entering the watercourse, and contributes to the maintenance of water quality.

Current Status:

A review of riparian classifications included in 77 recent SLP's, there were 136 classified streams, which showed the following stream classification distributions:

S6 - 111 streams (82%)

S5 - 0 streams (0%)

S4 - 3 streams (2%)

S3 - 9 streams (7%)

S2 - 1 stream (1%)

S1 - 12 streams (9%)

A review of conformance and compliance issues from December 1, 2001 to March 31, 2003 for active participants indicates there have been no non-conformances of SLP measures related to protecting stream bank, stream channel stability or riparian vegetation due to harvesting or silviculture activities.

Forecasting Assumptions and Analytical Methods:

- Does forecasting apply (y/n)? No

Strategy and Implementation Schedule:

Management practices will be included in SLP's to protect stream banks and stream channel integrity, and maintain some riparian vegetation in order to maintain water quality, aquatic habitats and riparian values on streams without mandatory riparian reserve zones.

All streams, wetlands, and lakes in or immediately adjacent to a planned harvest area will be classified in the field prior to the commencement of operations.

Management strategies for the protection of these values on streams without mandatory RRZ's (e.g. S4, S5, and S6 streams), as well as for the protection of other non-fishbearing waterbodies, is based on site-specific assessments during fieldwork. Foresters consider factors such as riparian classification, topography and slopes, edaphic characteristics, season of harvest, snow loads, vegetation and habitat characteristics. Measures that may be implemented are inclusion of all or part of the area in a wildlife tree patch or other reserve area, the restriction of activities to frozen ground conditions, compressible snow pack criteria, machine free zones, low ground pressure equipment, and/or the retention of non-merchantable stems which support the streambank integrity.

The location of these streams and waterbodies, and SLP protection measures are reviewed with workers prior to the commencement of harvesting and silviculture activities.

Monitoring Procedure:

Inspections will be completed on harvesting and silviculture activities by operations supervisors, and information on any potential concerns related to this indicator will be noted and tracked by the participants. Potential non compliances will be promptly reported to the Peace Forest District Manager and the WALP Regional Manager. Annual reports will summarize the number of non-conformance issues identified, specifically identifying any incidents relating to the protection of streambanks and stream channel stability.

Linkages to Operational Plans:

The location, classification and, where applicable, protection measures for classified waterbodies will be included in SLP's and/or operational maps used for timber harvesting or silviculture activities.

Linkages to the LRMP:

Protecting streambanks and related aquatic ecosystems through careful forestry practices assists in maintaining water quality in the downstream watersheds, and helps sustain fish and wildlife species which rely on stream side vegetation, or the maintenance of water quality.

This indicator therefore supports the following LRMP objectives:

- Maintain functioning and healthy ecosystems
- Maintain fish habitat and water quality for priority fish species
- Promote water stewardship to manage for other resources
- Manage critical wetland habitats for waterfowl and other wildlife species
- Maintain the headwaters of major rivers and streams as a source of water for current and future generations
- Protect water quality and quantity in Charlie Lake watershed
- Maintain water quality in the Peace River

6.37. SPILLS ENTERING WATERBODIES

Indicator Statement	Target Statement
Number of reportable spills entering water bodies	Zero reportable spills entering water bodies
SFM Objective: Maintenance of water quality	
Linkage to FSJPPR: N/A	

Acceptable Variance:

None.

What is this indicator and why is it important?

A reportable spill is any spill that enters a waterbody or is greater than the levels indicated in Table 32 below.

Table 32: Spill Reporting Levels

Material	Reportable Levels
Antifreeze	5 kg
Diesel Fuel	100 l
Gasoline (auto & chainsaw)	100 l
Greases	100 l
Hydraulic Oil	100 l
Lubricating Oils	100 l
Methyl Hydrate	5 kg
Paints & Paint Thinners	100 l
Solvents	100 l
Pesticides	1 kg
Explosives	Any

Current Status:

There were no reportable spills entering water bodies in 2002.

Forecasting Assumptions and Analytical Methods:

- Does forecasting apply (y/n)? No

All reportable spills will be investigated to minimize future occurrences.

Strategy and Implementation Schedule:

Applicable operational controls are within the Environmental Management Systems including: Work Instructions, Emergency Preparedness and Response Plan, and spill response training.

Monitoring Procedure:

Regular audits and inspections of our activities will be conducted. All reportable spills will be entered into the Issue Tracking System.

We will annual review and summarize our performance towards this target.

Linkages to Operational Plans:

Preworks are conducted prior to commencement of operations.

Linkages to LRMP:

- Maintain fish habitat and water quality for priority fish species
- Maintain water quality in the Peace River
- Protect water quality and quantity in Charlie Lake watershed

6.38. CARBON SEQUESTRATION RATE

Indicator Statement	Target Statement
DFA Average Carbon (C) sequestration rate (Mg C/year)	Maintain DFA average C sequestration rates that are consistent with or greater than natural sequestration rates.
SFM Objective: Maintenance of the processes for carbon uptake and storage	
Linkage to FSJPPR: N/A	

Acceptable Variance:

No decline lower than the natural disturbance sequestration rate as modeled in support of this indicator is acceptable.

What is this indicator and why is it important?

As a result of the 1997 Kyoto protocol, international attention has been focused on the problem of global greenhouse gas emissions. This has placed considerable pressure on the public and private sectors to account for the role of forests in storing carbon and reducing global CO_2 emissions. The capacity of forest ecosystems to sequester carbon can thus be considered an environmental value and should therefore be included as one aspect of sustainable forest management practice. For carbon sequestration to be effectively represented within an ecosystem-level management plan, however, it must be considered within the context of timber production, wildlife conservation, and visual aesthetics. Presently, there are few forest-level decision support tools available to managers for assessing carbon sequestration as part of an integrated suite of indicators of SFM (Seely and Nelson, 2002).

Sequestration is defined as the net amount of C removed from the atmosphere and stored in the ecosystem each year. The calculation of average net C sequestration rates within a timber supply area allows for a long-term evaluation of effects of management activities and/or natural disturbance on the rate at which the forested landscape is sequestering C. Average sequestration rates are based on changes in ecosystem carbon storage over time without accounting for C removed in harvested biomass. The rationale is that the carbon in harvested materials will be stored in wood products following harvest. An assessment of the sequestration rate provides a measure of the rate and direction of carbon exchange between the forest ecosystem and the atmosphere.

Current Status:

Following are two graphs, which provides an example of the average C sequestration rate for both an individual stand (Forecast AU 3 – Natural and Forecast AU 34 – Managed) and shows the average C sequestration rate over the whole DFA over time.

At the stand level there is a greater release of C to the atmosphere following the decomposition of the larger pool of dead organic matter (snags and CWD) in the natural stand which results in a lower sequestration rate during the first several decades of stand development (Figure 10). In the example provided, the average sequestration rate takes longer to return to positive values in the natural stand versus the managed stand. This is partly related to the fact that the harvested wood removed from the site during harvesting does not contribute to ecosystem C release to the atmosphere. Rather, it is assumed to be stored in wood products.

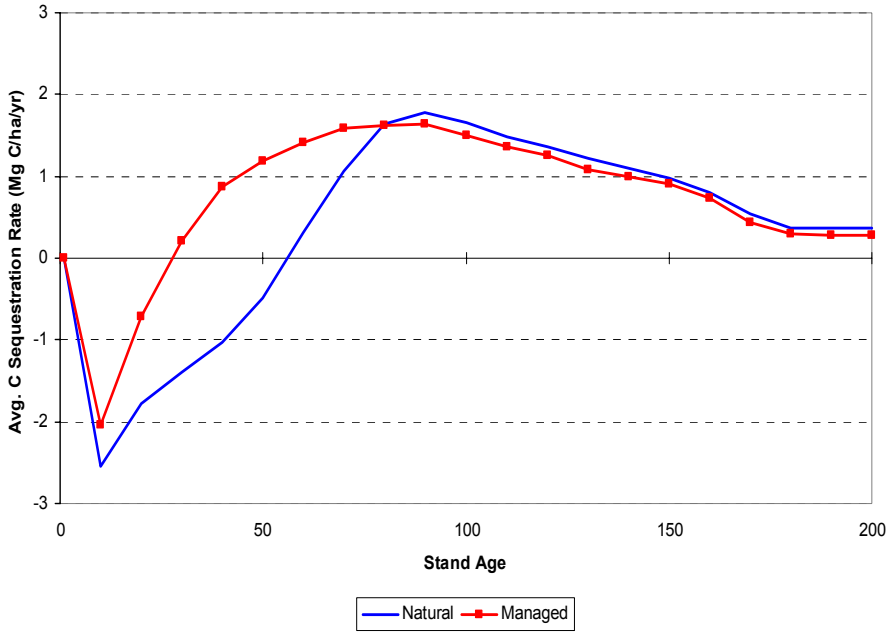


Figure 10: An Example of Average C Sequestration Rates for a Natural Spruce Leading Site Index 17 Stand (Forecast AU 3) and an Associated Managed Stand (Forecast AU 34)

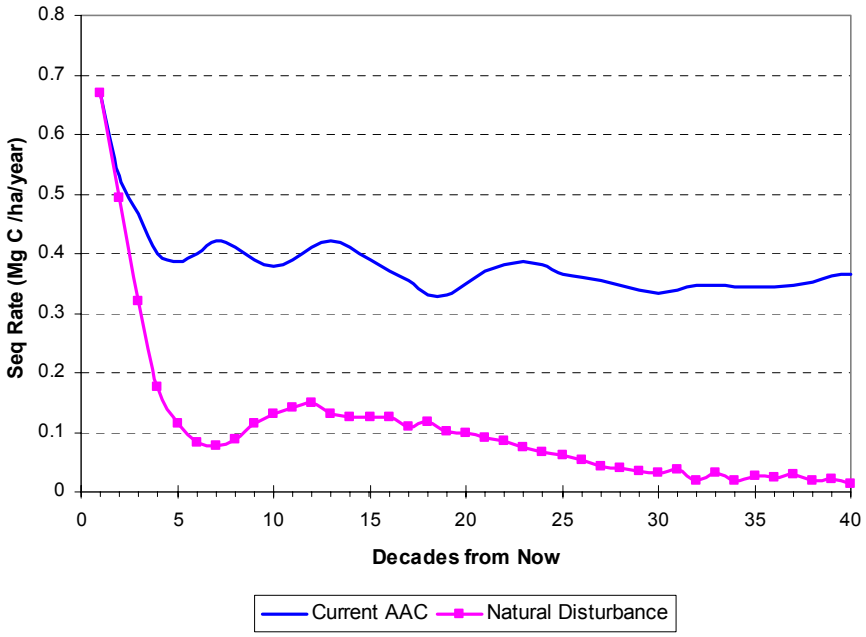


Figure 11: Average Carbon Sequestration (Mg C/ha/year) within the Ft St John DFA Over Time

At the DFA level (Fig. 2) the average sequestration rate declines from the present level of about 0.67 Mg C/ha/yr over the next 50 years and stabilizes between 0.3 and 0.4 Mg C/ha/yr in the long term. The decline from the current situation is due to the large amount of area (approximately 45%) that is between 40 and 100 years old. Over time the age class distribution is more evenly distributed with more area in younger stands and older stands with lower sequestration rates therefore the DFA level sequestration rate declines. For comparison purposes an estimate of the rate of C sequestration is provided for both the current AAC and the Ft St John DFA under a natural disturbance regime.

Forecasting Assumptions and Analytical Methods:

Stand level C curves were generated for the Ft St John DFA on both the THLB and the NHLB using the FORECAST model. Since many of the existing analysis units (AU's) used in TSR 2 were similar in terms of species and average SI, they were clumped together to fit within a series of 49 carbon analysis units developed for simulation in FORECAST. The FORECAST carbon analysis units were designed to represent a range of a site quality classes and a range of species mixtures that was consistent with the existing AU's. The regeneration assumptions for each of the carbon AU's were based on those described for the existing managed-stand AU's. Each of the existing THLB and new NHLB AU's was subsequently assigned to one of the new carbon AU's based on species, site index, and regeneration assumptions. Details of the FORECAST C AU's are provided in Appendix 17.

A carbon curve database was subsequently prepared by summarizing the results for total ecosystem C storage on 10-year time steps for each of the FORECAST carbon AU's. In addition, average rates of C sequestration were calculated for each time step based on the following equation:

$$\text{Avg. Sequestration Rate}_t = \frac{\text{Ecosystem } C_t - \text{Ecosystem } C_{t-10}}{10}$$

These curves were incorporated into the FSSIM forest estate model used to do forecasting in support of this SFMP.

In order to provide a context of C sequestration in relation to a natural landscape a simulation of natural disturbance was completed (i.e. no harvesting or fire control). Removing the volume target and applying an area target by Natural Disturbance Unit accomplished this. Minimum disturbance age was set to 10 years to mimic that fire can burn young stands as well as old stands and disturbance priority was set to random. Areas disturbed by NDU were based on DeLong 2002 and is summarized in Table 33 below.

Table 33: Area Disturbed/Year in Natural Disturbance Simulation

Natural Disturbance Unit	Stand Replacement Disturbance Cycle (years)	Annual Disturbance Rate (% Area/year)	Total Forested Area (ha)	Average Disturbance (ha/ year)
Boreal Plains - Alluvial	200	0.500%	31,227	156
Boreal Foothills - Mountain	150	0.667%	154,048	1,027
Boreal Plains – Upland	100	1.000%	1,855,662	18,557
Boreal Foothills – Valley	120	0.833%	34,470	287
Northern Boreal Mountains	180	0.556%	108,603	603
Omineca - Mountain	300	0.333%	87,602	292
Omineca - Valley	120	0.833%	8,680	72
Total				**20,995**

Separate C AU's were not completed which account for the different transitional pathway of a natural disturbance regime versus a natural stand transitioning to a managed stand. As such the natural disturbance simulation likely has some additional error.

Strategy and Implementation Schedule:

The strategy to manage sequestration rates is through prompt reforestation (section 6.30) and maintaining acceptable levels of stocking over the landscape on previously harvested and regenerated sites (section 6.29).

Fire suppression as well contributes to maintaining the sequestration rates by controlling age class distributions. Fire management strategies are described in section 6.25.

The process described for this indicator is a first approximation of the effects of forest management on sequestration rates in comparison to a natural disturbance regime. The models and inventory used to predict C sequestration rates are still rudimentary at this point and as new knowledge is gained this indictor will be assessed to determine if this data and methods are appropriate and methods will be adjusted if necessary.

Monitoring Procedure:

During TSR processes sequestration rates will be calculated for both the Timber Harvesting Land Base and the Non-Timber Harvesting Land Base and compared to the targets.

Linkages to Operational Plans:

The most direct link to operational plans is prompt reforestation and ensuring that sufficient stocking is on the harvested and regenerated sites. This is monitored through indicator 30 and 29 respectively.

Results from the monitoring plots and estimates of MAI influences harvest levels and long-term harvest levels. This indicator is reviewed and incorporated into Timber Supply Review process, which influences actual harvest levels within the DFA.

Linkages to LRMP:

This indicator helps to support the following LRMP objective:

- Maintain functioning and healthy ecosystems.

6.39. ECOSYSTEM CARBON STORAGE

Indicator Statement	Target Statement
Ecosystem Carbon Storage (Mg) in the Fort St. John DFA	Minimum of 95% of Natural Disturbance levels of Ecosystem Carbon Storage.
SFM Objective: Maintenance of the processes for carbon uptake and storage	
Linkage to FSJPPR: N/A	

Acceptable Variance:

No acceptable variance.

What is this indicator and why is it important:

As a result of the 1997 Kyoto protocol, international attention has been focused on the problem of global greenhouse gas emissions. This has placed considerable pressure on the public and private sectors to account for the role of forests in storing carbon and reducing global CO2 emissions. (Seely and Nelson, 2002).

C storage is contained in several components of forests including tree biomass, plant biomass, coarse woody debris, forest floor litter, and soil. Forest soils are a large but relatively stable reservoir of C with minimal changes over time. In contrast, variation is C storage in tree biomass is the dominant factor regulating temporal patterns in total ecosystem C storage (Seely and Nelson, 2002).

Total volume of standing time in both the THLB and Non-THLB (m^3) is used as a surrogate for storage of C within the Ft St John DFA. This indicator is influenced by harvest levels over time, natural disturbances, fire protection policies and fire suppression success.

Current Status:

There is an estimated 398 million Mg of C currently stored in the Ft St John DFA ecosystem declining in the long term to approximately 336 million Mg of C (Figure 13). Both the C storage levels based on current the AAC and the estimation of natural disturbance decline over the next 150 years and then stabilize for the remainder of the simulation. At the end of the 400-year simulation the current AAC results in 3.7% less C storage than the estimated storage in the natural disturbance regime.

For comparison a stand level graph (Figure 12) is provided which demonstrates a natural stand and its associated managed stand C storage levels over time. Note that while the natural stand started with more C remaining on the site after the disturbance the managed stand catches up in about 60 years.

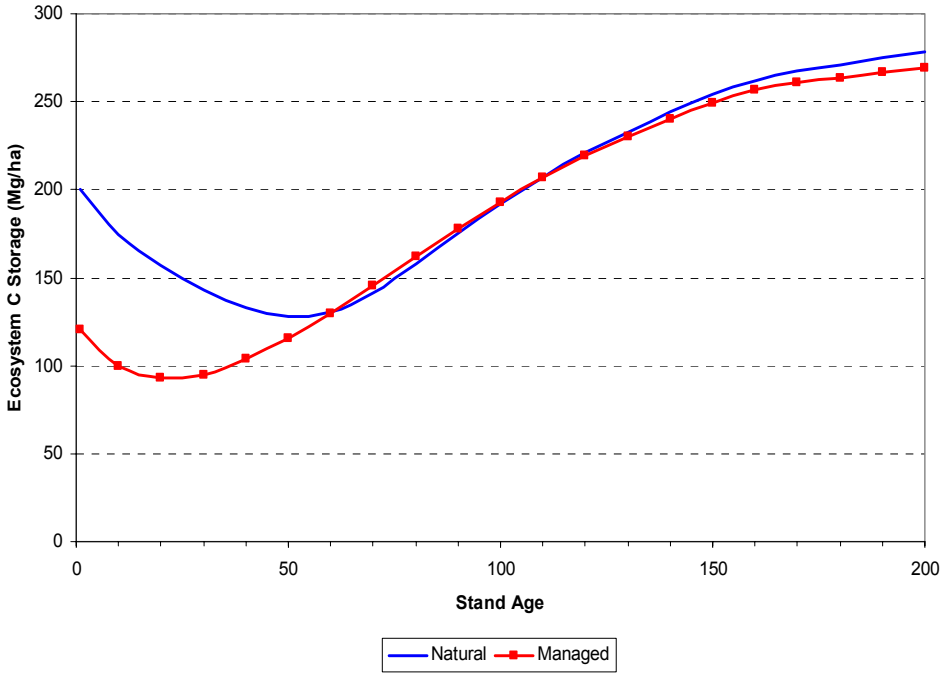


Figure 12: An Example of average C Storage for a Natural Spruce Leading Site Index 17 Stand (Forecast AU 3) and an Associated Managed Stand (Forecast AU 34)

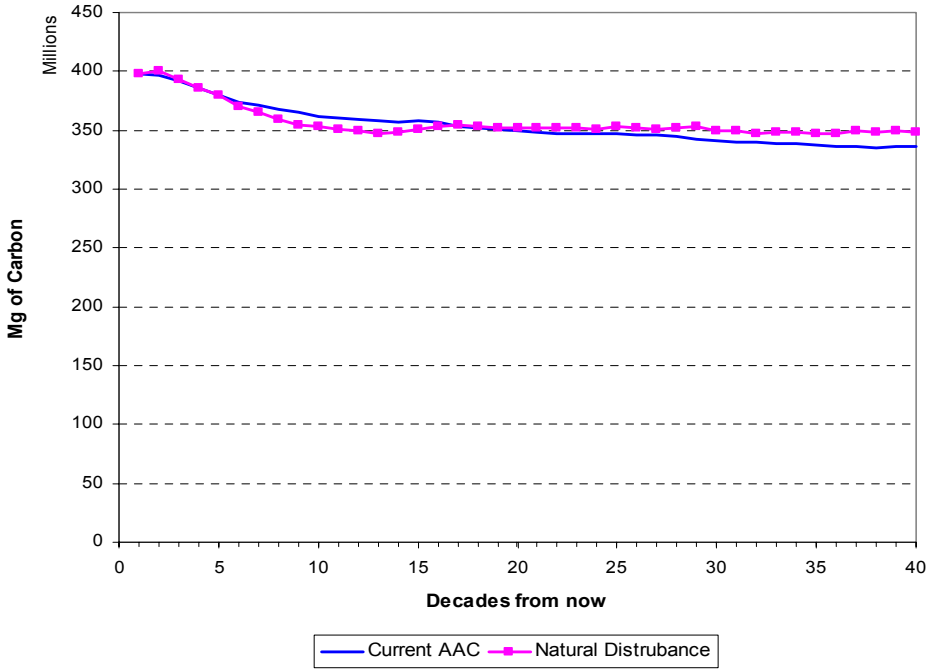


Figure 13: Total Carbon (Mg) Storage in the Ft St John DFA Over Time

Forecasting Assumptions and Analytical Methods:

See indicator 38 for details on how the C indicators were forecasted and analyzed. The exception being for indicator 39 that total ecosystem C storage is tracked rather than sequestration rates.

Strategy and Implementation Schedule:

The strategy to manage C storage is through prompt reforestation (section 6.30) and maintaining acceptable levels of stocking over the landscape on previously harvested and regenerated sites (section 6.29).

Fire suppression as well contributes to maintaining C storage by controlling age class distributions and minimizing C release into the atmosphere through wildfires. Fire management strategies are described in section 6.25.

The process described for this indicator is a first approximation of the effects of forest management on C storage in comparison to a natural disturbance regime. The models and inventory used to predict C storage are still rudimentary at this point and as new knowledge is gained this indictor will be assessed to determine if this data and methods are appropriate and methods will be adjusted if necessary.

Monitoring Procedure:

During TSR processes C storage will be calculated for both the Timber Harvesting Land Base and the Non-Timber Harvesting Land Base and compared to the targets.

Linkages to Operational Plans:

Forestry activities influence total C storage through harvest levels, reforestation-stocking levels, and fire prevention policies, which are, monitored through indicators 31, 53, 29 and 25.

Linkages to LRMP:

This indicator helps to support the following LRMP objective:

- Maintain functioning and healthy ecosystems.

6.40. COORDINATED DEVELOPMENTS

Indicator Statement	Target Statement
Number of coordinated developments	Report annually the number of proposed coordinated developments that are successful versus unsuccessful
SFM Objective: Foster inter-industry cooperation to minimize conversion of forested lands to non-forest conditions	
Linkage to FSJPPR: N/A	

Acceptable Variance:

The opportunities for coordinated development will fluctuate annually based on the overall activity of the oil and gas industry as well as the proximity of operations to one another. Any amount of coordinated development on the basis of making our plans readily available will

be viewed as a positive step in reducing the conversion of forested lands to non-forest conditions. Therefore no variance necessary as the target remains a reporting function primarily of our successes.

What is this indicator and why is it important?

This indicator is a measure of the number of coordinated inter-industry developments that occur annually that will minimize conversion of forested lands to non-forest conditions. . Coordinated developments are defined as those activities or structures within existing harvesting plan areas (e.g. areas identified in a FDP, FOS, Graham IRMP or similar plans) that will be used by more than one industry (e.g. road), or modified to accommodate the needs of both industries (e.g. increase depth of a pipeline to permit skidding). The basic premise of this indicator is to avoid duplicate access corridors by promoting the oil and gas industry use of existing or planned forest extraction routes, block roads, and other permanent access structures, as well as encouraging the modification of forest industry plans to use newly constructed oil and gas roads. This indicator will also include those forest roads proposed for permanent deactivation by the participants that have been re-assigned to the oil and gas sector to meet their operational needs.

The recent timber supply review recently determined by the Chief Forester identified that projected future roads, trails and landings attributed to the forest industry are in excess of 48,000 hectares on the THLB. Additional projected losses to the THLB for oil and gas activities can increase this figure by approximately another 26,000 hectares. It is believed that if more coordination of developments existed between the two largest industries developing the landbase that this overall deduction of over 74,000 hectares on the THLB can be diminished.

The development of pre-tenure plans is a requirement under the Muskwa-Kechika Management Area Act prior to the commencement of oil and gas activities in this area. A number of these pre-tenure plans have been completed or are under development. One key element of these plans is to ensure that oil and gas development minimizes new access route construction needed to undertake these activities. Therefore, the oil and gas industry must keep a record of consultation with other industrial users to determine future access plans or needs have been documented.

Current Status:

There is currently no formal tracking system to monitor past coordinated development activities although there has been a more concerted effort over the last number of years for industry to work more cooperatively, particularly minimizing duplicate access. For example in 2002, Canfor reviewed approximately 55 oil and gas referrals that warranted specific comments. Of this total, there were three instances in which access routes were requested to be changed to minimize disturbance by following existing or proposed forest roads. These changes were accepted by the companies involved. In addition Canfor did not request any changes to pipeline locations to avoid additional road requirements for future forest operations.

Forest development plans must undergo a legislated review and comment period, although these plans are not necessarily referred specifically to individual oil and gas sector companies. A copy of the final plan is provided to the Oil and Gas Commission, which allows their staff to review proposed oil and gas plans in context to the forest industries proposed harvest, road construction and deactivation plans. There is, however, no current indicator that identifies how successful this review process is. In addition, the referral system established at the Oil and Gas Commission requires companies proposing

petroleum resource exploration or development projects to refer their proposed plans to forest industry participants as well as the Ministry of Forests. The intent of the referral process is to provide the forest industry the opportunity to identify the potential impacts of the proposed oil and gas activities and suggest mitigating measures to reduce the overall impacts on both existing and proposed forest activities.

Forecasting Assumptions and Analytical Methods:

- Does forecasting apply (y/n)? No

Strategy and Implementation Schedule:

All forest management activities proposed under this SFMP and identified in the subsequent Forest Operations Schedule will identify all road construction and road deactivation activities being proposed by the participants in the submission of one consolidated, comprehensive schedule. Road construction and deactivation activities will be recorded and maintained within a common database (e.g. GENUS) which is accessible to all of the participants. The participants will endeavor to engage the oil and gas sector in promoting the benefits of the single database for maintaining a comprehensive road management infrastructure which has the potential to foster greater inter-industry co-operation on road management issues. However it is expected that the current referral system utilized by the Oil and Gas Commission will remain in place and continue to be the main method of identifying conflicts and potential synergies between oil and gas activities and forestry activities.

The participants have identified the following minimum critical road construction standards that will permit the forest industry to utilize oil and gas road locations:

Minimum width: 5 metres with inter-visible turnouts; or 7 metres with no turnouts

Maximum grade: 10% sustained; 12% short pitches; 5% on switchbacks

Minimum bridge requirements: L60 (i.e. legal highway loading)

The participants will endeavor to work closely with the oil and gas sector through the referral and planning process in proposed development areas where both sectors operate and to identify opportunities to locate and coordinate access in the most optimal location which will meet the needs of both industries.

Monitoring Procedure:

The participants will report annually on the number of proposed coordinated developments that have been discussed with the oil and gas sector and how many of these co-coordinated developments have led to a successful proposal or not and eventual successful implementation. This will also include agreements that have been reached independently of the referral process through our pro-active approach in engaging individual oil and gas sector companies in our planning processes. This will also take into account any joint road construction ventures and any forest roads that have been re-assigned to the oil and gas sector. We will also request that any oil and gas companies that have adjusted their plans on the basis of simply reviewing our forest development plans or forest operations schedules will contact us to advise us of their activities upon which discussions can then be undertaken to talk about the timing of operations.

Linkages to Operational Plans:

Operational plans will be reviewed at the time oil and gas referrals are received to review for potential issues or identify any possible synergies. In addition proposed operational plans may be adjusted to incorporate the oil and gas development in an effort to reduce further losses to the net forest landbase.

Linkages to LRMP:

This indicator strongly supports LRMP objectives to co-ordinate industrial access and linear development to minimize negative effects on other resource values including the reduction of permanent losses to the forest landbase.

6.41. RANGE ACTION PLANS

Indicator Statement	Target Statement
Consistency with mutually agreed upon action plans for range	Operations 100% consistent with resultant range action plans
SFM Objective: Provide opportunities for a feasible mix of timber, recreational activities, and non-timber commercial activities	
Linkage to FSJPPR: N/A	

Acceptable Variance:

Variances are permissible only on reaching mutual agreement between the affected range tenure holder and participant.

What is this indicator and why is it important?

Range tenures are administered under the Forest Practices Code Act of British Columbia (FPC). The Pilot regulation does not add to, negate or amend the Range regulation as specified in the FPC.

The extensive overlap of forest and range tenures within the south-east quadrant of the pilot project area necessitates mutually agreed upon action plans, the basis of which is an understanding of each industry's current and proposed activities.

Current Status:

The participants currently notify affected range tenure holders and associations of proposed forest operations during the preparation of the FDP and during the public review and comment period. As approved forest activities approach implementation further notification is provided to those tenure holders that will be affected by the activity.

A Coordinated Resource Management Planning (CRMP) team has been meeting on an irregular basis to keep range, forest and other resource industries informed of each other's activities and concerns. The CRMP process will end in 2003-04.

Forecasting Assumptions and Analytical Methods:

- Forecasting does not apply to this indicator.

Strategy and Implementation Schedule:

During the referral period for each FDP/FOS the participants will provide opportunities to meet with affected range tenure holders and associations to:

1. provide a review of the current SFMP, Forest Operations Schedule, PMP's, and Site Level Plans as applicable,
2. seek information from range tenure holders regarding; range improvements, removal of natural barriers, range use timing, and other issue pertinent to the overlap of forest and range tenures, and
3. develop, review and implement a mutually agreed to Range action plan.
4. Comments received from range tenure holders, and mutually agreed actions will be tracked by the participants.

Monitoring Procedure:

An annual review and summary of conformance to action plans will be conducted.

Linkages to Operational Plans:

Site Level Plans, Forest Operations Schedules and all other short term operational plans will be consistent with pertinent range tenures, Range Use Plans, and with strategies and recommendations agreed to with the range tenure holders and pasture associations.

Linkages to LRMP:

The LRMP General Management Direction (Range) specifies the strategic direction that the Coordinated Resource Management Planning process or similar process will be used to resolve potential conflicts between grazing and other resource values and interests.

The LRMP General Management Direction (Forest Management) specifies the strategic direction that flexible harvesting activities will be utilized to accommodate other resource values and optimize sustained yield.

6.42. DAMAGE TO RANGE IMPROVEMENTS

Indicator Statement	Target Statement
Number of range improvements damaged by participants' activities	No damage to range improvements by pilot participants activities
SFM Objective: Provide opportunities for a feasible mix of timber, recreational activities, and non-timber commercial activities	
Linkage to FSJPPR: For the purposes of Section 42 of the FSJPPR this indictor statement, target statement and acceptable variance will be used to determine if forest practices are consistent with the landscape level strategies.	

Acceptable Variance:

Temporary removal or alteration of a range improvement to enable short-term forestry activities to proceed, however repairs or replacement of improvements must be completed in less than 1 year. The indicator would not apply if the participant can implement alternative mitigation measures to the satisfaction of the range tenure holder.

What is this indicator and why is it important?

The overlapping nature of forest tenures and range tenures results in range improvements such as cattle guard and fences that restrict forest industry activities. Mutually agreed removal or alteration of these structures premised on reconstruction or replacement post-activity is critical to integrated range and forest relations.

Current Status:

The forest industry conducts referrals with range tenure holders at the pre-development stage to determine the extent of proposed disturbance and to develop agreements for mitigative measures if avoidance is not feasible.

Forecasting Assumptions and Analytical Methods:

- Forecasting does not apply

Strategy and Implementation Schedule:

Information regarding specific range improvements that will be affected by proposed forest activity will be tracked . This information will result from FDP/FOS referrals.

The participants will avoid range improvements when feasible and repair or replace range improvements when required.

A post-activity record will be maintained by the participant as to:

- range improvements disturbed or altered on a specific range tenure basis, and
- the degree and cost of mitigation and agreement by the range tenure holder that mitigation is satisfactory.

Monitoring Procedure:

The participant will maintain an annual record as above.

Linkages to Operational Plans:

Site Level Plans, Forest Operations Schedules and all other short term operational plans will be consistent with strategies and recommendations regarding range improvements agreed to with the range tenure holders.

Linkages to LRMP:

The LRMP General Management Direction (Range) specifies the strategic direction that the Coordinated Resource Management Planning process or similar process will be used to resolve potential conflicts between grazing and other resource values and interests.

The LRMP General Management Direction (Forest Management) specifies the strategic direction that flexible harvesting activities will be utilized to accommodate other resource values and optimize sustained yield.

6.43. RECREATION SITES

Indicator Statement	Target Statement
The number of recreation sites managed by participants	Participants will provide and maintain a minimum of one recreational site within the DFA
SFM Objective: Provide opportunities for a feasible mix of timber, recreational activities, and non-timber commercial activities	
Linkage to FSJPPR: N/A	

Acceptable Variance:

No less than the target.

What is this indicator and why is it important?

The DFA has a number of campsites operated by the government or commercial interests, however most are concentrated in the high traffic corridors near the Alaska Highway and charge fees to users.

Providing maintained campsites in more remote but locally popular locations helps meets local demand for recreational pursuits in a natural setting.

Current Status:

Canfor currently maintains the Crying Girl Prairie Recreation Site on the Graham River at 101 km on the Halfway Graham Forest Service Road. The area features hunting, fishing, boating, and hiking opportunities. The campsite was originally constructed by Canfor in 1991 on a 58 ha government recreational reserve. Additional campsites and a 2.5 km hiking trail were added in 1996 with FRBC funding. In July of 1999 Canfor assumed sole responsibility for the campsite and its maintenance. The site provides a total of 15 campsites for free public use.

Forecasting Assumptions and Analytical Methods:

- Does forecasting apply (y/n)? No

Strategy and Implementation Schedule:

Annual maintenance contracts are locally awarded to complete garbage disposal, site cleanup, outhouse cleaning, firewood cutting and distribution, and general cleanup.

Monitoring Procedure:

Canfor inspects and maintains this remote campsite from June 1 until October 31 annually. Status of this indicator will be updated in annual reports.

Linkages to Operational Plans:

An existing visual inventory utilized this campsite as a viewpoint. SLP's for harvesting within the Graham operating area will address any visual impacts from the Crying Girl campsite viewpoint. Maintenance of the recreational values present at the campsite will be considered in future development proposals included in FOS's.

Linkages to the LRMP:

This indicator supports the following LRMP objectives:

- Provide quality public and commercial recreation opportunities and values,
- Provide a full range of wilderness recreation opportunities identified in the ROS as primitive, semi primitive non-motorized, and semi primitive motorized.

6.44. VISUAL QUALITY OBJECTIVES

Indicator Statement	Target Statement
Consistency with Visual Quality Objectives (VQO's)	Pilot participants' forest operations will be consistent with the established VQO's
SFM Objective: Provide opportunities for a feasible mix of timber, recreational activities, and non-timber commercial activities	
Linkage to FSJPPR: For the purposes of Section 42 of the FSJPPR this indictor statement, target statement and acceptable variance will be used to determine if forest practices are consistent with the landscape level strategies.	

Acceptable Variance:

Variances to established VQO's which have a supporting rationale, and are approved by the District Manager are acceptable.

What is this indicator and why is it important?

- Visually sensitive areas visible from communities, public use areas, travel corridors and viewpoints that have been identified through a visual landscape planning process. Visual quality objectives are the extent to which the visual or scenic resources of a landscape may be altered compared to the pre-existing or natural condition. VQO's are resource management objectives established by the district manager or contained in a higher level plan that reflect the desired level of visual quality based on the physical characteristics and social concern for the area.
- Preservation – alterations result in no visible change.
- Retention – alterations are not visually apparent.
- Partial Retention – alterations remain visually subordinate to the characteristic landscape.
- Modification – alterations are visually dominant, but have characteristics that appear natural.
- Maximum Modification – alterations are dominant, and out of scale, but appear natural in the background.

Current Status:

The Visual Landscape Inventory is current to 1997. The District Manager made know 20 scenic areas in 1997,establishing Visual Quality Objectives in two known scenic areas (the

Graham River area and the Alaska Highway corridor), and recommended visual quality classes in the remaining 18 scenic areas (Figure 14).

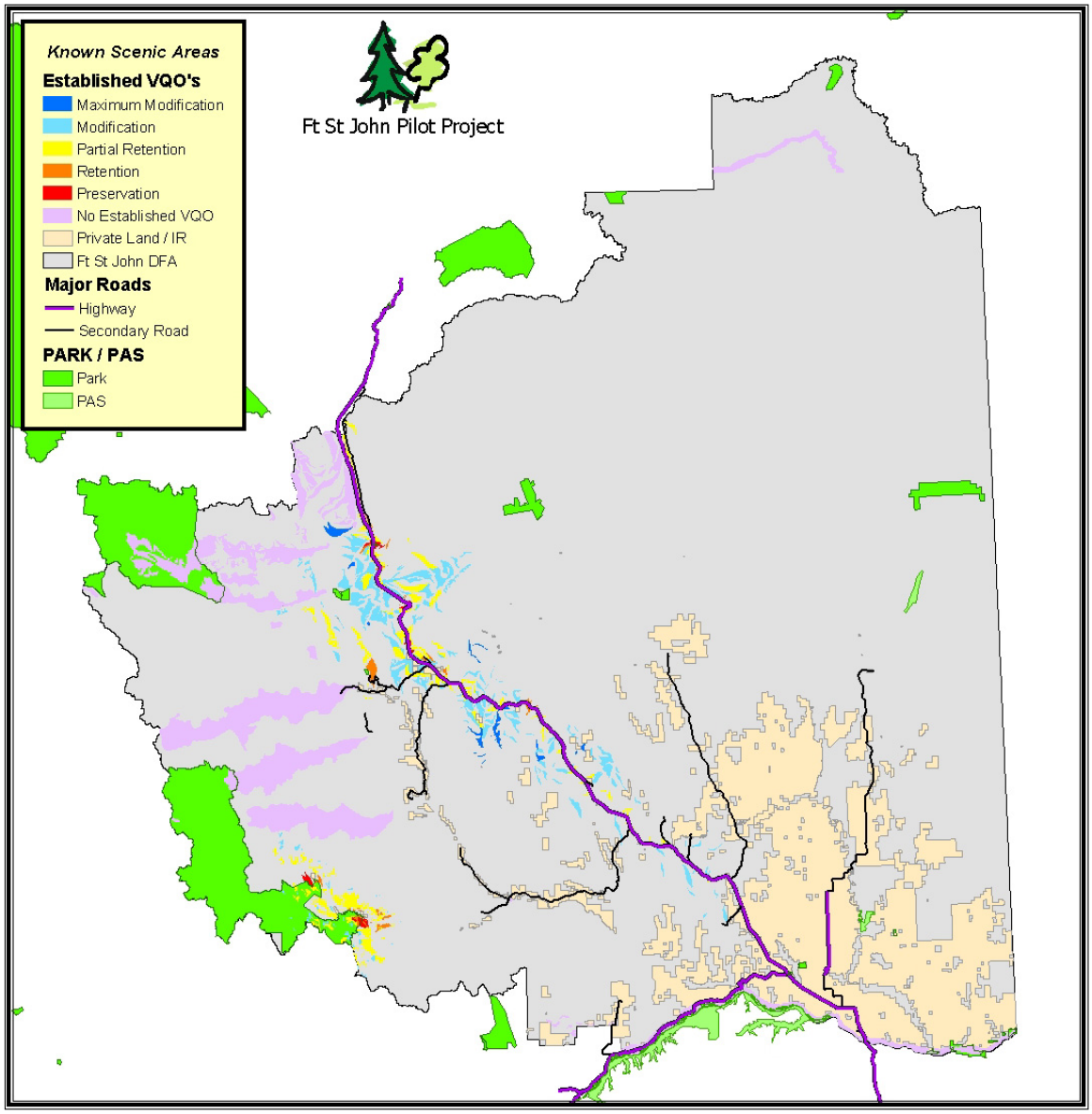


Figure 14: Fort St. John VQO's

Where blocks are identified in areas with established VQO's that may constrain operations, participants have carried out pre-harvest Visual Impact Assessments. In scenic areas without established VQO's, participants use visual design techniques to minimize visual impacts. To ensure conformance to the plan a pre-work session with harvesting contractors and periodic field inspections are commonly done and in areas of high visual values, some forest operations have been monitored during the harvesting phase.

Since 2001, eight post harvest visual quality assessments have been completed on blocks in areas with established VQO's, with all assessments indicating consistency with the VQO's was achieved.

Forecasting Assumptions and Analytical Methods:

The 2002 Fort St. John Timber Supply Review (TSR) and the current Allowable Annual Cut (AAC) for the Fort St. John TSA reflect the forecasted effect on the timber supply base case of the established VQO's as well as recommended visual quality classes that were considered current practice. Sensitivity analysis was also completed to analyze the lower end of the forest cover requirements allowed under each of the visual quality classes.

Strategy and Implementation Schedule:

Visual resource inventories containing the Visual Quality Objectives will be referred to during the development of FDP's and FOS's.

Where appropriate, pre-harvest visual impact assessments and landscape design processes will be done. Where variances are appropriate, district manager approval will be sought and recorded when approved. Commencing in the summer of 2003, post-harvest reviews of areas that were completed the previous year will be conducted on operations that had specific visual design.

Known scenic areas without established VQO's will be addressed in Site Level Plans using appropriate visual design techniques to minimize adverse visual impacts in order to manage and conserve visual resources.

Monitoring Procedure:

Participants will maintain records of the results of post harvest reviews and will report annually on their success.

Inspection and actions for variances will be recorded and tracked by the supervisor accountable at each company.

Linkages to Operational Plans:

Forest Operations Schedules and Site Level Plans will be consistent with the VQO's or variances.

Linkages to LRMP:

The indicator statement and target conform to the General Management Direction for (Visual Quality) and the following objectives set out in the Fort St. John LRMP:

- manage visually sensitive areas along existing access corridors/trails and adjacent to protected areas
- manage visually sensitive areas as scenic areas
- manage visually sensitive areas within the Peace River Valley
- manage visually sensitive areas within the Tommy Lakes area
- manage visually sensitive areas within the Alaska Highway corridor

6.45. RECREATION OPPORTUNITY SPECTRUM

Indicator Statement	Target Statement
Percent of area in primitive and semi-primitive non-motorized classifications of the Recreation Opportunity Spectrum (ROS) for Besa-Halfway-Chowade (B-H-C), Graham North (GN), Graham South (GS), and Crying Girl (CG) Resource Management Zones (RMZ).	Maintain the primitive level ROS percentage at 15% (1996 levels) for the B-H-C RMZ as proposed by the LRMP. Retain a minimum of 50% of area by RMZ as semi-primitive non-motorized ROS class for the Graham North, Graham South and Crying Girl RMZ See Table 34 below
SFM Objective: Provide opportunities for a feasible mix of timber, recreational activities and non-timber commercial activities	
Linkage to FSJPPR: For the purposes of Section 42 of the FSJPPR this indictor statement, target statement and acceptable variance will be used to determine if forest practices are consistent with the landscape level strategies.	

Acceptable Variance:

The primitive ROS percentage for the B-H-C may fluctuate over time as roads are constructed and permanently deactivated to retain the percentage at 1996 levels. At any given time the primitive ROS percentage may decrease down to 10% on a temporary basis until such time as the constructed forest roads are permanently deactivated and the primitive classification is restored.

There is no variance necessary for the remaining RMZ's.

What is this indicator and why is it important?

This indicator is a measure of the amount of primitive and semi-primitive forest land that has been classified under the Ministry of Forests Recreation Opportunity Spectrum within each resource management zone that will provide a full range of wilderness recreational opportunities for the general public. The Besa-Halfway-Chowade and Graham North RMZ's are in the Sikanni and Graham Landscape Units, and the Graham South and Crying Girl RMZ's are in the Crying Girl Landscape Unit.

The Fort St. John LRMP has identified the importance of maintaining and providing a wide range of public and commercial outdoor recreational opportunities. The specifically identified resource management zones provide an additional recreational opportunity in the retention of the "wilderness recreation experience" that can be found in these areas. This can be described as a moderate to high probability of experiencing solitude, closeness to nature, high degree of self reliance, natural appearing environment, low interaction with people and little to no on-the-ground evidence of other people.

Access management and deactivation can be used as tools to achieve the desired ROS classification (see Appendix 13 for definition of ROS classes).

The participants may use roads developed and maintained by other non-forest industry industrial users (e.g. oil/gas, mining). If a participant assumes responsibility for the road due to no other industrial user having long term interests in the road then it will be assessed as a change in ROS attributable to forest management activities.

Current Status:

The baseline (1996) and current (2003) recreational opportunity spectrum in both hectares and percentage for the stated Resource Management Zones are shown on the following tables.

Table 34: Baseline Condition – 1996 ROS Inventory

Resource Management Zones	ROS Class - 1996											
	Primitive		Semi-Primitive Non Motorized		Semi-Primitive Motorized		Roaded		Urban/ Agriculture		Total ha	Total %
	ha	%	ha	%	ha	%	ha	%	ha	%		
Besa Halfway Chowade	65,839	15.2%	269,453	62.2%	97,323	22.5%	269	0.1%		0.0%	432,884	100.0%
Crying Girl		0.0%	38,984	80.7%	7,020	14.5%		0.0%	2,287	4.7%	48,291	100.0%
Graham North RMZ		0.0%	22,947	76.0%	7,255	24.0%		0.0%		0.0%	30,202	100.0%
Graham-South RMZ		0.0%	30,067	87.0%	4,492	13.0%		0.0%		0.0%	34,559	100.0%
Grand Total	65,839	12.1%	361,451	66.2%	116,090	21.3%	269	0.0%	2,287	0.4%	545,936	100.0%

Table 35: Current Condition – Updated to March 2003

Resource Management Zone	ROS Class 2003											
	Primitive		Semi Primitive Non-Motorized		Semi Primitive Motorized		Roaded		Urban/ Agriculture		Total ha	Total %
	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%		
Besa Halfway Chowade	65,839	15.2%	267,508	61.8%	99,270	22.9%	269	0.1%		0.0%	432,886	100.0%
Crying Girl		0.0%	31,677	65.6%	14,328	29.7%		0.0%	2,287	4.7%	48,292	100.0%
Graham North		0.0%	22,947	76.0%	7,255	24.0%		0.0%		0.0%	30,202	100.0%
Graham-South		0.0%	22,356	64.7%	12,203	35.3%		0.0%		0.0%	34,559	100.0%
Grand Total	65,839	12.1%	344,488	63.1%	133,056	24.4%	269	0.0%	2,287	0.4%	545,939	100.0%

Forecasting Assumptions and Analytical Methods:

- Does forecasting apply (y/n)? No

Strategy and Implementation Schedule:

All forest management activities within each of the specified resource management zones will be closely evaluated in the development of the Forest Operations Schedule. The potential impact of the proposed developments will be evaluated by recalculating the recreation opportunity spectrum classification for each RMZ as per the Ministry of Forests procedures (attached). Amendments to proposed forest operations may be implemented to mitigate impacts or other deactivation measures may be implemented following harvest operations to ensure a minimum of 50% SPNM is retained for the CG, GS and GN RMZ's. For the B-H-C RMZ we will ensure that proposed forest operations do not cause the primitive classification to dip below 10% and that appropriate deactivation measures will be implemented as soon as possible following harvesting and primary silviculture activities to restore the primitive classification to the original 15% level. It is proposed that these evaluations will be undertaken by the participants upon the preparation of each Forest

Operations Schedule. This periodic evaluation prior to the finalization of each FOS will endeavor to capture the most current ROS condition of each RMZ.

Forest management will be consistent with the objectives of the RMZ. Access will be managed under the direction given in the LRMP in the RMZ's. This may involve access control, road deactivation, accelerated harvesting or alternative silvicultural techniques. Access control and or deactivation may be completed for existing roads adjacent to or within the RMZ areas to remove areas from the roaded classification and move to the semi-primitive. These works and strategies are subject to agency approvals and do not include oil/gas or mining activities. All deactivation measures and other mitigating measures will be implemented as soon as feasibly possible following harvesting and primary silviculture activities.

New road construction will be open for the duration of the season in which the forest management activity occurs (e.g. road construction, harvesting, primary silviculture). Seasonal deactivation and access restrictions will be completed by the end of the active season. Upon completion of primary silviculture activities (site preparation and planting) the road will be deactivated and motorized access restricted.

The Graham River Integrated Resource Management Plan incorporates restricted access parameters limiting public access as agreed to in the LRMP to the southern Graham River area. There currently exists a gated provision within the plan restricting access for non-industrial users with the construction of a remote control gate on the bridge crossing the Graham River and the removal of bridge panels when activities in the area are temporarily halted. The participants will continue to uphold the LRMP agreement to restrict public access to this area.

Monitoring Procedure:

Upon the approval of this SFMP, a Forest Operations Schedule (FOS) will be developed that will identify proposed forest operations for the next several (6) years. Included in the FOS will be a table identifying the forest management activities proposed within the stated resource management zones and the projected impact, if any, on the most current ROS percentages within each zone.

Linkages to Operational Plans:

Operational plans as prepared by the forest planners will have to carefully evaluate the impact of any access management plans in the preparation of a Forest Operations Schedule to ensure that the overall percentages of each classification are not negatively impacted by road development or are within the stated variance. It is expected that this percentage may fluctuate slightly over time and that deactivation strategies will have developed to mitigate any short term impacts.

Linkages to LRMP:

This indicator has very strong links to the Fort St. John LRMP with the objectives to provide a full range of wilderness recreation opportunities classed as primitive, semi-primitive non-motorized and motorized for the Besa-Halfway-Chowade RMZ and retain a component of the semi-primitive non-motorized for the Crying Girl, Graham North and Graham South RMZ's.

6.46. ACTIONS ADDRESSING GUIDES, TRAPPERS AND OTHER INTERESTS

Indicator Statement	Target Statement
Consistency with mutually agreed upon action plans for guides, trappers and other known non-timber commercial interests	Operations 100% consistent with the resultant action plans
SFM Objective: Provide opportunities for a feasible mix of timber, recreational activities and non-timber commercial activities	
Linkage to FSJPPR: N/A	

Acceptable Variance:

Variances are permissible only on reaching mutual agreement between the affected tenure holders and participant.

What is this indicator and why is it important?

Diversity in commercial resource activities within a limited landbase is important to the sustainability of communities. Extensive overlap of forest tenures with guide, trapping, and other non-timber commercial interests may necessitate mutually agreed upon action plans to address site specific issues. This indicator measures the participant's implementation success in addressing these actions.

Current Status:

The participants currently notify trappers, guides and others that may be affected by proposed activities during the preparation of the FDP, as part of the regulatory public review and comment period. Prior to the commencement of approved forest activities, further notification is provided to those stakeholders that will be affected by the activity. In the event site specific comments are received, participants attempt to come to agreement with the stakeholder on reasonable actions that may mitigate the impacts.

The participants track comments, responses, and actions arising from this consultation with stakeholders.

Forecasting Assumptions and Analytical Methods:

- Forecasting does not apply to this indicator.

Strategy and Implementation Schedule:

During the referral period for each FDP/FOS the participants will provide opportunities to meet with affected guide, trapper and known non-timber commercial interest stakeholders to:

1. Provide a review of the current SFMP, Forest Operations Schedule, PMP's, and/or Site Level Plans (if available) as applicable,
2. Seek site specific information from tenure holders and known non-timber commercial interests regarding tenure improvements, tenure use timing, and other issue pertinent to the overlap of forest and guide, trapping tenures and non-timber commercial interest activities, and
3. Where possible, develop, review and implement a mutually agreed action plan to address site-specific issues.

Monitoring Procedure:

An annual review and summary of conformance to Action plans will be conducted, and reported in annual reports.

Linkages to Operational Plans:

Forest Operations Schedules, Site Level Plans and all other short-term operational plans will be consistent with any agreements between participants and guides, trappers and other known non-timber commercial interests.

Linkages to LRMP:

The LRMP General Management Direction (Forest Management) specifies the strategic direction that flexible harvesting activities will be utilized to accommodate other resource values and optimize sustained yield.

The indicator statement and target conform to the objectives set out in the Fort St. John LRMP:

- Maintain guide outfitting opportunities
- Provide quality public and commercial recreational opportunities and values
- Manage backcountry recreation and tourism opportunities in a natural or natural appearing condition
- Ensure future infrastructure requirements are considered when exploring for oil and gas (intent – for agriculture or settlement needs)

6.47. TIMBER PROCESSED IN THE DFA

Indicator Statement	Target Statement
Volume of timber processed in the DFA in proportion to volume harvested in the DFA	The annual equivalent of 70% of the DFA's harvest is primary processed in the DFA
SFM Objective: Viable timber processing facilities in the DFA	
Linkage to FSJPPR: N/A	

Acceptable Variance:

An acceptable negative variance of 5% (minimum of 65% of the harvest processed in DFA). This target level and variance is necessary to account for timber harvested within the DFA that is not directly harvested by the participants thus having less control as to its final processing destination.

What is this indicator and why is it important?

This indicator is a measure of the volume of timber harvested within the DFA which goes directly to the timber processing facilities located within the DFA as compared to the total volume of wood harvested within the DFA. The proportion of the volume of timber processed locally in comparison to total volume harvested should provide a reasonable assurance of the continued viability of the local timber processing facilities.

Current Status:

A query of the Ministry of Forests Harvest Billing system for all timber harvested in the 2002 calendar year has shown that in excess of 95% of timber harvested within the DFA was delivered to local timber processing facilities as indicated in the following Table 36. This volume includes timber originating from the major licensee tenures in Fort St. John, all timber sales awarded in Fort St. John and license to cuts however it excludes timber originating from private lands and woodlots.

Table 36: Proportion of Total Volume Locally Processed

Total scaled volume of timber originating within DFA	Total scaled volume of timber delivered to local Processing Plants	%age of total volume processed locally
955 117 m^3 coniferous 56 780 m^3 deciduous 1 011 879 m^3 total	940 897 m^3 coniferous 50 522 m^3 deciduous 991 419 m^3 total	98.5% coniferous 89.0% deciduous 98.0 % total

Forecasting Assumptions and Analytical Methods:

- Does Forecasting apply (y/n)? No

Strategy and Implementation Schedule:

Every unit of timber to be harvested within the DFA is assigned a unique timber mark identifier. In addition each unit of timber also requires that scale site designation (SSD) be approved by the Ministry of Forests. Each truckload of timber is then marked appropriately and delivered to the approved scale site designation and recorded into the Ministry of Forests scaling information system. A query of the scale information system based on the population of tenures originating within the DFA will identify specifically where the timber was hauled to, how many cubic metes of timber was hauled and subsequently milled.

It is expected that most of the timber harvested by the major licensee participants will be processed in their local facilities. Timber that is sold through auction by BCTS can be delivered to any approved milling facility however there is no requirement that it be processed locally. This can also be said for timber originating from private lands, woodlots, and oil and gas cutting permits. For the purposes of monitoring this indicator all timber harvested within the DFA and delivered to a processing facility within BC will be included with the exception of timber originating from private lands and woodlots (outside of DFA).

Monitoring Procedure:

Each timber mark assigned to a unit of timber to be harvested within the DFA requires that a scale site designation (SSD) be approved by the Ministry of Forests. Each truckload of timber is then marked appropriately and delivered to the approved scale site designation and recorded into the Ministry of Forests scaling information system. The SSD will be queried and results will be summarized in the annual report.

Linkages to Operational Plans:

There are no distinct links between short-term operational plans and the SFMP for this indicator.

Linkages to LRMP:

There are no LRMP objectives linked to this indicator.

6.48. SUMMER AND FALL VOLUMES

Indicator Statement	Target Statement
Volume of timber (m^3) delivered annually to mills between May 1st and November 30th	2003: Minimum of 100,000 m^3 coniferous delivered to FSJ sawmill 2004+: Minimum of 150,000 m^3 coniferous delivered to FSJ sawmill and 185,000 m^3 delivered to the deciduous manufacturing facilities
SFM Objective: Viable timber processing facilities in the DFA	
Linkage to FSJPPR: N/A	

Acceptable Variance:

The target volumes assume planned production levels are achieved at the local mills, once they are fully operational. Commencing in 2004, allowable variances for minimum deliveries will be proportional to the number of actual operating weeks, divided by the normal fifty operating weeks of the facilities per year.

What is this indicator and why is it important?

This indicator is the volume of logs delivered during the summer and fall months. These deliveries are essential to providing an uninterrupted fibre supply to run major timber processing facilities. The minimum targets are approximately 10 to 15 percent of annual deliveries. Providing for deliveries between May 1st and November 30th (the frost free period) to major facilities reduces the amount of wood that must be decked in mill yards at breakup (i.e. the end of March). This substantially reduces carrying costs, and minimizes fibre value losses associated with excessive drying, which significantly improves the cost competitiveness of the local forest industry.

These deliveries provide summer employment opportunities which increase the length of the work season for harvesting and road contractors. This improves the contractor's efficiency, and supports more stable employment, thereby also contributing to the stability of local communities.

Variances to the target are required to reflect situations where facilities may be closed for reasons other than lack of fibre supply.

Current Status:

In 2002 the coniferous sawmill received 268,000 cubic metres in this time period. In 2003 the projected deliveries are 120,000 cubic metres, due to an extended shutdown to rebuild the mill. The OSB plant is not currently operating, but expects to require at least 185,000 cubic metres of summer deliveries to sustain operations, once constructed.

Forecasting Assumptions and Analytical Methods:

- Does forecasting apply (y/n)? No

Strategy and Implementation Schedule:

Areas that are suitable for harvesting operations during frost free conditions are limited within the TSA. Harvest planning therefore needs to emphasize the identification and development of these areas.

Implementing this strategy will require careful assessment of all areas which may have potential for summer or fall logging, the identification of potential constraints, and development scheduling to support this strategy accordingly. Management practices on areas planned for summer harvesting will be implemented to ensure site productivity is not compromised by this strategy. Proposed blocks will be assessed to determine if moisture regime, soil conditions, and access opportunities are potentially conducive to operations during frost free periods. In potential summer or fall harvest areas, the following measures will be implemented to minimize environmental risks.

- Areas proposed for summer harvesting areas will be risk ranked higher than similar areas proposed for winter logging, and consequently will receive increased monitoring attention by supervisory staff. Careful monitoring of ongoing operations will determine when ground conditions become unfavorable due to excessive moisture, at which time harvesting operations will cease until conditions dry out.
- Low ground pressure equipment will be used on fine textured soils to reduce compaction risks. This requirement will not apply when sufficient frost conditions or a compressible snow pack exists to prevent compaction.
- "Boot survey" ocular site degradation assessments will be implemented where and when needed to monitor site degradation and provide guidance on when to cease operations.
- Streams and wet areas will be identified, and measures identified in SLP's to protect these areas during summer harvest conditions will be implemented.
- If the access conditions are favourable, but site conditions preclude summer harvesting activities on the block, timber may be winter logged and decked in the block on landings or at roadside for summer load and haul.

Monitoring Procedure:

The volume delivered to the mills from May 1 to November 30th of each year will be determined from company scale information and reported in annual reports, along with information on the number of weeks of mill operations.

Linkages to Operational Plans:

The location of blocks identified in FDP's and FOS's will, among other criteria, be based on the potential for summer harvesting. The proposed target volumes will provide guidance to the development of these plans.

SLP's will note site conditions and the relative opportunities for summer harvesting or hauling in cutblocks, as well as identify potential issues to consider when determining if summer harvesting is feasible.

Annual harvesting plans will utilize information in these plans to assign season and year of harvest to blocks.

Linkages to LRMP:

This indicator relates to LRMP forestry strategies to maintain permanent road infrastructures to facilitate summer harvesting opportunities in some LU's, which supports the following LRMP objective:

- Maintain or enhance timber harvesting opportunities.

6.49. HARVEST SYSTEMS

Indicator Statement	Target Statement
% of coniferous area harvested using conventional ground based harvesting equipment.	95% of the coniferous harvested area will utilize conventional ground based harvesting equipment
SFM Objective: Viable timber processing facilities in the DFA	
Linkage to FSJPPR: N/A	

Acceptable Variance:

An acceptable variance range will be 85% to 99% of the harvest area utilizing conventional ground based harvesting systems.

What is this indicator and why is it important:

This indicator measures the percentage of coniferous area harvested using conventional ground based harvesting systems, which is the most cost efficient harvesting method in the DFA. The indicator applies only to the coniferous landbase, as non-conventional harvesting was only considered on the coniferous portion of the THLB in the most recent TSR.

To remain cost competitive on a continuing basis, harvest plans must provide a relatively constant supply of blocks suitable for ground based harvesting systems, while still addressing some of the more difficult areas which make up the THLB. As harvesting cost is a major component of overall costs, they have a significant impact on the viability of the timber processing plants.

The target is established based on the average amount of non-conventional ground noted in the approved FDP's for the major Forest Licenses. The variance is provided to accommodate logistical cost concerns such as contractor mobilization/demobilization etc., and to indicate a portion of the coniferous THLB consistent with the TSR assumptions may need to be harvested using non conventional systems.

Current Status:

In 2002-2003, 96% of timber harvested on the DFA used conventional harvesting systems.

Forecasting Assumptions and Analytical Methods:

The TSR analysis report notes that out of a coniferous THLB of 733,221 ha, there are 9481 ha (1%) that require cable or aerial harvesting systems.

Strategy and Implementation Schedule:

Following is a brief description of each method, and the strategy for when they may be utilized:

Conventional (Ground-based) Systems

Conventional ground based harvesting will be the primary harvest method employed in the Fort St. John TSA. Feller bunchers, grapple skidders, and stroke or dangle head delimbers will most commonly be used to cut, skid and process logs. The logs are typically skidded to the roadside where they are processed, and loaded with butt'n'top loaders. Where steep roadside slopes restrict decking or loading, landings may be constructed, and wheeled front end loaders may be used to load trucks. Wheeled skidders will typically be used on favourable slopes that average less than 30%, or short adverse slopes up to 15%, provided

topography is favourable. Tracked skidders may be used on favourable slopes between 30-50%, or short adverse slopes of 15%-25% where topography and ground conditions permit. Low ground pressure skidding equipment is normally used during unfrozen conditions to minimize site impacts. A modification of conventional equipment includes cut to length systems, where logs may be manufactured either at the stump or at roadside using various equipment modifications.

Cable Yarding

This method utilizes a feller buncher or hand faller to cut the trees, and a grapple or tower yarder to yard trees to roadside. Cable yarding is utilized on steeper ground greater than 50%, but may be employed on slopes of 31%-49% where topography or ground conditions limit the use of skidders. In some cases cable logging may be employed on slopes less than 31% on sensitive sites where ground skidding presents significant risks to other resource values.

Aerial

Aerial movement of logs from harvest areas to remote processing locations may be used where other techniques will not be feasible, or road access would be cost prohibitive or environmentally undesirable. Trees would typically be hand felled and moved suspended under helicopters to landings located some distance from the harvesting activity. Helicopters will generally require large landings for safe operations. Helicopter logging has only been employed on a very limited basis to date due to economic considerations. The feasibility of helicopter logging depends on current timber values and site-specific conditions which can significantly impacts costs, and must be evaluated on a case by case basis.

Other Methods

Other harvesting methods (e.g. horse logging) may be implemented to a limited degree in certain instances. Alternative methods may be used only if they can provide a significantly higher level of environmental protection in very sensitive areas.

Implementation

Long term planning (e.g. FDP's) identifies the potential location and the expected harvest system to be employed. These plans are developed to provide no less than 85% ground based harvesting systems.

Monitoring Procedure:

Annual harvest plans will identify the expected levels of harvest system implementation. This indicator's performance will be reported in subsequent SFMP's.

Linkages to Operational Plans:

Planning considers timber profile objectives, site characteristics, and potential harvesting systems when delineating blocks in FDP's or FOS's. Estimated conventional ground based systems will be with the target range.

SLP's confirm the appropriate harvesting system options for different parts of cutblocks based on detailed fieldwork.

Linkages to the LRMP:

This indicator does not directly address any LRMP objectives.

6.50. COORDINATION

Indicator Statement	Target Statement
Joint FOS	All FOS's will be jointly prepared by active participants
SFM Objective: Viable timber processing facilities in the DFA	
Linkage to FSJPPR: N/A	

Acceptable Variance:

May exclude participants who may not be required to complete a FOS.

What is this indicator and why is it important?

A fully coordinated FOS between the participants will provide opportunities for cost efficiencies in planning, harvesting and road construction. Increased cost efficiencies promote the viability of the timber processing facilities.

Coordinated planning also allows comprehensive analysis of all harvesting plans concurrently to determine forecasted impacts to the SFMP indicators, and provides a clearer document for members of the public to understand cumulative impacts of all forestry operations.

Current Status:

In 2001 a coordinated FDP mapping product was developed by the active participants, although separate FDP documents were produced. This facilitated common consultation presentations to interested stakeholders. Since that time, participants have moved digital data to a common server which is expected to greatly facilitate the development and production of future plans.

Forecasting Assumptions and Analytical Methods:

- Does forecasting apply (y/n)? No

Strategy and Implementation Schedule:

Within 3 months following SFMP approval, participants will develop a schedule and responsibility matrix outlining a timeline for the preparation and completion of a joint FOS.

The preparation of the initial FOS is expected to be completed prior to December 31st, 2004.

Monitoring Procedure:

Progress on this objective will be reported in annual reports.

Linkages to Operational Plans:

FOS will be consistent with an approved SFMP.

Linkages to the LRMP:

Coordinating forestry activities is expected to optimize main road locations and reduce the amount of road construction needed. This indicator therefore supports the following LRMP objective:

- Coordinate access and linear development to minimize effects on other resources

6.51. UTILIZATION

Indicator Statement	Target Statement
The percentage of blocks and roads assessed in which avoidable waste and residue levels are within the target range	Annually, 100% of cutblocks and roads will fall within the target avoidable waste and residue range
SFM Objective: No decrease in the LTHL in the DFA	
Linkage to FSJPPR: N/A	

Acceptable Variance:

Maximum acceptable annual variance is 2% less than the target.

What is this indicator and why is it important?

This indicator is a measure of utilization compared to acceptable waste and residue ranges.

Timber Utilization levels can impact the long term sustainability of the timber harvest level by impacting the volume per hectare delivered. Lower utilization levels may result in more area being harvested to provide the same volume deliveries to mills, and therefore are a potential source of concern for maintaining sustainable harvest levels.

Utilization specifications define the species, dimensions and quality of trees that must be harvested and removed from an area during harvesting operations. The following specifications apply to sawlog grade timber for endemic stands, and all sawlog grade and dead and dry sawlog grade timber for catastrophic stands:

Table 37: Utilization Specifications

Utilization Specification	Lodgepole Pine and Deciduous Species	All Other Species
Maximum stump height [1]	30 cm	30 cm
Minimum diameter at stump height	15 cm	20.0 cm
Minimum log length	3.0 m	3.0 m
Minimum top diameter [2]	10 cm	10.0 cm

[1] Maximum stump height is measured on the side of the stump adjacent to the highest ground level.
[2] Minimum top diameter is measured as the inside bark diameter at the narrowest end of the log.

The following range of avoidable merchantable waste and residue, derived from guidelines in the Logging Residue and Waste Procedures Manual (Section 3), will be the basis for evaluating this indicator.

Biogeoclimatic Zone	Avoidable Waste &Residue range (m^3/ha)
ESSF	0- 20 m^3/ha
BWBS	0-10 m^3/ha

Controlling the level of waste and residue can reduce visual impacts in areas adjacent to existing access corridors, and minimize some forest health risks (e.g. bark beetles), which may be associated with large quantities of waste and residue.

Current Status:

The most current waste and residue information is from 2002. 98 waste and residue assessments of cutblocks and road permits were completed by Canfor and BCTS. 100% of the assessed areas had waste and residue levels within the target range of waste and residue.

Forecasting Assumptions and Analytical Methods:

- Does forecasting apply (y/n)? No

Strategy and Implementation Schedule:

Mill log quality specifications used to assess contractors log quality performance are designed to be consistent with the timber utilization target ranges. Harvesting operations are inspected during or following operations, and inspections note whether utilization levels are acceptable. Where activities are noted as unacceptable during operations, contractors are required to rework areas to achieve acceptable results if practical.

A preliminary visual assessment of waste and residue levels will be made by qualified assessors on all blocks and operational roads the first summer following completion of harvesting, to determine whether a block clearly has less than the maximum allowable avoidable waste. If the waste level is potentially near the threshold an ocular or full survey procedure will be completed to more accurately determine the waste level.

Monitoring Procedure:

Information on waste levels will be reported annually to the MOF, and a summary included in the annual report, commencing in 2004.

Linkages to Operational Plans:

None.

Linkages to LRMP:

TSR's and annual allowable cut determinations consider utilization levels in determining long term sustainable harvest levels. Managing waste and residue within the target ranges supports sustainable timber management over the long term. Avoiding excessive waste also helps reduce the risks of insects and diseases that can proliferate in excessive woody debris accumulations. Controlling waste and residue adjacent to well traveled corridors can assist in reducing the visual impact of cutblocks as well. This indicator therefore supports the following LRMP objective:

- Maintain timber harvesting and forest management opportunities
- Manage for forest health
- Manage visually sensitive areas along existing access corridors/trails
- Manage visually sensitive areas within the Tommy Lakes area

6.52. TIMBER PROFILE

Indicator Statement	Target Statement
The proportion (%) of area of height class two pine types to total cutblock area, in blocks harvested	November 15th, 2001 - March 31st, 2006: 8% or more of the total cutblock area of coniferous blocks harvested will be in height class two pine inventory types Subsequent 5 year periods: 8% or more of the total cutblock area of coniferous blocks harvested will be in height class two pine inventory types
SFM Objective: No decrease in the LTHL in the DFA	
Linkage to FSJPPR: For the purposes of Section 42 of the FSJPPR this indictor statement, target statement and acceptable variance will be used to determine if forest practices are consistent with the landscape level strategies.	

Acceptable Variance:

Not less than 5% of the total cutblock area of coniferous blocks harvested in each time period will be from height class two pine inventory types.

What is this indicator and why is it important?

This indicator measures the proportion of small pine (height class two) forest cover type polygons (as depicted on inventory maps available at the time of the TSR) included in the total cutblock areas of blocks logged over a five year period.

The Chief Forester identified his expectation that approximately 8% of the coniferous AAC be harvested from small pine stands (Fort St. John TSA Rationale for Allowable Annual Cut (AAC) Determination, 2003). One of the primary assumptions used in determining an AAC is that a particular timber harvesting profile will be harvested. The decision to include a stand type as part of the timber harvesting landbase is largely based on some past performance of the industry in harvesting these stands. Although the base case forecast suggested a potential sustainable long term coniferous harvest level higher than the current allocation, uncertainty around the merchantability of the small pine stands, and the ability of the inventory to accurately reflect the attributes of these forest types, resulted in only a portion of these stands being included in the base case. This is, therefore, a key component of the timber profile that supports the AAC.

Harvesting similar timber profiles to those assumed in the TSR process supports the maintenance of sustainable long-term timber supplies.

Harvesting plans have needed to be flexible to address logistical issues, as well as ever changing external factors (e.g. markets, economics, politics, climatic events, natural disturbance salvage, etc). The variance recognizes this reality, as well as the difficulties associated with balancing these factors within a relatively short time frame, and the uncertainty presented by the timber inventory. The component of these forest cover types that may be merchantable, and their distribution across the landscape is highly variable. There is therefore, a need to measure this indicator over an extended period of time, as there will be significant variations in the area of height class two pine harvested annually.

Current Status:

Currently coniferous licencees are required to demonstrate in FDP's, which are generally for a five year period, the percentage of the planned harvest that is in height class two pine polygons. Reporting is based on the forest cover polygon designations the TSR analysis used, to provide the strongest correlation practical to the TSR's information base. In current approved FDP's, the average five year planned percentage is approximately 8% of the total planned cutblock area in the FDP. Table 38 summarizes this information presented in the most current approved FDP's for each participant.

Table 38: Summary of Current FDP Height Class Two Pine Stands

Licencee	Height Class Two Pine (ha)	Total Ha	% of FDP
Canfor	1570	17020	9.2%
Tembec	190	1835	10.4%
CRL	180	1967	9.2%
BCTS	463	9350	5.0%
Total	**2403**	**30172**	**8.0%**

Forecasting Assumptions and Analytical Methods:

- Does forecasting apply (y/n)? Yes

Estimated areas in current approved FDP's were determined from analysis of the total block area in height class 2 pine types, and compared to the total area of blocks included in the FDP to derive a percentage of small pine included in the FDP for the five year term of each FDP.

Strategy and Implementation Schedule:

Strategy: The participants will plan a proportion of coniferous harvesting in merchantable height class two pine types (as denoted on forest cover maps available used at the time of the TSR), to be generally consistent with the most current assumptions of the Chief Forester AAC determination rationale.

Implementation: During preliminary identification of potential blocks to be included in forest development plans or forest operations schedules, height class two pine polygons are identified on forest cover maps, and transferred to aerial photographs. A photo interpreter then makes an initial assessment of merchantability. Where a stand's merchantability is still questionable, a field reconnaissance assessment is completed to determine if the stand is merchantable, and qualifies for inclusion in the FDP or FOS.

Sufficient suitable merchantable stands to meet the target are included in the forest development plans or forest operations schedules. These inventory polygons normally only make up a portion of the forest cover polygons within a cutblock, so the area included in these small pine forest cover polygons in proposed blocks will be calculated, and compared to the total area within the coniferous leading blocks in the plan to provide an expected proportion of height class two pine stands.

Monitoring Procedure:

The proportion (%) of area of height class two pine types compared to the total cutblock area in all blocks actually harvested in the time period will be monitored and reported in the annual report at the end of each time period.

Linkages to Operational Plans:

FDP's and FOS's identify the expected percentage of area included in height class 2 pine stands over at least a 5 year period. During field layout and the completion of SLP's, the actual area included in the total block area is determined.

Linkages to the LRMP:

This indicator and strategy supports the sustainability of timber harvesting levels. It therefore supports the following objective:

- Maintain timber harvesting and forest management opportunities.

6.53. CUT CONTROL

Indicator Statement	Target Statement
The percentage of the actual periodic cut control relative to target periodic cut control	Cut control volumes will not exceed 110% of the 5 year periodic cut control volume on each participant's licence
SFM Objective: No decrease in the LTHL in the DFA	
Linkage to FSJPPR: N/A	

Acceptable Variance:

None.

What is this indicator and why is it important?

The allotted periodic cut control is the five year AAC volume assigned to a participants license. Harvesting at levels that do not significantly exceed that volume supports the assumptions used in assigning annual allowable cuts in the Chief Foresters AAC determination, and is consistent with supporting ongoing sustainable timber supplies. Harvesting volumes up to 110% is permissible, as cut control target volumes for subsequent 5 year periods is reduced according to the amount harvested in excess of 100% of AAC.

The targets may need to be revised in the event of catastrophic natural disturbances, or related regulatory changes.

Current Status:

Current performance on periodic cut levels for all participants, as of January 1, 2003, is as follows:

CRL and Tembec Licences: Cut control percentage as of January 1, 2003 was 0%, as initial harvesting on these licences did not commence until January of 2003.

Slocan and LP Licences: No harvesting on these licences has occurred.

Canfor: The five year cut control period ended December 31, 2002. Periodic Cut control for FL A18154 was 99.2% of the adjusted AAC for the period 1998-2002.

Timber Sale Program: The five year cut control period ended December 31, 2002. The cut control was 95% of the adjusted conifer AAC, and 44% of the adjusted deciduous AAC for the period 1998-2002.

Forecasting Assumptions and Analytical Methods:

- Does forecasting apply (y/n)? No

Strategy and Implementation Schedule:

The participants prepare harvest plans that are consistent with the licences five year cut control volumes. The cut control volumes are monitored annually, and revisions to plans made if needed to ensure the five year targets are attainable.

Monitoring Procedure:

Harvest plans use the best available information to project volumes logged, for comparison to target cut levels. Scale information is used to monitor the actual deliveries compared to planned deliveries. The Ministry of Forests provides annual summaries of actual cut control performance to the licencees.

Annual harvested volumes, and progress towards five year periodic cut control levels will be reported in Annual Reports, starting with the 2002-2003 reports.

Linkages to Operational Plans:

FDP's and FOS's use periodic cut control volumes to determine the approximate areas and volumes that need to be included in these plans to meet cut control targets.

SLP's and cruise compilations are used for annual harvest plans or BCTS plans to more accurately project the volumes to be delivered or auctioned in the next year.

Linkages to LRMP:

Managing and controlling cut levels helps ensure the sustainability of timber production. This indicator therefore supports the following LRMP objective:

- Maintain timber harvesting and forest management opportunities

6.54. DOLLARS SPENT LOCALLY ON EACH WOODLANDS PHASE

Indicator Statement	Target Statement
Percentage of dollars spent locally on each woodlands phase in proportion to total expenditures	Woodlands Phases to be monitored: Logging/hauling: minimum of 80% Road construction/maintenance: minimum of 80% Silviculture: minimum of 8% Planning and administration: minimum of 50%
SFM Objective: Diverse local forest employment opportunities exist in the DFA	
Linkage to FSJPPR: N/A	

Acceptable Variance:

A 10% variance of the minimum target is required for each identified woodlands phase as the dollars to be spent fluctuate annually, depending on the amount of harvesting completed that year.

What is this indicator and why is it important?

Woodlands operations purchase a wide variety of products and services to produce timber and to manage its forestry activities. This indicator is a measure of total amount of dollars attributed to forestry activities (woodlands phase*) that are spent locally which indirectly is a measure of the diversity of the local forest employment opportunities associated with forest industry activities, the SFM objective for this element. For the purposes of this objective, local has been defined as those residences or businesses which have mailing addresses or known established businesses located in the Peace Forest District.

Current Status:

There is currently no direct measurement of employment within the DFA at this time. However as a component of TSRII for the DFA, a profile of the current socio-economic setting was prepared. It identified that the forestry supports approximately 9% of the labour force and the employment multiplier for forestry activities is in the range of 1.51-1.88 for every direct forestry job. For example for every 100 full time direct forestry jobs in the DFA it supports an additional 51 to 88 indirect and induced full time jobs depending on the forestry activity. The analysis further estimated that the employment supported by the average harvest level of 990,000 m^3/year from 1998 to 2000 within the DFA has been calculated at 565 person years of direct forest employment and 315 person years of indirect and induced employment for an overall total of 880 person years. Furthermore, the analysis also calculated that the average income for direct forestry sector employees in the DFA at $47,400 (1999 dollar value).

The following table (Table 39) outlines the total dollars spent locally for 2002 on the various woodlands phases as identified in the table.

Table 39: Dollars Spent Locally on Each Woodlands Phase

Woodlands Phases	Total dollars expended	Total dollars spent locally	Percentage	Projected local employment *
Logging and hauling	$28,251,214	$26,850,811	95%	566
Road construction and maintenance	$7,259,772	$6,602,631	91%	139
Reforestation	$6,796,640	$1,121,868	16%	23
Planning and administration	$5,862,977	$4,041,505	69%	85
TOTAL	$48,170,603	$38,618,815	80%	814

* This is a projected number only for comparative purposes only.

Forecasting Assumptions and Analytical Methods:

No forecasting assumptions for this indicator as the dollars to be spent fluctuate annually, depending on the amount of harvesting activity.

Strategy and Implementation Schedule:

All woodlands phases costs will be tracked annually and a query will be done identifying the amount of these dollars that are expended in contracts to local contractors and dollars paid to employees. Although this indicator will not ultimately identify local forest employment opportunities directly attributable to our activities it does provide a certain measure of assurance of the amount of dollars that are spent in the local economy which ultimately leads to employment opportunities. A rough translation of the number of jobs tied to the total woodlands dollar figure using the average 1999 wages for direct forestry jobs and indirect forestry jobs has shown a relatively close correlation to those figures identified in the TSRII socio-economic analysis.

Monitoring Procedure:

To better define this indicator we must clearly identify those forestry activities that will be defined as a woodland phase. We have included the following activities as an individual phase for the purposes of defining what contributes towards being a woodlands phase.

- Logging and hauling costs
- Road construction and road maintenance, including deactivation
- Reforestation, including seedling cost, site preparation, planting, brushing and all surveys
- Planning and administration, including wages, office overhead, forest development costs, taxes, leases and rentals

Each participant will be responsible for ensuring that the all costs are tracked by each phase as identified above and further tracked by the invoice addresses to determine whether this is local or not. A summary will be provided in the annual report.

Linkages to Operational Plans:

This indicator provides no links between short-term operational plans and the SFMP.

Linkages to LRMP:

There are no linkages between this indicator and the LRMP objectives.

6.55. VALUE AND TOTAL NUMBER OF TENDERED CONTRACTS VERSUS TOTAL CONTRACTS

Indicator Statement	Target Statement
Value of tendered contracts in proportion to the total value of all awarded contracts on an annual basis	A minimum of 50% of the total value of contracts will be tendered on an annual basis
SFM Objective: Provide opportunities for a range of interests to access benefits	
Linkage to FSJPPR: N/A	

Acceptable Variance:

A variance of 10% is required for this indicator as the dollars to be spent fluctuate annually dependent on the amount of harvesting completed.

What is this indicator and why is it important?

This indicator is a measure of the total dollar value of contracts that are tendered in comparison to the total value of contracts that are awarded by all the participants. This indicator supports the objective by effectively measuring the percentage of the value of contracts that are tendered through a competitive bid process thus providing a larger opportunity for the private sector to secure work and directly having access to both timber and non-timber benefits. This indicator does not include any logging contracts that the major licensees enter into with their contract loggers with the primary reason being that these contracts are direct awarded with little option for open tendering due to the long term or replaceable contract conditions as required within Bill 13 *Timber Harvesting Contract and Subcontract Regulation.*

Current Status:

The following table (Table 40) outlines the total of number of contracts and total value of contracts that were awarded in 2002.

Table 40: Total Number and Value of Contracts Awarded in 2002

Contract Type	# of contracts	% age of contracts	Total value of contracts	Percentage of total value contracted out
Tendered contracts	120	60%	$7,996,288	46%
Direct award/select invitation	81	40%	$9,256,125	54%
Total number of contracts	209		$17,252,413	100%

The above table identifies that approximately 46% of the value of all contracts awarded annually are done in an open and competitively tendered process.

Forecasting Assumptions and Analytical Methods:

- Does Forecasting apply (y/n)? No, forecasting assumptions for this indicator as the dollars to be spent on contracts fluctuate annually are dependent on the amount of harvesting that has occurred.

Strategy and Implementation Schedule:

All contracts awarded by the participants will be tracked annually and a query of the business plan database will conducted to determine the total value of all contracts that have been awarded on an open tender basis. A percentage will then be calculated to determine the relation between value of contracts tendered versus the total value of all contracts awarded annually. It is proposed that the participants will target 50% of the value of all contracts to be openly and competitively tendered commencing with the 2005 annual reporting period.

Monitoring Procedure:

A summary will be provided in the annual report.

Linkages to Operational Plans:

This indicator provides no links between short-term operational plans and the SFMP.

Linkages to LRMP:

There are no linkages between this indicator and the LRMP objectives.

6.56. CONFORMANCE TO ELEMENTS PERTINENT TO TREATY RIGHTS

Indicator Statement	Target Statement
% conformance by participants to SFM elements pertinent to treaty rights (i.e., hunting, fishing and trapping) defined in Treaty 8	Participants will conform 100% to the SFM Indicators and Targets of the SFM Elements pertinent to sustaining hunting, fishing and trapping, as follows: Element 1.1 Ecosystem Diversity (Indicators 6.2, 6.3, 6.4), and Element 1.2 Species Diversity (Habitat Elements) Indicators (6.5, 6.6, 6.7, 6.8 & 6.9), and Element 3.2 Water Quality and Quantity Indicators (6.34, 6.35, 6.36 & 6.37)
SFM Objective: Recognition of Treaty 8 rights and respect aboriginal rights in development of plans	
Linkage to FSJPPR: N/A	

Acceptable Variance:

Variances provided in the specific indicators will apply.

What is this indicator and why is it important?

The DFA is within a larger area of Treaty 8 of 1899, which established hunting, fishing and trapping as treaty rights for the local aboriginal First Nations communities. The rights as such are available across the treaty area and have no site specificity or quantum. The following six First Nations have known traditional territory in the DFA whose treaty rights need to be protected: Prophet River, Doig River, Blueberry River, Halfway River, West Moberly, Saulteau, Fort Nelson and Dene-Tha.

Aboriginal rights are affirmed in the Canadian Constitution (S. 35), but have not been proven through judicial processes in the DFA.

The indicator identifies and measures the participants' effectiveness in recognizing and respecting existing treaty rights. In doing so the participants demonstrate their role of recognizing and respecting societies commitment to sustain core traditional values and ways of life for First Nations in the DFA, as follows:

- **Hunting and trapping rights** are generally upheld by meeting Criterion 1 – Conservation of Biological Diversity, Element 1.1 Ecosystem Diversity – specifically seral stage, patch size and shape index, and Element 1.2 Species Diversity more specifically by meeting the objective of suitable habitat elements and its relevant indicators: snags/cavity sites, coarse woody debris, riparian, shrubs and wildlife tree patches.
- **Fishing rights** are generally upheld by meeting Criterion 3 – Conservation of Soil and Water Resources, Element 3.2 Water Quality and Quantity, and more specifically by meeting the objectives and indicators of maintaining water quality and water quantity within the natural ranges of variation.

Participants need good working relationships and communications with the First Nations in the DFA in order to meaningfully consider and plan for site-specific information in forest development plans related to treaty or aboriginal rights. This aspect is covered in Indicator 6.57.

Current Status:

Participants refer Forest Development Plans (FDP's) and Pest Management Plans (PMP's) to First Nations for comment and input on planned development. Often a meeting is called for to provide clarification and answer questions. Capacity is often cited as a reason that First Nations cannot better address the effect of forest development on treaty (or aboriginal) rights. Government has a fiduciary obligation and carries out the role of meeting consultation requirements. Currently there is an expectation of participants to carry a greater role in the consultation and accommodation process, as noted in recent judicial decisions although this is being challenged.

Participants also have relationship and capacity building processes underway with the local First Nations, ranging from extensive and complex Memorandum of Agreement, to joint ventures.

See also Indicators (6.2, 6.3, 6.4, 6.5, 6.8 and 6.9) for current status about the ecosystem diversity and species diversity (habitat element) indicators.

See also Indicators (6.34, 6.35, 6.36, and 6.37) for current status about the water quality and quantity indicators.

Forecasting Assumptions and Analytical Methods:

- Forecasting does not apply to this indicator.

Strategy and Implementation Schedule:

Continue with the relationship and capacity building processes as noted above.

Continue to engage with First Nations in the development of strategic and operational plans.

Report annually on the performance of the Indicators noted for SFM Elements 1.2 and 3.2, as noted above.

Review legal compliance to aboriginal rights as duly established in law and accepted by government and summarize for each annual report.

Monitoring Procedure:

The participants will maintain an annual record of performance.

Linkages to Operational Plans:

Operational plans will be consistent with the strategies to manage for the Indicators and Targets for SFM Element 1.1 (Ecosystem Diversity), SFM Element 1.2 (Species Diversity), and SFM Element 3.2 (Water Quality and Quantity).

Linkages to LRMP:

The indicator statement and target conform to the objectives set out in the Fort St. John LRMP:

> The Fort St John LRMP adopts the general management direction of protecting culture and heritage resources. This will be achieved through the application of the Forest Practices Code, Heritage Conservation Act, Agreement of the Management of Cultural Heritage Resources and the Archaeological Impact Assessment Guidelines to identify and maintain culture and heritage resources.

6.57. NUMBER OF KNOWN VALUES AND USES ADDRESSED IN OPERATIONAL PLANNING

Indicator Statement	Target Statement
% of known traditional site-specific aboriginal values and uses identified during SFMP, FOS, FDP, or PMP referrals addressed in operational plans	100% of known traditional site-specific aboriginal values and uses identified during SFMP, FOS, FDP, or PMP referrals will be addressed in operational plans
SFM Objective: Respect known traditional aboriginal forest values and uses	
Linkage to FSJPPR: N/A	

Acceptable Variance:

None.

What is this indicator and why is it important?

The indicator is a measure of the participant's recognition and response to the traditional aboriginal values and uses that are made known in a timely manner during referral processes. The requirement for site-specificity enables both the participant and First Nations to best qualify and/or quantify the effects of forest development and the strategies required to manage for the development.

This indicator contributes to respecting the social, cultural, heritage and spiritual needs of aboriginal people who traditionally and currently use the DFA for the maintenance of traditional aspects of their lifestyle. Working with aboriginal peoples to identify, define and develop management strategies for traditional values and uses is an important component of the forest industry's sustainable forest management framework.

This indicator does not apply to values which may otherwise be well represented in the same general area, or sites where information cannot be validated through traditional or scientific knowledge sources from both within and outside of the First Nations.

Current Status:

Following a review of FDP blocks, the District Manager currently directs participants to conduct Archaeological Impact Assessments on areas with high potential, as determined from an Archaeological Overview Assessment. In addition to MOF direction, the participants, with cooperation from the MOF, recently contracted a third-party archaeologist to further evaluate a number of proposed FDP cutblocks using a detailed risk-rating process for archaeological potential. The new process adds resolution to the older AOA, and will assist in providing direction regarding cultural heritage resources.

Participants have an obligation to not damage any resource feature, including cultural heritage features. Active participants have made a number of adjustments to operational plans for local First Nations values brought to their attention. For example, WTP's have been amended to include CMT's, riparian and lake buffers have been widened to accommodate traditional use areas, and vegetation management buffers have been extended to avoid berry-picking patches.

A 1998 report summarizes a number of Traditional Use Studies (TUS's), which were carried out by First Nations in the DFA. The participants and government currently do not have any access to the information or data due to the confidential nature of much of the information. The participant's ability to effectively manage for traditional values and uses may be

dependent upon the First Nation (s) providing access to some levels of confidential information.

Forecasting Assumptions and Analytical Methods:

- Forecasting does not apply to this indicator.

Strategy and Implementation Schedule:

- Participants will continue with ongoing relationship building processes with First Nations, to encourage meaningful engagement and input to the development of SFMP, FOS, FDP and PMP's.
- Participants will engage in and record all communications and meetings with First Nations (including attempts) to garner input on the development of operational plans
- Participants will seek to gain access to site-specific information about traditional values and uses (subject to confidentiality agreements) at the SFMP, FOS, FDP and PMP stages.
- Participants will work with First Nations in an attempt to develop joint agreement on operational strategies to manage for site-specific traditional values and uses.
- Participants will implement strategies in operational plans to address all site specific known values and uses included in the scope of this indicator that are identified during referrals of these major plans.
- Detailed planning will occur after referral comment periods for major plans expire. Information provided subsequent to these referral review and comment periods will be considered and addressed to the extent participants are able to without unduly disrupting ongoing operations.

Monitoring Procedure:

Participants will record the number of opportunities for communication, meetings and input into each plan.

Participants will record the adoption of all strategies used to manage for known site-specific traditional values and uses in operational plans (and will be adopted for strategic plans as required). This information will be summarized in operational planning processes subject to confidentiality agreements.

Information from Archeological Impact Assessments (AIA) required by the District Manager, will be monitored through participants GIS systems, also subject to confidentiality agreements.

Linkages to Operational Plans:

Operational plans will be consistent with jointly agreed upon strategies between participants and First Nations.

Information from AIA's will guide the development of operational plans.

Linkages to LRMP:

The indicator statement and target conform to the objectives set out in the Fort St. John LRMP:

The Fort St John LRMP adopts the general management direction of protecting culture and heritage resources. This will be achieved through the application of the Forest Practices

Code, Heritage Conservation Act, Agreement of the Management of Cultural Heritage Resources and the Archaeological Impact Assessment Guidelines to identify and maintain culture and heritage resources.

6.58. REGULATORY PUBLIC REVIEW AND COMMENT PROCESSES

Indicator Statement	Target Statement
Public Review and Comment Process for the FSJPPR	Obtain PAG acceptance of Public Review and Comment Process Comply with Public Review and Comment Process
SFM Objective: Satisfactory public participation process	
Linkage to FSJPPR: N/A	

Acceptable Variance:

No variances, unless authorized by the Regional Manager.

What is this indicator and why is it important?

This is a demonstration that the public participation process is designed and functioning to the satisfaction of the PAG and that the pilot participants comply with the regulations for the public review and comment process.

Current Status:

The PAG accepted the Public Review and Comment Process for the FSJPPR on July 12, 2002. The FSJPPR came into effect on December 1, 2001.

On July 15, 2003 the Regional Manager approved the pilot participants' request to reduce the SFMP review period to not less than 60 days.

Forecasting Assumptions and Analytical Methods:

- Does forecasting apply (y/n)? No.

Strategy and Implementation Schedule:

The PAG has accepted the Public Review and Comment Process. No further action required.

The Public Review and Comment Process requires each SFMP and FDP or FOS to undergo a public review and comment period.

The pilot participants are committed to maintaining a Public Advisory Group. PAG meetings are open to the public and provide additional opportunities for the PAG and public to be informed of the pilot participants activities.

On occasion, as required, the pilot participants will also bring experts to the PAG meetings to provide relevant information to interested parties to support their involvement in the public participation process, and increase knowledge of ecosystem processes and human interactions with forest ecosystems. PAG members are also provided summaries of STAC input.

The pilot partners will also make copies of the SFMP and annual reports available on the web.

Monitoring Procedure:

The PAG has accepted the Public Review and Comment Process. No monitoring required.

Each plan advertised will document the Public Review and Comment Process comments received.

The pilot participants will identify, maintain and report annually on communication activities designed to disseminate information to the public.

Linkages to Operational Plans:

Each SFMP and FDP or FOS will undergo a public review and comment period.

Linkages to LRMP:

This process provides an opportunity for local municipal governments to review and comment on plans. It therefore supports the following objective:

- Ensure that all land and resource management planning activities within the planning area provide for consultation with local municipal governments.

6.59. TERMS OF REFERENCE (TOR) FOR PUBLIC PARTICIPATION PROCESSES

Indicator Statement	Target Statement
Terms of reference (TOR) for the FSJPPR public participation process	Obtain PAG acceptance of TOR for public participation process Complete annual review of TOR
SFM Objective: Satisfactory public participation process	
Linkage to FSJPPR: N/A	

Acceptable Variance:

No variances.

What is this indicator and why is it important?

The participants are committed to provide ongoing opportunity for the public to be involved in the Fort St. John pilot project planning and monitoring activities. A key element in the public oversight component is the establishment of a public advisory group.

This is a demonstration that the public participation process is designed and functioning to the satisfaction of the PAG.

Current Status:

The PAG accepted the TOR on April 18, 2001. The last review was on February 3, 2003.

Forecasting Assumptions and Analytical Methods:

- Does forecasting apply (y/n)? No

Strategy and Implementation Schedule:

The PAG has accepted the TOR. PAG members or pilot participants may recommend revisions at any time. The TOR will be reviewed annually.

Monitoring Procedure:

An annual review of the TOR will be a regular agenda item for PAG meetings. Meeting summaries will be distributed to the PAG.

Linkages to Operational Plans:

Not applicable.

Linkages to LRMP:

Not applicable.

6.60. PUBLIC INQUIRIES

Indicator Statement	Target Statement
The percentage of timely responses to Public Inquiries	Respond to 100% of public inquiries regarding our forestry practices within one month of receipt
SFM Objective: Satisfactory public participation processes Relevant information used in decision making process is provided to PAG, FNAG, general public and affected parties	
Linkage to FSJPPR: N/A	

Acceptable Variance:

Responses will be provided to all inquiries, provided contact information is provided so that the participants can reach the person making the inquiry.

What is this indicator and why is it important?

This indicator measures the percentage of timely responses provided to public inquiries or concerns regarding our woodlands activities that effect the environment or other forest resource users. The indicator includes responses to public comments on operational plans (e.g. FDP's, FOS's, PMP's) as well as unsolicited public comments on operational activities.

Providing timelines for responses that provide information on our operational practices, or indicate how a particular issue will be addressed, encourages participants to actively consider and respond to public input. The responses also provide an indication that comments are being considered within our planning and communication processes.

Current Status:

The participants currently solicit feedback from interested stakeholders and the public when preparing public plans. As well, ongoing feedback is often received regarding the practices and management of the forest from interested parties.

The only FDP prepared in 2002 was for FL A59959. Comments were received from 1 range tenure holder, 2 trappers, 1 guide-outfitter, as well as 1 First Nation. Responses were provided within 1 month of receipt of the comments, and copies of the responses were included with the final submission of the FDP to the Ministry of Forests. Amendments to participants FDP's prepared during this time period have not received any public comments.

Forecasting Assumptions and Analytical Methods:

- Does forecasting apply (y/n)? No

Strategy and Implementation Schedule:

All staff that receive inquiries are responsible for forwarding them to the appropriate person within the organization in a timely manner that allows for a response within one month.

Supervisors responsible for applicable plans or operational activities will ensure that responses are provided to inquiries concerning the environment or other forest resource users, and records kept of the responses.

Monitoring Procedure:

Public inquiries will be summarized annually and reported in the Annual Report.

Linkages to Operational Plans:

Public operational plans with requirements for public review and comment that are applicable to this indicator include Forest Development Plans, Forest Operations Schedules, and Pest Management Plans. Where specific comments are received regarding operational activities that may impact other plans such as SLP's, harvesting plans, or silviculture plans, the comments will be forwarded to the accountable supervisor, who will be responsible for evaluating the comments and determining if changes to plans are required, and responding to the comments.

Linkages to LRMP:

This indicator does not directly link to any LRMP objectives.

6.61. SCIENTIFIC/TECHNICAL ADVISORY COMMITTEE (STAC)

Indicator Statement	Target Statement
Scientific/Technical Advisory Committee (STAC)	Establish and maintain a scientific technical committee until December 2003
SFM Objective: Relevant information used in decision making process is provided to PAG, general public and affected parties	
Linkage to FSJPPR: N/A	

Acceptable Variance:

None.

What is this indicator and why is it important?

The Scientific Technical Advisory Committee (STAC) is a team of well-recognized and respected professionals who contribute a diverse set of knowledge in forest management to the development of the SFMP. In addition to members of this committee, other specialists have been brought in to review the input from the public advisory group and make recommendations to the participants on possible operational methods, strategies, training and other considerations.

The overall role of the Scientific Technical Advisory Committee is to provide strategic input for consideration in the development and implementation of the Sustainable Forest Management Plan (SFMP). Additionally, the scientific and/or technical experts assist the participants in the identification of appropriate indicators, objectives or strategies to address values and goals derived through the public advisory process. The Committee also provides an overview and comments on the adaptive management framework that will be used by the pilot participants.

The participants are responsible for the development and implementation of the SFMP and will carefully consider recommendations of the Public Advisory Group and the Scientific Technical Advisory Committee.

The STAC ensures that the most up-to-date credible and relevant information is used in the development of the SFMP.

Current Status:

The STAC was formed in April 2002 and has had 2 meetings to date. Individual presentations by some STAC members have also occurred.

Forecasting Assumptions and Analytical Methods:

Forecasting does not apply to this indicator.

Strategy and Implementation Schedule:

The STAC process of review and technical input has already been implemented. The pilot participants will provide the opportunity for the STAC to comment on the SFMP.

Monitoring Procedure:

STAC activities will be recorded through meeting summaries.

Linkages to Operational Plans:

The STAC deals at the strategic level in the development of the SFMP.

Linkages to LRMP:

Not applicable.

7. DESCRIPTION OF PUBLIC INPUT

The Public Review Strategy, a copy of the notice published, as submitted to the Regional Manager Ministry of Forests, and copies of written comments received can be found in Appendix 15.

The following sections summarize the input received regarding the SFMP from the public, First Nations, agencies, KPMG and the STAC.

7.1. SUMMARY OF PAG RECOMMENDATIONS

In accordance to section 37 of the FSJPPR the PAG provided comments on a preliminary draft SFMP during meetings held on September 15th and 22nd 2003. See Table 41.

During a meeting held on November 24, 2003 the PAG also reviewed changes made to the proposed SFMP as a result of input received by the participants. See attached summary (Table 42). The PAG did not have any concerns with the changes made to the SFMP.

7.2. SUMMARY OF COMMENTS RECEIVED

There were no comments received from the public.

During July 28th to July 31st and October 14th to 17th, 2003, KPMG assessed the SFMP and related forest practices. KPMG has recommended the participants for CSA certification.

The STAC provided comments on the draft SFMP on November 2, 2003. A copy of the draft minutes can be found in Appendix 15.

MOF, MWLAP and MSRM staff conducted a thorough review of the draft SFMP. They provided suggestions, identified several wording problems and pointed out several items that required clarification in the text. Where appropriate, these issues were incorporated into the SFMP.

Table 43 summarizes input received from the agencies, KPMG and the STAC that affect the regulatory required components of this plan.

7.3. FIRST NATIONS

Table 44 summarizes comments received from First Nations.

Table 41: PAG Comments on Preliminary Draft SFMP

SFMP REFERENCE	PAG SUPPORT (YES/NO)	PAG COMMENTS AND QUESTIONS	PILOT PARTICIPANTS RESPONSE OR INFORMATION	PARTICIPANTS ACCEPTANCE OF PAG INPUT
LANDSCAPE LEVEL STRATEGY AND RELATED INDICATORS				
4.6 Forest Health Strategy	Yes			
General		How has fire been dealt with in the SFMP?	The SFMP contains a salvage (6.26) indicator and a revised forest health indicator (6.25) that address fire.	Yes
		How has SFMP mitigated against fire?		
		What are impacts of Mountain Pine Beetle to SFMP? Including wood coming from outside the TSA/DFA?	Forest Health Strategy and indicators include monitoring and risk ranking of damaging agents including Mountain Pine Beetle. The SFMP relates to forest management within the DFA. Wood coming from outside the DFA is not subject to the SFMP. However, participants do have monitoring programs and EMS management controls such as timing windows, transportation, waste disposal, traps etc to minimize risk.	N/A
6.26 (Salvage)	Yes			
6.25 (Proportion of forest health issues with treatment plans)	Yes	Can the response can be quicker than 1 year if needed, e.g., MPB issues?"	The target is to be within one year. High risk issues will be addressed expeditiously as appropriate. SFMP will be amended to clarify.	Yes
6.01 (Forest Type)	Yes			
4.7 Range & Forage Management Strategy	Yes			
6.10 (Noxious Weeds)	Yes	Suggest add in new invaders species	Indicator has been revised to include "known invasive species of concern".	Yes

SFMP REFERENCE	PAG SUPPORT (YES/NO)	PAG COMMENTS AND QUESTIONS	PILOT PARTICIPANTS RESPONSE OR INFORMATION	PARTICIPANTS ACCEPTANCE OF PAG INPUT
6.42 (Damage to Range Improvements)	Yes	Suggest target should be no-net damage	Variance revised so that the participant can implement alternative mitigative measures to the satisfaction of the range tenure holder.	Yes
6.41 (Range Action Plans)	Yes	Mutually agreeable between who?	For clarification, the agreement is between participants and range tenure holders.	N/A
		Why not meet on an annual basis?	The participants do not impact all tenure holders every year. The aim is to work with these tenure holders that we have a real stake with impending operations as identified in the FOS.	N/A
4.5 Visual Quality Management Strategy	Yes			
6.44 (Consistency with VQO's)	Yes	Yes- Sept 15, 2003 Follow-up- Sept 22, 2003: Check for accuracy of LRMP visuals objectives in PA's in Table 2 on page 9 ("Visual1"). Clarify that areas adjacent to protected areas are managed for visual quality.	Redfern-Keilly PA in the Sikanni LU is the only PA with specific objectives related to visuals in the LRMP. Visual objectives relating to other scenic areas ("Visual2" in Table 2), however, will include areas adjacent to other PA's. Revised the indicator strategy to clarify scenic areas include areas adjacent to PA's in Crying Girl, Graham, Sikanni and Trutch LU's.	Yes

SFMP REFERENCE	PAG SUPPORT (YES/NO)	PAG COMMENTS AND QUESTIONS	PILOT PARTICIPANTS RESPONSE OR INFORMATION	PARTICIPANTS ACCEPTANCE OF PAG INPUT
4.2 Road Access Management Strategy	Yes			
6.24 (Permanent Access Structures)	Yes	How can reducing the requirement from 7% to 5% be achieved?	The 7% maximum only applied to individual blocks. The 5% target refers to a maximum amount for multiple blocks, thus providing greater flexibility to achieve this and will be consistent with the LRMP.	N/A
		Cautioned about public reaction to increased block size.	See comments under 6.03.	N/A
		Review with timber harvesting and block/patch size	This was reviewed in conjunction with the timber harvesting and patch size strategies and related indicators at the September 15, 2003 PAG meeting.	N/A
6.40 (Number of coordinated developments)	Yes	How to determine what is “coordinated”? Define multiple user	The definition for coordinated developments is defined as those activities or structures within existing harvesting plan areas (e.g. identified in FDP/FOS, Graham IRMP or similar plans) that will be used by more than one industry, or have or will be modified to accommodate the needs of both industries. Reference to forest industry changing plans to utilize oil and gas roads has also been added.	Yes
		Clarify “report on accepted”, and determine what is accepted, or. Suggest using successful / unsuccessful shared coordinated access, instead of using opportunities as the measure.	Target changed to use successful / unsuccessful shared coordinated access.	Yes

SFMP REFERENCE	PAG SUPPORT (YES/NO)	PAG COMMENTS AND QUESTIONS	PILOT PARTICIPANTS RESPONSE OR INFORMATION	PARTICIPANTS ACCEPTANCE OF PAG INPUT
6.45 (ROS)	Yes	Concern about deactivation standards (i.e., cut culverts are hazards) Don't leave major hazards when you deactivate	The primary reason for deactivation is to control erosion. A secondary reason is to control access. Deactivation measures in FOS requirements have been revised to include: "When deactivation is primarily done for controlling erosion deactivation structures will be designed to ensure hazards are minimized."	Yes
4.4 Riparian Management Strategy	Yes			
6.36 (Stream Bank Integrity) * Including revisions presented to PAG on September 22, 2003.	Yes			
6.22 (Pattern of Harvesting in Major River Corridors)	Yes			
6.07 (Riparian Reserve Zones)	Yes			
6.23 (Visual Screening)	Yes			
6.34 (Peak Flow Index)	Yes			
4.3 Patch Size, Seral stage and Adjacency Strategy	Yes			
6.02 (Seral Stage)	Yes			

SFMP REFERENCE	PAG SUPPORT (YES/NO)	PAG COMMENTS AND QUESTIONS	PILOT PARTICIPANTS RESPONSE OR INFORMATION	PARTICIPANTS ACCEPTANCE OF PAG INPUT
6.03 (PATCH SIZE)	Yes	How different is the proposed Patch size distribution vs. current harvesting plans? A comparison (rationale, in public-speak) should be made.	Table 15 and Table 16 (Patch Size Class Current and Post FDP Status) shows the current patch size distribution and the effects from harvesting plans. This will be reviewed at a future PAG meeting.	N/A
		Need to be concerned about potential public reaction to large cutblocks.	The participants appreciate the cautions raised by the PAG. The participants will address large block size concerns through improved communications (eg PAG/Public meetings, web etc) Specific comments from the public will be addressed through indicator 6.60 (public Inquiries).	N/A
6.04 (Shape Index)	Yes	Request picture illustration to explain shape index (ie 1 vs 4).	The SFMP has been revised to include an illustration for shape index.	Yes
4.1 Timber Harvesting Strategy	Yes			
6.48 (Summer and Fall Volumes)	Yes	Why the increase for coniferous (2003 vs 2004)?	FSJ mill closed for 5 weeks in August and September of 2003 to accommodate rebuild of mill	N/A
		Encourage local summer hauling	Indicator 6.54 (Dollars spent locally) sets a target for local spending. This is set at 80% for logging and hauling.	N/A
		Refer to delivered vs. Harvested	The target statement has been revised to clarify the reference.	Yes
		Refer to % of yr.'s volume for mill's	The indicator description has been revised to include how much proportional volume this represents	Yes
		Consider impacts on residents & vegetation regarding eg., road into the graham/halfway	Specific comments from residents will be addressed through indicator 6.60 (public Inquiries).	N/A

SFMP REFERENCE	PAG SUPPORT (YES/NO)	PAG COMMENTS AND QUESTIONS	PILOT PARTICIPANTS RESPONSE OR INFORMATION	PARTICIPANTS ACCEPTANCE OF PAG INPUT
6.49 (Harvesting Systems)	Yes	Conventional systems may limit summer deliveries. Review limits created by the current target (95%)	Harvesting systems and summer deliveries will be managed to optimize economic and environmental objectives. The acceptable variance provides for flexibility to utilize other systems to increase summer deliveries if needed.	N/A
		Consider options for horse logging	Horse logging is included in "other methods".	N/A
6.50 (Joint FOS)	Yes			
6.27 (Even aged Silviculture Systems)	Yes	Define even-aged silviculture system	Definition provided in "what is this indicator and why is it important".	N/A
6.18 (Graham Harvest Timing)	Yes	Sonsider rewording to follow GRIMP or refer to Table 26--- but simplify	Indicator Statement revised.	Yes
6.19 (Graham Harvest Areas)	Yes	Simplify i.e., refer to Table 26	Indicator Statement revised.	Yes
6.20 (Graham Connectivity Corridors)	Yes			
6.21 (Clustered Harvest Plans)	Yes			
6.51 (Utilization)	Yes			
6.52 (Height Class 2 Pine)	Yes			
6.53 (Cut Control)	Yes	How is under-utilization addressed?	This indicator is designed to ensure that the LTHL does not decrease which may occur if actual harvest significantly exceeds permissible levels. Under-utilization is not specifically addressed. However, the SFMP contains an objective to maintain viable timber processing facilities that is supported by indicators 6.47, 6.48, 6.49, and 6.50.	N/A

SFMP REFERENCE	PAG SUPPORT (YES/NO)	PAG COMMENTS AND QUESTIONS	PILOT PARTICIPANTS RESPONSE OR INFORMATION	PARTICIPANTS ACCEPTANCE OF PAG INPUT
			This indicator is consistent with current changes to cut control regulations.	
4.8 Reforestation Strategy	Yes			
6.28 (Plantation Species Composition)	Yes			
6.30 (Establishment Delay)	Yes			
6.29 (Merchantable Volume for Coniferous Areas)	Yes	Clarify whether current volume harvested can be maintained over time.	The Growth and Yield monitoring strategy (Sec 3.3) will allow comparison of predicted vs. actual yields for managed stands.	N/A
		Compare new vs. old system (pros & cons). Simplify.	Previously, reforestation was a block-based performance standard focusing on species and stems per hectare. This reforestation level strategy measures performance by harvest year over multiple blocks based on individual cut block data. Presentation to be reviewed at September 22, 2003 PAG meeting.	N/A
		Compare a sample of both systems parallel (i.e., old =’s block based species and stocking requirements vs landscape based productivity-- potential and actual)	See above.	N/A
		Develop info/communications about the system to eliminate skepticism.	The pilot participants will continue with contributing our data analysis to the MOF website, exchange of info with Riverside, presentations to groups as the opportunities present themselves	N/A

SFMP REFERENCE	PAG SUPPORT (YES/NO)	PAG COMMENTS AND QUESTIONS	PILOT PARTICIPANTS RESPONSE OR INFORMATION	PARTICIPANTS ACCEPTANCE OF PAG INPUT
		Suggest a review of the system every x yrs to ensure it's effective. (annual reporting)	Annual reporting will be provided. Assessments will commence in 2003 on older blocks to refine the system.	N/A
		Build in assurances for monitoring overall system	Monitoring provisions are outlined in indicators 6.30 (e.g. 2 year establishment delay) and 6.29 (e.g. 8 year progress review and 15 year assessment).	N/A
		How to protect against failure?		N/A
		PAG supports new system		N/A
PERFORMANCE STANDARDS				
8.1.1 Wildlife Tree Patches (indicator 6.9)	Yes			
8.1.2 Permanent Access Structures	Yes	Clarify what is included, define what is in and what is out.	Glossary in SFMP has been revised.	Yes
8.1.3 Reforestation	Yes	See comments related to indicator 6.29		N/A
8.1.4 Coarse Woody Debris (indicator 6.6)	Yes	Review how CWD storage impacts the use of permanent access structures (roads and landings), and/or coordinated use of roads (inter-industry)	Currently in the Fort St John DFA, CWD storage does not hinder use of permanent access structures. Harvesting slash is generally piled along side roads and burnt the following year.	N/A
8.2 Revised FOS requirements	Yes	Reinforce continued support for coordinated access planning.		N/A
		Access issues from stakeholders should be taken directly to participants.	Specific comments from the public will be addressed through indicator 6.60 (public Inquiries).	N/A
OTHER INDICATORS				
6.43 (Recreation Sites)	Yes	Participants have not dealt with going beyond the maintaining recreation sites other than the Crying Girl	The participants will review opportunities annually considering budgetary constraints.	Ongoing

SFMP REFERENCE	PAG SUPPORT (YES/NO)	PAG COMMENTS AND QUESTIONS	PILOT PARTICIPANTS RESPONSE OR INFORMATION	PARTICIPANTS ACCEPTANCE OF PAG INPUT
6.46 (Action plans for guides, trappers etc)	Yes	Reword to clarify consistency by parties, and define mutually agreeable with user groups	For clarification, consistency means no material difference between action item and timing as agreed to in the action plan.	N/A
		Use the words "follow through" instead of "consistency"		N/A
		PAG supports old Indicator # 30, and reword if necessary	Indicator and target have been reworded.	Yes
		Use this same line of thinking on the RANGE indicators too.	Indicator and target have been reworded.	Yes
6.47 (Volume of timber processed in DFA)	Yes			
6.54 (Dollars spent locally)	Yes			
6.55 (Tendered contracts)	Yes			
6.56 (conformance to SFM elements pertaining to treaty rights)	Yes			
6.57 (known traditional site-specific aboriginal values and uses)	Yes			
6.58 (public review and comment process)	Yes			
6.59 (TOR for PAG)	Yes			
6.60 (Public Inquiries)	Yes			
6.61 (STAC)	Yes			
6.5 (Snags/Cavity Sites)	Pending	Request participants to determine how much area this will apply to.		TBD
6.8 (Shrubs)	Yes			
6.11 (Species at Risk)	Yes			
6.12 (Caribou)	Pending	Request to refer to wildlife biologist and timber supply analyst.		TDB
6.13 (Coniferous Seeds)	Yes			

SFMP REFERENCE	PAG SUPPORT (YES/NO)	PAG COMMENTS AND QUESTIONS	PILOT PARTICIPANTS RESPONSE OR INFORMATION	PARTICIPANTS ACCEPTANCE OF PAG INPUT
6.14 (Aspen Regeneration)	Yes			
6.15 (Class A parks, ecological reserves etc)	Yes	Suggest adding "protected areas" to indicator and target for clarification.	Indicator and target have been revised in the SFMP.	Yes
6.16 (Consistency with objectives of WHA's and UWR's)	Yes	Suggest adding consistency with objectives of the Muskwa – Kechika management area.	Indicator and target have been revised in the SFMP.	Yes
6.17 (Representative examples of ecosystems)	Yes			
6.31 (LTHL)	Yes	Suggest target statement be revised to reflect a positive statement.	Target has been revised in the SFMP.	Yes
6.32 (Site Index)	Yes			
6.33 (Landslides)	Yes			
6.35 (Water Quality)	Yes			
6.37 (Spills)	Yes			
6.38 (MAI)	Yes			
6.39 (Total growing stock)	Yes			

Table 42: Summary of PAG Comments on Changes to Draft SFMP

SFMP REFERENCE	PUBLIC/AGENCY/STAC/AUDITOR COMMENTS AND QUESTIONS	PARTICIPANT RESPONSE
4.1 Harvesting	Suggestions for improving clarification and readability.	Input did not require significant changes to the intent of the draft SFMP. Edits will be incorporated to improve readability and clarity.
4.1 Harvesting	Suggestions for additional soil conservation indicators for soil productivity.	The participants will solicit input and suggestions from STAC and will consider additions to SFMP 2. The participants have included a description in the SFMP of EMS controls and measures for soil conservation.
4.2 Roads	Suggestions for improving clarification and readability.	Input did not require significant changes to the intent of the draft SFMP. Edits will be incorporated to improve readability and clarity.
4.3 Patch Size, Seral Stage and Adjacency	Suggestion to clarify section on Adjacency.	The participants will include the disapplication section 28(1)(b)(iv) of the FSJPPR (green up adjacency) to section 8 of SFMP. This will include rationale.
4.3 Patch Size	Suggestion that Interior Forest condition be considered in relation to mature patch size.	The participants have provided preliminary analysis of interior forest to the regional ecologist.
4.4 Riparian	Suggestions for improving clarification and readability. Suggests review of H60 application in Boreal Plains. Comment on 6.36 (ongoing monitoring of Stream bank integrity.)	Input did not require significant changes to the intent of the draft SFMP. Edits will be incorporated to improve readability and clarity.
4.5 Visual Quality Management	Suggestion for improving clarification regarding which area this strategy is applicable to.	The participants will update the SFMP to incorporate all known scenic areas and established VQO's and recommended Visual Quality Classes.
4.6 Forest Health	Suggestions for improving clarification and readability.	Input did not require significant changes to the intent of the draft SFMP. Edits will be incorporated to improve readability and clarity.
4.7 Range and Forage Management	Suggestions for improving clarification and readability.	Input did not require significant changes to the intent of the draft SFMP. Edits will be incorporated to improve readability and clarity.

SFMP REFERENCE	PUBLIC/AGENCY/STAC/AUDITOR COMMENTS AND QUESTIONS	PARTICIPANT RESPONSE
4.8 Reforestation	Suggestion to review survey data when available and adjust the target.	The participants have collected survey data and a preliminary analysis is complete. The participants will continue to work with the MOF to set target and variances for inclusion in the SFMP. Target will be higher than 85%.
4.8 Reforestation	Suggestion to enhance Mixedwood Management Strategy	SFMP commits the participants to have mixedwood stocking standards by Dec 2004. The SFMP also identifies key components of a mixedwood management strategy that will be developed.
6.1 Forest Type	Suggestions for improving clarification and readability of Targets	The participants will update the Target table.
6.6 Coarse Woody Debris	Ecological rationale for 50% of pre-harvest levels is unclear.	The proposed change to the performance standard is based on local data and achievement at a DFA level. The proposal is to improve administration of this standard. The participants will review the approach with the STAC and other technical experts and will consider revisions to SFMP 2.
6.9 Wildlife Tree Patch	Suggestions for improving clarification on contribution of non-productive forest to target establishment. Recommend higher level of WTP (up to 7%) for blocks greater than 500 ha regardless of LU target.	SFMP will be updated accordingly and targets adjusted.
6.12 Caribou	Suggestion to include linkage to SARA Recovery Plan	SFMP will include clarification that when they become available, the recommendations for caribou recovery plans will be incorporated into future SFMPs
6.38 Mean Annual Increment	Indicator does not capture carbon storage and update process.	SFMP will be updated to replace MAI indicator with carbon sequestration indicator.
6.39 Growing Stock	Indicator does not capture carbon storage and update process.	SFMP will be updated to replace Growing Stock indicator with carbon storage indicator.

Table 43: Summary of Comments from STAC, MoF, MWLAP, and MSRM

Fort St John Pilot Project Summary of Comments: Sept 22 draft SFMP			
SFMP Reference	**Source**	**Comments and Questions**	**Participant Response and Revisions to SFMP**
1.2.3 Graham River IRM Plan	MOF, WALP	Clarify intent of GRIRMP. Graham indicators OK-suggest clarifying intent.	SFMP Section 1.2.3 GRIRMP revised to quote plans objective.
1.3.1 Description of the Landscape Units	MOF, MOF-Region	Table 2 - Revise table to clarify visual objectives in Alaska Hwy and other areas, and expand timber objective 5.	Visuals objectives which were similar had been lumped. Split out highway corridor and revised applicable LU's accordingly as per Regional comments.
3.4 Effectiveness Monitoring	STAC	Develop stronger link of strategic to operational planning with an effectiveness monitoring and adaptive management strategy.	Participants will prioritize in the SFM Investment Plan committed to in the SFMP.
4 Landscape level strategies	MOF	Suggestion to clarify landscape level strategies and performance indicators that are being submitted for approval.	SFMP revised to provide clarification on which indicators affect Part 3 Division 5 of the FSJPPR, which indicators will be used for evaluating success of the strategies (Section 42 FSJPPR).
4.1 Harvesting	MOF, STAC	Soil Conservation - suggestions for additional soil conservation indicators for soil productivity.	The participants will solicit input and suggestions from STAC and will consider additions to SFMP 2. The participants have included a description in the SFMP of EMS controls and measures for soil conservation.
4.1 Harvesting	MOF	Strategy #4 - clear direction to operate within a range of criteria that define what is commercial.	SFMP revised to include: "The participants will operate in stands consistent with merchantability criteria outlined in the Fort St. John Timber Supply Analysis Report (Table A-10)".

Fort St John Pilot Project Summary of Comments: Sept 22 draft SFMP			
SFMP Reference	**Source**	**Comments and Questions**	**Participant Response and Revisions to SFMP**
4.1 Harvesting	MOF	Strategy #4 - questioned whether small pine should be 10%/110,000 m3.	Page 39 of the rationale for AAC determination, the Chief Forester states "I also hold the expectation in this determination that of this, 100,000 m3/year will be harvested from small pine stands, although at this time I will not partition to these areas". The document indicates that the total coniferous AAC is 1,200,000 m3. The small pine portion therefore is expected to be approx. 8% of the total coniferous AAC. Reference to 110,000 m3 small pine in other portions of the document are in reference to the base case harvest level (which is 1,804,000 total coniferous), prior to the Chief Forester's consideration of downward pressures, therefore no change is proposed to the SFMP.
4.1 Harvesting	MOF	Strategy #5 - clarify Modified Shelterwood reference.	Added modified shelterwood to glossary. Revised wording: "Modified shelterwoods will be employed in deciduous logging to protect coniferous understorey on an operational trial basis, consistent with the reforestation strategy".
4.1 Harvesting	MOF	Strategy #6 - clarify intent	Changed: "Harvest plans will be designed to maintain conventional ground based harvesting systems as a consistently high proportion of total harvesting systems, in order to minimize cost fluctuations, and support contractor stability."
4.1 Harvesting	MOF	MKMA - need to be consistent with BOTH the Act and the management plan.	As the management plan references LRMP objectives, and the plan addresses these, we believe the strategy is consistent with both Act and plan.

Fort St John Pilot Project Summary of Comments: Sept 22 draft SFMP			
SFMP Reference	**Source**	**Comments and Questions**	**Participant Response and Revisions to SFMP**
4.1 Harvesting	MOF	Strategy #10 - unclear whether this strategy is proposing other areas in the Graham OR within other LU's; as an amended GRIRMP or as a separate plan? Where will this occur? Why the distinction with the Omineca portion?	Strategy states it's in the MKMA, which includes the Sikanni and Graham LU's only. Plans would be stand alone and may be on a drainage by drainage basis. Omineca portions of Graham LU coincides with the GRAHAM IRM Plan boundary that falls within the MKMA, which is the portion that has the existing clustered harvesting plan. No changes required in SFMP.
4.2 Road Access Management	MOF	Clarify introduction of this piece.	SFMP introduction has been revised.
4.2 Road Access Management	MOF	No apparent commitment or attempt to account for oil and gas roads or disturbances or to undertake the strategies listed in section 4.2.	Participants are proactive with their relationship with the oil and gas sector. The oil and gas sector is not obligated to the SFMP. No change to the SFMP.
4.2 Road Access Management	MOF	Statement that the LRMP recommended a coordinated access management plan be undertaken for the high and moderate intensity LU's, evidently this was not a priority in the SFMP.	The LRMP primary objective found in the majority of the RMZ's was to coordinate access and linear development to minimize negative effects on other resource values. A suggested LRMP strategy might have been to develop a coordinated access management plan however the participants cannot impose the landscape level strategies described in this SFMP onto other parties. We have attempted to be as proactive and transparent as to what our access plans are and to share these as broadly as possible with the anticipation that this would support achieving the LRMP objective of coordinated development. No changes to the SFMP.

Fort St John Pilot Project Summary of Comments: Sept 22 draft SFMP			
SFMP Reference	**Source**	**Comments and Questions**	**Participant Response and Revisions to SFMP**
4.2 Road Access Management	MOF	The objective associated with Strategy 1 appears to indicate two things, that we will limit our THLB losses from permanent access structures within blocks and two, will not be held accountable for losses incurred by other users. There is the potential for overestimating forest landbase and associated timber supply. Clearly none of the DFA provides exclusive control to the partners to use the land, it implies that sustainability of the forest resource isn't planned, it is merely accidental if it occurs. Revisit the objective.	This SFMP is only applicable to the participants and although we are well aware of additional losses occurring on the DFA as a result of other industrial activity, it is something we do not directly control. In order to be able to achieve the first strategy it must be restricted to those activities we have control over however disturbances on our blocks as a result of other industrial activity is also measured but not reported under this strategy. These additional losses to the forest landbase have normally been captured in TSR reviews and it anticipated they will continue to be captured in this manner and no change to this strategy would alter that. No change to the SFMP
4.2 Road Access Management	MOF	Strategy 2 - how will partners address increasing requests for PDR's, not consistent with LRMP.	Participants are not responsible for approving PDR requests. Transferring road responsibilities from ourselves to another sector without us having to permanently deactivate the road first meets with LRMP goals to coordinate access and deactivation. No change to SFMP.
4.2 Road Access Management	MOF	Strategy 2 - good strategy, but how do you measure success?	See indicator 6.40, which has been revised for clarification.
4.2 Road Access Management	MOF	Strategy 3 - What time period is being used to calculate the maintenance of primitive ROS over time? Is it possible to maintain.	ROS calculations will be performed with every FOS preparation in order to use the most current information. It is believed that the ROS primitive can be maintained for our operations solely however oil and gas activities that are approved in the area may jeopardize this. No change to SFMP.
4.2 Road Access Management	MOF	Strategy 3 - problem with table, has rural in 1996 table and roaded in the 2003 table.	Tables have been corrected to reflect that the category is roaded.
4.2 Road Access Management	MOF	Does Table 3.1 reflect only forestry activities? How is oil and gas activity factored into this table or in the calculation of ROS?	Table 3.1 includes all disturbances found within these areas regardless of nature, including oil and gas therefore reflected in the ROS calculations.

Fort St John Pilot Project Summary of Comments: Sept 22 draft SFMP			
SFMP Reference	**Source**	**Comments and Questions**	**Participant Response and Revisions to SFMP**
4.3 Adjacency	MOF	Concern about how adjacency will be addressed through seral and patch targets	Clarified strategy and added section in section 8 to dissapply Section 28 (1)(b)(iv) of field performance standards.
4.4 Riparian Management	MOF	Major River Corridors - logging method is not necessarily as important as the % retention. One hectare or less within 100 m of the RRZ could, in fact, occupy the entire 100 m. Is there some maximum strip width? Similarly, for visual screening, what strip widths will be used given the riparian flora typical of area.	There is no maximum strip width, or width for visual screening, as these are site specific decision. The intent is to be consistent with the LRMP objectives to maintain non timber values (as noted in the indicator write-up) but the nature and significance of these values will vary from site to site. The spatial distribution will be addressed in the SLP, which can be requested by the district manager through the notification requirements of the pilot regulation. No change in the SFMP is required.
4.4 Riparian Management	MOF	Strategy #2 - concern about logging around streams, and appropriateness of referring to stream crossing procedures as protection for riparian values.	No change intended to stream protection requirements in regulation. Indicator "current status" clarifies the relative proportions of small stream classifications in blocks, with most being S6's, and only a very few being S4's. Reworded strategy to clarify that intent is site specific assessments of smaller streams to reflect variable stream values and ground conditions, and clarify that addressing stream crossings according to procedures previously agreed to by WALP will supplement the site specific assessments.
4.6 Forest Health Management	MOF	Forest health definition. Principles and objectives clarified.	Regional and Forest Practices Branch specialists support SFMP definition by participants; no citation is required. Principles and objectives are clarified.
4.6 Forest Health Management	MOF	Strategy # 1 - suggest adding "prevent"	The concept of "prevent" is inappropriate in this strategy since the application of "coarse filter" principles such as IFHM cannot block or prevent pests on a large multi-resource user landscape. Thus retaining the strategy wording to "minimize potential of catastrophic damage" is the best IFHM can do.

Fort St John Pilot Project Summary of Comments: Sept 22 draft SFMP			
SFMP Reference	**Source**	**Comments and Questions**	**Participant Response and Revisions to SFMP**
4.6 Forest Health Management	MOF	Suggest cooperation with governments when emergency pest occurrences found.	SFMP revised to indicate participants do contact governments in the event of alien invasive pests found – See Current Status under Indicator 6.25.
4.6 Forest Health Management	MOF	Editorial wording, consistency, references and changes to Table 26.	SFMP revised accordingly.
4.6 Forest Health Management	MOF	Suggestion to develop more complex and suitable indicators to measure performance of forest health issues.	SFMP does not address this explicitly since this would require very detailed stand and landscape level knowledge of damage impacts, which will require high cost intensive monitoring and extensive research. However, the SFMP focuses on the results of forest productivity and resilience including the attribution of which damage agents affect the sustainability parameters, versus focusing on the performance of actual forest health issues (translated – it means no. of hectares affected, how severely and how much treated etc.). Continuous improvement may lead the participants do this for some damage agents.
4.6 Forest Health Management	MOF	Appendix 3 - Very little planned to monitor effects of insects and disease.	SFMP GY monitoring process will attribute damage agents, but no other explicit larger “pest monitoring” protocol is planned due to low benefit cost, and the extreme variability in pest populations requires costly sampling that is currently not warranted in this DFA.
4.6 Forest Health Management	MOF	Indicator - “no interim strategy proposed”, and “no risk management classification”.	SFMP addresses interim strategy in the Current Status, and SFMP commits to a risk classification by April 2005.
4.6 Forest Health Management	MOF	No pest forecasting.	SFMP cannot address this since there is no historical information and there are no models able to do this; nor is it warranted given current or projected conditions and risk potential.
4.6 Forest Health Management	MOF	Editorial, missing information Table 25 and 26. Armillaria not included?	SFMP amended accordingly. Armilliaria is excluded, as it is not a damage agent of any concern.

Fort St John Pilot Project Summary of Comments: Sept 22 draft SFMP			
SFMP Reference	**Source**	**Comments and Questions**	**Participant Response and Revisions to SFMP**
4.6 Forest Health Management	MOF	Notification of MOF for high risk situations.	SFMP amended accordingly.
4.7 Range and Forage Management	MOF	Domestic Crown range use; LRMP priority; potential for noxious weeds.	SFMP amended accordingly.
4.7 Range and Forage Management	MOF	Range and forage management issues (numerous in landscape level strategy #1 and # 2).	SFMP amended accordingly.
4.7 Range and Forage Management	MOF	Indicator 6.41 - CRMP phase-out, add "removal of natural barriers" to Strategy # 2.	SFMP amended accordingly.
4.7 Range and Forage Management	MOF	Indicator 6.42 - editorial.	SFMP amended accordingly.
4.8 Reforestation	MOF / MSRM / STAC	Suggestion to enhance Mixedwood Management Strategy.	SFMP commits the participants to have mixedwood stocking standards by Dec 2004. The SFMP also identifies key components of a mixedwood management strategy that will be developed.
4.8 Reforestation		Suggestion to review survey data when available and adjust the target.	The participants have collected survey data and a preliminary analysis is complete. The participants will continue to work with the MOF to set target and variances for inclusion in the SFMP. Target will be higher than 85%.
6.1 Forest Type	MOF	Error in calculation of some targets	Revised targets.
6.2 Seral Stage	MOF	Suggest allowing some variance around amount of >140 year old forest in low and moderate forest management intensity zones to allow young natural forest to persist.	Updated acceptable variance.

Fort St John Pilot Project Summary of Comments: Sept 22 draft SFMP			
SFMP Reference	**Source**	**Comments and Questions**	**Participant Response and Revisions to SFMP**
6.3 Patch Size	MOF, WLAP	Concern that mature patch does not address interior forest condition. Clarify contribution of Sb to mature patch.	Added info about interior forest. Provided clarification is Patch indicator on contribution of Sb (~184,000 ha of Sb contributes or 16% of all Sb).
6.6 CWD	MOF- FD/WALP	1. Indicator appears to reflect conifer, not deciduous (or mixedwood), CWD volume. Need to identify target for each timber type (or species group?). 2. Confirm that the volume range is correct (i.e., 590m3/ha) and identify what CWD volume measures include. 3. Targets should be set for different types eg. mixedwood/deciduous/ coniferous.	2. The 590 m3/ha is from page 7 table 4 of Natural Disturbance Unit Descriptions-Delong. Not comparable to merchantable volume, as that includes only current volumes net of utilization standards and DWB, CWD includes gross volume which may accumulate through time. The natural range quoted is the best available information for BC Interior forests, as we could find no reference for the FSJ TSA area. 1 and 3: The intent of this indicator is to facilitate administrative requirements to quantify CWD volume retention. We are proposing to put an actual overall ongoing measured volume to CWD retention, however we are not going to measure CWD on every block or every type, since it is cost prohibitive to get reliable numbers if you overstratify your sample. Note that from the existing data set referenced, of the 27 blocks, 2 mixedwood blocks are included, which is proportional to the amount of mixedwood harvesting versus coniferous harvesting being logged at present. The 2 mixedwoods, A59303 and A56946 had 57m3/ha and 125.2m3/ha preharvest CWD, which is consistent with the other blocks CWD levels. 6 deciduous blocks in Alberta that we have post harvest CWD survey results showed an average 75.7m3/ha, ranging from 40.9 to 112.4 m3/ha., which suggests deciduous stands fall in generally similar ranges of CWD. No change in SFMP plan.

Fort St John Pilot Project Summary of Comments: Sept 22 draft SFMP			
SFMP Reference	**Source**	**Comments and Questions**	**Participant Response and Revisions to SFMP**
6.6 CWD	WALP	With large natural range and so many unknowns, Plan should not be managing to the minimum.	The plan is not managing to the minimum. A range of CWD is and will continue to be retained, but this is very difficult to quantify. The indicator target is the proposed minimum compliance value that the participants are committing to at least achieving over the DFA, and is intended as an indicator of the relative success of the participants measures to retain CWD.
6.6 CWD	WALP	Strategies that may be used in SLP's should be documented in the plan, and should reflect accepted research recommendations and/or the Provincial *Short Term Strategy (*1999) recommendations.	While site level plans are the appropriate place to determine which measures should be included on a given site, the SFMP has been modified to provide strategic guidance and principles consistent with the short term strategy.
6.7 Riparian Reserves	MOF, WALP	Notification to government not sufficiently timely	Revised monitoring section of SFMP indicator to clarify prompt notification will be made to government of non-compliances.
6.8 Shrub	MOF	Flexibility around target.	Adjust acceptable variance +/- 20%.
6.9 WTP's	MOF	Methodology does not use BEC variants?	LU's largely designed to follow NDT boundaries. The TSA has relatively gentle topography in most areas, and BEC variant mapping is considered to have a low reliability as a result. Consequently developing WTP targets by BEC variant within each LU in the FSJ TSA is a low value, administratively burdensome layer. Other indicators in the SFMP help maintain representativeness. No change to SFMP.
6.9 WTP's	WALP, MOF	Unclear on what stands included. Clarify whether WTP % reflects THLB or forested land base.	Revised contribution of non-contributing forest. Only productive forest as per seral requirements used in TSR 2 was used to determine proportion of THLB vs. non-THLB. (NP Sb was excluded.) SFMP has been revised to make some minor changes to WTP targets as a result of refinements to the calculation base- information provided at the roundtable meeting. WTP indicator updated to clarify contributing stands.

Fort St John Pilot Project Summary of Comments: Sept 22 draft SFMP			
SFMP Reference	**Source**	**Comments and Questions**	**Participant Response and Revisions to SFMP**
6.9 WTP's	MOF , WALP	"Dash distance" misleading, add in length of time WTP's retained.	SFMP revised to clarify distribution of WTP's, remove reference to dash distance, and to include WTP's for full rotation.
6.9 WTP's	MOF	Recommended changing large opening criteria to 500 ha and a minimum of 7% WTP regardless of LU.	SFMP revised to replace at least minimum WTP % for LU in blocks >100 ha, with a criteria of at least 7% for all blocks over 500 ha.
6.9 WTP's	WALP	Concerned NHLB will be used disproportionately used identifying WTP's.	Not the intent - only trying to point out that some NHLB may be included as a portion of WTP's, if they meet the other criteria. Revised the SFMP wording to address this item.
6.9 WTP's	WALP	Concerned about emphasis on external WTP's, and indicated external patches are only of value to wildlife if they contain attributes such as those described in policy.	Intent is to indicate WTP's which may be joined to the block boundary provide some benefits, and as long as they provide suitable habitat elements or protect specific features they are meeting the objectives. Note WTP objective in this plan is not solely to provide attributes in policy, but more significantly to provide sources of habitat elements (as described by Bunnell) through time. Modified SFM indicator wording somewhat to reduce perceived emphasis on external WTP's.
6.10 Noxious Weeds	MOF	Add in marsh plume thistle, and allow flexibility to add to list as per District Manager direction.	SFMP and appendices revised to include weed, and provide for changes.
6.24 Permanent Losses	MOF	Planned road and landing development will not be 'disproportionate' to the area harvested, need to define in this context.	SFMP has been amended to define disproportionate a little better to include the following: <u>In other words, the prescribing forester will only plan what is necessary to get the entire block harvested, typically larger blocks require less overall development percentage wise as opposed to smaller blocks</u>. The word 'cumulative' in the target statement and in the text has been replace with the word 'aggregate' to avoid confusion with any tie-in to 'cumulative impact studies'

Fort St John Pilot Project Summary of Comments: Sept 22 draft SFMP			
SFMP Reference	**Source**	**Comments and Questions**	**Participant Response and Revisions to SFMP**
6.24 Permanent Losses	MOF	OK with strategy but wished to include the current wording in regulation that if the proposed harvesting plan for a cutblock exceeds 7%, district manager approval must be obtained.	The overall intent of the SFMP is to manage more on a landscape basis or larger scale as opposed to the current block by block focus. To include this wording defeats the purpose of managing more globally, by proposing a more stringent target the participants wish to retain the right to manage this target more strategically.
6.34 Peak Flow Index	MOF	Concern about definition of PFI and lack of monitoring to determine if target is appropriate.	SFMP updated to clarify PFI definition. Adjusted monitoring section to include review of target appropriateness.
6.36 Protection of Streambanks	WALP	Conformance does not indicate if values protected.	Not proposing any change to existing regulatory compliance S28 g(5). RPF's use professional judgment based on local site conditions on the degree and type of protection. Effectiveness monitoring will address the degree to which it is successful. No change to SFMP.
6.36 Protection of Streambanks	MOF	Reporting of non compliances reported to government officials promptly.	SFMP revised to promptly report to officials.
6.40 Coordinated Developments	MOF	Under variance, suggest that a relative measure could be applied and also unclear as to how to define success.	No change to the indicator as this is a reporting indicator only and no relative measure is necessary. This indicator has been revised slightly to better define what we would include as successful coordination.
6.40 Coordinated Developments	MOF	Questioning statement contained within indicator that states that coordination of developments would diminish the THLB reduction, cite source and is it realistic.	The LRMP has stated that coordination of access is necessary and to sustain the THLB policies should be developed to reduce losses to the THLB due to roads, landings, seismic lines, wellsites and other developments. Although there is no supporting evidence at this stage there is circumstantial evidence that where joint coordination has been successful like in the Tommy Lakes LU that additional road construction has been eliminated thus potentially reducing the losses to the THLB. Therefore we believe that the statement is true and it is realistic.

Fort St John Pilot Project Summary of Comments: Sept 22 draft SFMP			
SFMP Reference	**Source**	**Comments and Questions**	**Participant Response and Revisions to SFMP**
6.40 Coordinated Developments	MOF	How does the statement regarding pre-tenure plans being a requirement of the MKMA useful and how is this being addressed in the SFMP for areas outside of the MKMA?	The intent of this statement is to show that the oil and gas industry for activities within the MKMA must provide evidence of consultation with other industrial users in the area regarding their activities or future plans, including the forest industry. Although this requirement of the oil and gas industry does not go beyond the MKMA area it does demonstrate that they must engage other industrial users. It just goes to show that the oil and gas sector does have some obligations that must be adhered to even though this SFMP does not apply to them.
6.40 Coordinated Developments	MOF	What are some incentives for oil and gas industry to coordinate access with partners?	Although the SFMP does not delve into incentives, the participants continue to be proactive in their dealings with the oil and gas sector in our attempts to identify the benefits of one single database for maintaining a comprehensive road management infrastructure.
6.44 VQO	MOF	Beneficial to present a summary of post harvest reviews.	SFMP revised to include brief summary.
6.44 VQO	MOF	VQO definition incorrect.	Revised SFMP consistent with Visual Impact Assessment Guidebook.
6.44 VQO	MOF	VIA a requirement prior to harvesting in areas with established VQO's.	Results based pilot regulation does not require a preharvest VIA, only consistency with established VQO's. VIA's are likely to be completed in most cases as due diligence, but in some cases foresters may decide they are not needed, if it is obvious that VQO's will be achieved anyway. No change to SFMP.
6.44 VQO	MOF	Change variance to reflect requires rationale and approval of statutory decision maker.	SMFP revised accordingly to provide rationale and approval of DM.
6.44 VQO	MOF	Include scenic areas without established VQO's.	Revised figure to show other scenic areas, as well as strategy and indicator text as per regional suggestion on strategy to include visual design techniques in designing blocks in these areas.

Fort St John Pilot Project Summary of Comments: Sept 22 draft SFMP			
SFMP Reference	**Source**	**Comments and Questions**	**Participant Response and Revisions to SFMP**
6.45 ROS	MOF	Variance - over what period will ROS be reported? Clarify.	This has been clarified in the indicator write-up, but essentially will be within the term of the FOS up to 6 years.
6.45 ROS	MOF	What roads and activities are included in the ROS calculations? Clarify	In the preparation of a FOS the most current ROS condition for each RMZ will be analyzed which would include the most current disturbances by all industries.
6.48 Summer/Fall Volumes	MOF	Unclear on variance.	This is a business related objective to ensure sufficient cost effective wood supplies are available to operate the mills. If mills are closed for extended periods, there is less need for wood, so inventories in general and summer harvesting particularly may be reduced. No change.
6.52 Timber Profile	MOF	Beneficial to include some discussion regarding harvesting priorities within the profile i.e. diseased, damaged, overmature, etc.	Clarified profile section by adding following: "Harvest priorities will be significantly influenced by seral stage and patch size strategies, as well as the salvage strategies outlined in section 6.26."
6.56 and 6.57 First Nations	MOF	McLeod Lake, provide clarifications.	McLeod Lake FN does not have territory north of Peace River. SFMP indicators 6.56 and 6.57 clarified.
6.56 and 6.57 First Nations	MOF	Add description of MOA's.	MOA's are only specific to two deciduous licensee participants at this time and it does not seem appropriate to further expand the functions and process of the MOA's in the text. Clarification may be arranged through other means.
8.2 FOS Changes	MOF Region	Concern that our statement regarding replacement structures is inadequate to meet the regulations.	The OSPR is currently silent on the requirements for replacement structures. Our requested change is in keeping with this and to eliminate our current need to identify these on the FOS but provide detours where possible and keep delays to a minimum. The FOS will continue to identify on our maps the location of new proposed road construction including the location of bridges or major culverts associated with the new construction.

Fort St John Pilot Project Summary of Comments: Sept 22 draft SFMP			
SFMP Reference	**Source**	**Comments and Questions**	**Participant Response and Revisions to SFMP**
8.2 FOS Changes	MOF Region	The wording under General Deactivation Measures are not valid since the Code only recognizes permanent deactivation and the bullets specify less than what is required for deactivation under Section 15 of the Forest Road Regulation.	The Forest Road Regulation has been disapplied under the FSJPPR therefore the intent of these general deactivation measures in the SFMP is to eliminate the need to include this within the FOS as the FOS must be consistent with the SFMP. We have not changed any performance requirement that is currently applicable to road deactivation in the FSJPPR.

Table 44: Summary of Comments from First Nations

SFMP REFERENCE	PUBLIC COMMENTS AND QUESTIONS	PARTICIPANT RESPONSE
FN – BRFN	**Wildlife:** The BRFN rely on moose as the main staple food in their diet. All forestry practices must take into account the need to enhance wildlife browse and shelter. Blocks must be structured to create forage for ungulates and small mammals. The availability of moose to FN is critical to their existence. All best management practices must be incorporated into planning for all wildlife species.	The SFM Plan contains the following approach to address wildlife concerns: 1. SFMP is approved by both government agencies responsible for forest management (MOF), and wildlife management (plus water, air and pesticide) (MWALP). 2. Indicator 6.56 (Treaty rights) with respect to wildlife, reflects on the need to sustain habitat *via* CSA SFM Element 1.1 Ecosystem Diversity as measured by the following Indicators; 6.2 (seral stage), 6.3 (patch size), and 6.4 (shape index); and the CSA Element 1.2 Species Diversity as measured by the following relevant 'habitat element' Indicators; 6.5 (snags), 6.6 (coarse woody debris), 6.7 (riparian reserves), 6.8 (shrub habitat) and 6.9 (wildlife tree patches). 3. Indicator 6.57 (Aboriginal values in operational planning) addresses site-specific values such as wildlife that may require modified approaches.
FN – BRFN	**Permanent Access:** The amount of roads in NE BC is astronomical. It is imperative that forestry and oil/gas sector work closely with one another with respect to future road layout and planning. The amount of permanent access roads must be limited. These all-weather roads allow hunters and recreationists into areas that were once pristine. In order for remaining areas to be less developed, we must use existing structures already in place.	The SFM Plan contains the following Landscape Level Strategies and Indicators to address permanent access concerns: • Strategies # 2 and 3, and Indicators 6.40 and 6.45 of the Road Access Management LLS address the issue of managing the amount and condition of permanent access in the DFA.
FN – BRFN	**Pesticide Spraying:** Treaty 8 FNs are heavily opposed to the spraying of pesticides. The amount of pesticides used in BC must be significantly reduced and/or eliminated. Many FN are opposed to pesticides because of the toxicity to plants and other resources, i.e., water. BRFN has expressed their frustrations to the Ministry about the use of pesticides within their area of interest. The Ministry has provided no further information to the BRFN.	The SFM Plan contains the following to approach to address the concern: 1. SFMP is approved by both government agencies responsible for forest management, and pesticide management (plus water, air and wildlife) (i.e., MOF and MWALP, respectively). 2. Indicator 6.57 addresses the need to identify and develop operational plans (including SLP's and PMP's) that are sensitive to known site-specific First Nations values.

SFMP REFERENCE	PUBLIC COMMENTS AND QUESTIONS	PARTICIPANT RESPONSE
FN – BRFN	**Reclamation:** Best management practices must be used with respect to reclamation. Areas, which are harvested, must be reclaimed back to their natural state.	The SFM Plan contains the following to address concerns about reclamation: 1. CSA SFM Criterion 1 'Conservation of Biodiversity' its Elements 1.1-1.4 inclusive broadly address the interest that harvested areas are brought back to a natural and sustainable state. 2. Strategy # 1 of the Road Access Management LLS prescribes the percent area remaining in 'permanent access structures' as 5%, which is down from 7% (or ~71.5%) from pre-FSJPPR performance standard. 3. The Reforestation LLS also addresses the issue of reclamation through the evaluation of Establishment Delay (Indicator 6.30) and Reforestation Assessment (Indicator 6.29).
FN – BRFN	**Traditional Use Studies:** The BRFN would like to see forest companies fund more traditional use studies. This would allow FNs to go out and assess the land for community use areas. Currently, oil/gas companies provide funding for FN elders and monitors to go and assess any potential sensitive areas. The BRFN would like to see this same process applied to the forestry sector.	The SFM Plan addresses the potential for using TUS-type information in the following way: • The Strategy and Implementation Schedule of Indicator 6.57 identifies TUS information as one means for establishing or validating First Nations values during the development of operational site-specific plans.
FN – HRFN	**General Comment**: The HRFN forestry advisor wrote, "I…finished the SFMP (review) and everything looks good."	Not applicable.

8. CHANGES IN REQUIREMENTS

The participants must ensure that the sustainable forest management plan includes any applicable performance standards that are to be used for the purposes of Part 3 Division 5 and the associated Schedules.

8.1. REVISED FIELD PERFORMANCE REQUIREMENTS

8.1.1. Wildlife Tree Patch Retention Levels

Pursuant to Section 35(6) of the FSJPPR, this SFMP proposes to revise the Applicable Performance Standard relating to wildlife trees and wildlife tree patches in Section 29(1) of the FSJPPR. For the purposes of 29(1) of the FSJPPR the applicable performance standard is specified by the indicator statement, target statement and acceptable variance in section 6.9 of this SFMP.

Currently the WTP retention performance requirement is the approved WTP levels indicated in the forest development plans for all but one participant. For those participants with approved FDP's, the WTP levels were calculated separately for deciduous and coniferous landbases, and were based on either operating areas (for the coniferous licencees) or the old landscape units (for the BCTS program and the deciduous licensees). The one licensee without an approved FDP would default to the 4% standards in Section 29(1)(b).

In order to facilitate landscape level management on a common platform by all participants, this SFMP proposes that WTP retention levels be consistent between participants and apply to the landscape units. The criteria are outlined in section 6.9 Wildlife Tree Patches. The base calculations used the process outlined in Table 20 (a) and (b) of the biodiversity guidebook, with modifications upwards in some landscape units to address lower forest management intensities, or minimum natural retention ranges outlined by Delong (2002).

The proposed revision requires a cumulative calculation of all identified WTP's in a landscape unit, included in blocks harvested since the inception of the FSJPPR.

The minimum targets would be as follows:

LU	WTP %
Blueberry	6%
Halfway	3%
Kahntah	7%
Kobe	5%
Lower Beatton	8%
Milligan	6%
Tommy Lakes	3%
Trutch	5%
Sikanni	4%
Graham	4%
Crying Girl	6%

Refer to Appendix 14.

The WTP % applies to the cumulative percentage of all blocks logged by participants under the FSJPPR in each landscape unit, which will be reported in annual reports.

October 2004 and subsequent annual reports: Reporting of Cumulative Actual WTP% by LU in annual report, for all pilot project blocks on which harvesting commenced from November 15, 2001 to March 31 of the reporting year.

Rationale

Although the FSJPPR does not require rationale for Applicable Performance Standards, the following is provided for background information.

Equivalent Protection

This revised Applicable Performance Standard provides equivalent or better protection that the current APS and Field Performance Requirements for the following reasons:

1. The average WTP minimum retention level is greater than the average WTP levels in the APS

2. Higher WTP retention levels are being proposed for the Kahntah, Lower Beatton, Milligan, Sikanni, Graham, Trutch and Crying Girl LU's , because table 20(b) was used to provide for less risk to biodiversity in these moderate and low forest management intensity zones.

3. Higher WTP levels than were calculated using Table 20(a) are also proposed for the Halfway and Tommy Lakes LU's, to increase the retention levels to a minimum 3%, consistent with the lower end of retention noted by Delong (2002)

4. Managing to one level for all participants minimizes current issues related to which standard applies, as when different participants harvest blocks immediately adjacent to each other.

Consistency with the Preamble to the Code

The development of a CSA-Z809/SFMP incorporating the six criterion and indicators provides assurance that the participants are managing the forests based on sustainable use for all British Columbians.

Adequate Management and Conservation of Forest Resources

The calculation of WTP retention levels is based on procedures outlined in the biodiversity guidebook. The only changes to the levels of retention relative to the biodiversity guidebook levels require increasing the retention levels, consequently the participants believe this change to field performance requirements contributes to adequately managing and conserving forest resources.

8.1.2. Permanent Access Structures

Pursuant to Section 35(5) of the FSJPPR, this SFMP proposes to replace the current Field Performance Requirements in relation to permanent access structures described in Section 30(1)(b) of the FSJPPR. For the purposes of Section 30(1) of the FSJPPR the performance requirement is specified for the indicator statement, target statement and acceptable variance in section 6.24 of this SFMP.

The current performance requirement for all participants in respect to the level of permanent access structure remaining in a cutblock at the end of harvesting operations is as follows; a participant or holder of a timber sale license must not cause the proportion of the cutblock area occupied by permanent access structures to exceed 7% of the total cutblock area. Section 25 of the FSJPPR allows the participant to request a variance to the District Manager in respect to this requirement subject to meeting the requirements of this section and if the District Manager is satisfied that implementing the variance will adequately manage and conserve the forest resources on the area affected by the application or the variance is necessary for the safety of the public.

This SFMP proposes a new performance requirement (see indicator 6.24) that will allow the proportion of permanent access structures to be measured on a larger scale, albeit not a landscape level approach but a better approach then the current block by block basis. This new standard will also allow greater flexibility in cutblock development to all participants, eliminate the use of Section 25 requesting variances and proposes a lower percentage which will reduce the losses of productive forest land.

The proposed performance requirement will measure by managing participant the cumulative area in all cutblocks occupied by permanent access structures in proportion to the total cumulative area harvested in which harvesting was completed during the annual reporting period.

Equivalent Protection

This revised Field Performance Requirement provides equivalent or better protection that the current APS and Field Performance Requirements for the following reasons:

1. The proposed maximum level of permanent access structures that will be constructed on the landbase and reported annually will provide equivalent protection to the current standard. The measurement process has been modified to be more reflective of the cumulative impact of multi-block (quasi landscape level) than the current individual block (stand level) measurements on permanent access structures.

2. The proposed maximum level for compliance purposes is lower than the current standard.

Consistency with the Preamble to the Code

The development of a CSA-Z809/SFMP incorporating the six criterion and critical elements as approved by the Canadian Council of Forest Ministers and the development of our objectives, indicators and targets as provided by our public advisory group should

provide that assurance that the participants are managing the forests in the defined forest area based on the ethics of sustainable use for all British Columbians.

Adequate Management and Conservation of Forest Resources

The calculation of permanent access structure levels has been modified to be more reflective of a multi-block approach versus a single block approach and the allowable percentages have been reduced. The definition of permanent access structures has not been modified and this new standard eliminates the need to request district manager variances but requires that the participants adhere to the new allowable percentage. Therefore the participants believe this change to field performance requirements contributes to adequately managing and conserving forest resources.

8.1.3. Reforestation

Coniferous Areas:

Pursuant to Section 35(5) of the FSJPPR, this SFMP proposes to revise the Field Performance Requirements relating to reforestation of coniferous areas in Section 32 of the FSJPPR.

For the purposes of Section 35(5)(a) of the FSJPPR the Landscape Level Reforestation Strategy will disapply Sections 32(1), (3), (4), (5), (6) and (8) for coniferous areas logged after November 15, 2001. The above will also apply to coniferous areas with commencement dates before November 15, 2001 if the participant currently carries reforestation liability and has submitted a statement to the district manager that the cutblock(s) will be subject to the SFMP under Section 42 of the FSJPPR.

The following components of the LLRS will be subject to Section 42 of the FSJPPR:

- 6.29 Reforestation Assessment
  - For the purposes of Section 35(5) of the FSJPPR this indicator statement, target statement and acceptable variance will be used in replacement of the portions of affected section 32 of the FSJPPR through the application of the landscape level strategy for coniferous areas logged after November 15, 2001. This will also apply to coniferous area in cutblocks with commencement dates before November 15, 2001 if the participant currently carries reforestation liability and has submitted a statement to the district manager that the cutblock(s) will be subject to the SFMP under Section 42 of the FSJPPR.

    For the purposes of Section 42 of the FSJPPR this indicator statement, target statement and acceptable variance will be used to determine if forest practices are consistent with the landscape level strategies for coniferous areas.
- 6.30 Establishment Delay
  - This indicator statement, target statement and acceptable variance will be used as a new performance requirement through the application of the landscape level strategy for coniferous areas logged after November 15, 2001.

    For the purposes of Section 42 of the FSJPPR this indicator statement, target statement and acceptable variance will be used to determine if forest practices are consistent with the landscape level strategies for coniferous areas.

- Appendix 6 (only applies to coniferous area)
  - For the purposes of Section 35(5) of the FSJPPR Appendix 6 Sections 1.1 Definition, Use of Seed and Use of Livestock, 1.2.2 Free from Vegetative Competition, and 1.3 Stocking Requirement for Conifer Crop Trees will be used in replacement of the portions of affected section 32 of the FSJPPR through the application of the landscape level strategy for coniferous areas logged after November 15, 2001. This will also apply to coniferous area in cutblocks with commencement dates before November 15, 2001 if the participant currently carries reforestation liability and has submitted a statement to the district manager that the cutblock(s) will be subject to the SFMP under Section 42 of the FSJPPR.

    For the purposes of Section 42 of the FSJPPR Appendix 6 Sections 1.1 Definition, Use of Seed and Use of Livestock, 1.2.2 Free from Vegetative Competition, and 1.3 Stocking Requirement for Conifer Crop Trees will be used to determine if forest practices are consistent with the landscape level strategies for coniferous areas
- Situations may arise in which despite due diligence in prescribing and carrying out the silviculture regimes the licensee has not met the target. Where further treatment options are limited the Regional Manager may waive a requirement for further treatment. When damage to the plantation (fire, disease, frost, etc.) requires replanting the reduction in effective age will lower the future yield. Timely and aggressive silviculture regimes can help to moderate this effect but it is largely out of the control of the licensee. The licensee is not required to direct extraordinary effort into area under management to try to correct this problem.
- Section 108 of FRPA will apply if an event causing damage to a plantation or site occurs that will result in significant extra expense to the Licensee in meeting the obligation to establish a free growing stand. The Licensee must not have caused or contributed to the damage unless by officially induced error and must have exercised due diligence in relation to the cause of the damage.

Equivalent Protection

This revised Field Performance Requirement and landscape level strategy provides equivalent or better protection than the current Field Performance Requirements for the following reasons:

1. The reforestation strategy requires that current silviculture regimes be employed aggressively over the entire Net Area to be Reforested (NAR) during the initial establishment phase.
2. The reforestation strategy allows trade offs at the stand level to account for biodiversity and other non timber values while still ensuring sustainability of the timber resource at the DFA level.
3. The reforestation strategy provides a landscape level measure of success that exceeds current practice since landscape level summaries are not currently in place.

Consistency with the Preamble to the Code

The revised field performance requirements support a landscape measure of reforestation success not currently in place. This will provide an additional assurance that the needs of future generations are not compromised. As well assessment over the landscape allows flexibility at the block level to address biodiversity requirements and other values as set out in the preamble.

Adequate Management and Conservation of Forest Resources

The revised Field Performance Requirements provide equivalence to current practice. The landscape level assessment of reforestation will provide an additional measure of the management and conservation of resources and support feedback to improve silviculture practice.

Deciduous Areas:

For the purposes of Section 35(5) of the FSJPPR the Landscape Level Reforestation Strategy does not affect Field Performance Requirements relating to reforestation of deciduous areas in Section 32 of the FSJPPR.

- 6.30 Establishment Delay
  - This indicator statement, target statement and acceptable variance will be used as a new performance requirement through the application of the landscape level strategy for deciduous areas logged after November 15, 2001. For the purposes of Section 42 of the FSJPPR this indicator statement, target statement and acceptable variance will be used to determine if forest practices are consistent with the landscape level strategies for deciduous areas.

For the purposes of 32(5)(a)(i) of the FSJPPR the applicable performance standard for stocking requirements of deciduous areas is specified by "Stocking Requirement for Deciduous Crop Trees" in Appendix 6 of this SFMP.

Mixedwood Areas:

For the purposes of Section 35(5) of the FSJPPR the Landscape Level Reforestation Strategy does not affect Field Performance Requirements relating to reforestation of mixedwood areas in Section 32 of the FSJPPR.

8.1.4. Coarse Woody Debris

Pursuant to Section 35(6) of the FSJPPR, this SFMP proposes to revise the Applicable Performance Standard relating to coarse woody debris in Section 29(2)(b) of the FSJPPR. For the purposes of Section 29(2) of the FSJPPR the applicable performance standard is specified by the indicator statement, target statement and acceptable variance in section 6.6 of this SFMP.

Rationale

Although the FSJPPR does not require rationale for Applicable Performance Standards, the following is provided for background information.

Currently the FSJPPR requirement is as follows:
For each calendar year, at least 50% of the estimated total amount of pre-harvest coarse woody debris remains among cutblocks in which harvesting was completed that year.

The proponents propose to provide defensible information on the actual retention rates of CWD at the DFA level by proposing the following revision to the requirement.

Using the systematic DFA grid being implemented as part of the monitoring effectiveness program (see section 3.2), the minimum average CWD retention level will be 46 cubic metres/hectare, as determined from plot information collected between December 1, 2003 and November 30th, 2008 from FSJPPR harvested blocks.

This is 50% of the estimated average pre-harvest CWD (92 m^3/ha) on blocks proposed for logging, which was determined from pre-harvest CWD volumes from NIVMA research plots in the Fort St. John TSA.

Equivalent Protection

This revised Field Performance Requirement provides equivalent or better protection that the current APS and Field Performance Requirements for the following reasons:

1. The revised average pre-harvest level of 92 cubic meters/ha is based on the best available information of pre-harvest CWD in the Fort St. John TSA.
2. There is a definitive process in place to systematically measure a sample of actual post harvest CWD retention levels, which will allow DFA comparisons of average post harvest CWD levels.

Consistency with the Preamble to the Code

The development of a CSA-Z809/SFMP incorporating the six criterion and indicators provides assurance that the participants are managing the forests based on sustainable use for all British Columbians.

Adequate Management and Conservation of Forest Resources

The basic premise of retaining at least 50% of CWD is unchanged, as the primary objective of the change is to provide specific measurable targets that can be efficiently measured during other monitoring activities.

Consequently the participants believe this change to field performance requirements contributes to adequately managing and conserving forest resources.

8.2. REVISED FOREST OPERATIONS SCHEDULE REQUIREMENTS

Section 79(a) Forest operations schedule information requirements not required if already included in a sustainable forest management plan.

It is proposed to amend the current content requirements of a forest operations schedule as identified in Section 81 by delineating the following road management activities in this section of the SFMP.

The FOS will continue to identify on maps the approximate location of all new proposed road construction, including the proposed location and construction of a bridge or major culvert.
It will also identify the location of all existing operational roads.
It is proposed to remove the requirements of Section 81(1)(e)(ii) and (iv) of the FOS by incorporating the following approach for all infrastructure replacements:

- *Stream culverts or bridges may require replacement from time to time, but delays will be kept to a minimum and where possible detours will be established to minimize traffic disruptions.*

The FOS will continue to identify the location all existing operational roads.

Rationale: This change is consistent with the current *Operational and Site Planning Regulation* for which proposed replacements of infrastructures need not be shown.

The FOS will continue to identify road deactivation operations that have been or are to be conducted by the participants. It is proposed to remove the requirements of Section 81(1)(g)(i) to (iv) and incorporate the following approach:

- *All roads that have been deactivated by a participant will be shown on the appropriate map.*

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